Lumpy skin disease: diagnosis and vaccination

Pip Beard
OIE Reference Laboratory Expert
Capripoxviruses

Sheeppox virus

Goatpox virus

Lumpy skin disease virus
Global distribution of LSDV
Diagnosis of lumpy skin disease

1. Clinical signs and history
2. Detection of viral DNA
3. Detection of anti-LSDV antibodies
Clinical signs and history
Detection of viral DNA

- Polymerase chain reaction (PCR)
  i. Pan-capripoxvirus
  ii. LSDV
  iii. Vaccine vs wildtype
Detection of viral DNA

• Polymerase chain reaction (PCR)
  i. Pan-capripoxvirus
  ii. LSDV
  iii. Vaccine vs wildtype

• Which sample should I take?
Which sample is best to take?

1. Skin nodule
   - 2mm biopsy punch
2. Blood sample
   - Intermittent and low level
3. Nasal and oral sample
   - Herd-level test
Detection of anti-LSDV antibodies

- Used for:
  - post vaccination monitoring
  - surveillance

- Types of LSD diagnostic test:
  1. ELISA
     - ID Screen® Capripox Double Antigen Multi-species
     - High throughput capacity
  2. IPMA
     - Uses LSDV-infected cell culture
  3. Virus neutralisation test
     - Takes 7 days
     - Technically demanding
References

Chapter 2.4.14 Lumpy skin disease in the latest edition of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals under the heading “B. Diagnostic Techniques”

Review


Pathology


Virus detection


Serology:

Vaccination

• Poxviruses are easy to vaccinate against
  • Live attenuated strains provide:
    • Strong and long lasting immunity
    • Within genus protection
  • Lumpy skin disease live attenuated vaccines (LAV):
    • Neethling strain
  • Sheeppox virus and goatpox virus LAVs:
    • Some protect against LSD in cattle
    • Some may not protect against LSD in cattle
Vaccination

- Poxviruses are easy to vaccinate against
  - Live attenuated strains provide:
    - Strong and long lasting immunity
    - Within genus protection
  - Lumpy skin disease live attenuated vaccines (LAV):
    - Neethling strain
  - Sheeppox virus and goatpox virus LAVs:
    - Some protect against LSD in cattle
    - Some may not protect against LSD in cattle
Vaccination

1. LAV
   • LSDV based
   • SPPV or GTPV based

2. Killed
   • Not usually recommended for poxviruses
   • Evidence for short term protection

3. Subunit
   • Under development
My advice

- **Efficacy** is the degree to which a vaccine prevents disease under ideal and controlled circumstances (comparing vaccinated with placebo).
- **Effectiveness** meanwhile refers to how well it performs in the real world (field trial).

- Choose your LSD vaccine according to the evidence
  - What is the **efficacy** of this vaccine?
  - What is the **effectiveness** of this vaccine?
  - Test the vaccine you buy
    - Is it freedom from contaminants?
    - It is the correct strain?
    - It is the correct titre?

- Monitor vaccine effectiveness
  - Post vaccination monitoring
References

Vaccine efficacy

Vaccine effectiveness

Killed vaccines

Within-genus cross-protection

Post vaccination monitoring

Mixed strains
- A novel strain of lumpy skin disease virus causes clinical disease in cattle in Hong Kong John Flannery, Barbara Shih, Ismar R. Haga, Martin Ashby, Amanda Corla, Simon King, Graham Freimannis, Noemi Polo, Anne Ching-Nga Tse, Christopher J. Brackman, Jason Chan, Patrick Pun, Andrew D. Ferguson, Andy Law, Samantha Lycett, Carrie Batten, Philippa M. Beard doi: https://doi.org/10.1101/2021.04.20.440323
How can Pirbright help?

- Advice
- Methodology
- Positive control reagents

- Pip.Beard@pirbright.ac.uk