

VACCINES FOR LUMPY SKIN DISEASE: WHERE ARE WE AT?

This document was prepared by Animal Health Australia in consultation with the Industry Taskforce on Lumpy Skin Disease and the Australian Government.

Vaccination is the most effective tool for prevention and potential eradication of Lumpy Skin Disease (LSD). Currently there are NO vaccines approved for importation or use within Australia against LSD for use in cattle or buffalo.

If a largescale outbreak occurred tomorrow, could we access vaccines: There are live vaccines that are currently being used overseas to protect livestock against LSD and these are considered effective. These are known as live-attenuated vaccines and use a weakened version of the virus to obtain an immune response.

LIVE-ATTENUATED VACCINES

Advantages/opportunities

- ✓ Already developed and ready to go
- ✓ Considered effective due to its use and research testing in other countries.
- ✓ Can achieve a strong and long-lasting immune response.

Disadvantages/challenges

- ✗ Diagnostic tests cannot tell the difference between naturally infected and vaccinated animals, therefore Australia would lose its disease-free status, if used purely for prevention purposes.
- ✗ Vaccines may not meet Australia's strict standards of importation, particularly as we currently don't have the virus in Australia.
- ✗ While unlikely, has the potential to cause infection in unaffected, healthy animals.

Australia is investigating an emergency use permit to bring in these vaccines for use in cattle, if required, as part of an emergency animal disease response. The Australian Chief Veterinary Officer would be the proponent for the emergency use permit application.

What other options do we have: The Australian Government is also assessing the ability to import the live virus to potentially develop our own vaccines. This would be to a highly biosecure environment at the CSIRO's Australian Centre for Disease Preparedness in Geelong. Importation of the live virus into this secure facility would not cause Australia to lose its disease-free status.

What sort of vaccines could Australia develop: There are several types of vaccines that could be developed, however at the moment there are two likely candidates that scientists intend to focus on:

- Inactivated vaccines which use dead versions of the virus.
- mRNA vaccines which use a blueprint of a part of the virus (rather than the entire virus).

Both of these vaccine types create an immune response in the animal that reduces its chance of getting sick in the future. Each type has their own advantages and disadvantages

INACTIVATED VACCINE	
Advantages/opportunities	Disadvantages/challenges
<ul style="list-style-type: none"> ✓ Safer than using a live virus, and would not cause infection. 	<ul style="list-style-type: none"> ✗ Diagnostic tests cannot distinguish between naturally infected and vaccinated animals, therefore Australia would lose its disease-free status, if used purely for prevention purposes.
<ul style="list-style-type: none"> ✓ Usually has fewer side effects. 	
<ul style="list-style-type: none"> ✓ Ability to be stored and transported at fridge temperature. 	

mRNA VACCINE	
Advantages/opportunities	Disadvantages/challenges
<ul style="list-style-type: none"> ✓ Safer than using a live virus, and would not cause infection. 	<ul style="list-style-type: none"> ✗ Setting up this type of vaccine takes significant time (i.e. setting up a system for LSD mRNA replication).
<ul style="list-style-type: none"> ✓ Once set up vaccines can be made rapidly and respond quickly to new variants. 	
<ul style="list-style-type: none"> ✓ Allows diagnostic testing to distinguish between naturally infected and vaccinated animals 	<ul style="list-style-type: none"> ✗ Requires frozen storage making transportation more expensive and difficult to roll out.

Why is vaccine development being considered in Australia: The advantages of developing a vaccine in Australia is that we can ensure it meets Australia’s strict national safety and efficacy standards and is not contaminated with impurities. We would also be self-sufficient in supplying vaccines.

When will the vaccine be available: Developing the vaccine, depending on the type, may take a number of years. During this time multiple tests are run to make sure the vaccine is both safe and effective. Importantly, planning has already commenced and further updates will be provided in due course.

The process of developing a vaccine requires the following to be achieved:

- does not pose a health risk to consumers of animal products from vaccinated animals
- ability for the vaccine technology platform to be adapted rapidly and efficiently to other emergency animal diseases and animal species
- testing to demonstrate that it is safe and effective in the target species
- minimal or manageable WHS risks to people administering the vaccine
- vaccine dose-volume and administration method is user-friendly and suitable for large-scale populations
- vaccine able to safely used in a wide range of categories of the target species (pregnant, lactating, breeding, young animals etc)
- potential to develop DIVA (Differentiating Infected from Vaccinated Animals) test
- does not pose a risk to the environment

If these are checked off to the satisfaction of the Australian Pesticides and Veterinary Medicines Authority, it is likely an LSD vaccine would be rolled out as part of a largescale vaccination campaign.

