Experience on control and prevention for Lumpy Skin Disease

Chinese Taipei

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World Organisation for Animal Health
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Disease situation of Lumpy Skin Disease

- **The disease situation of Lumpy Skin Disease (LSD)**

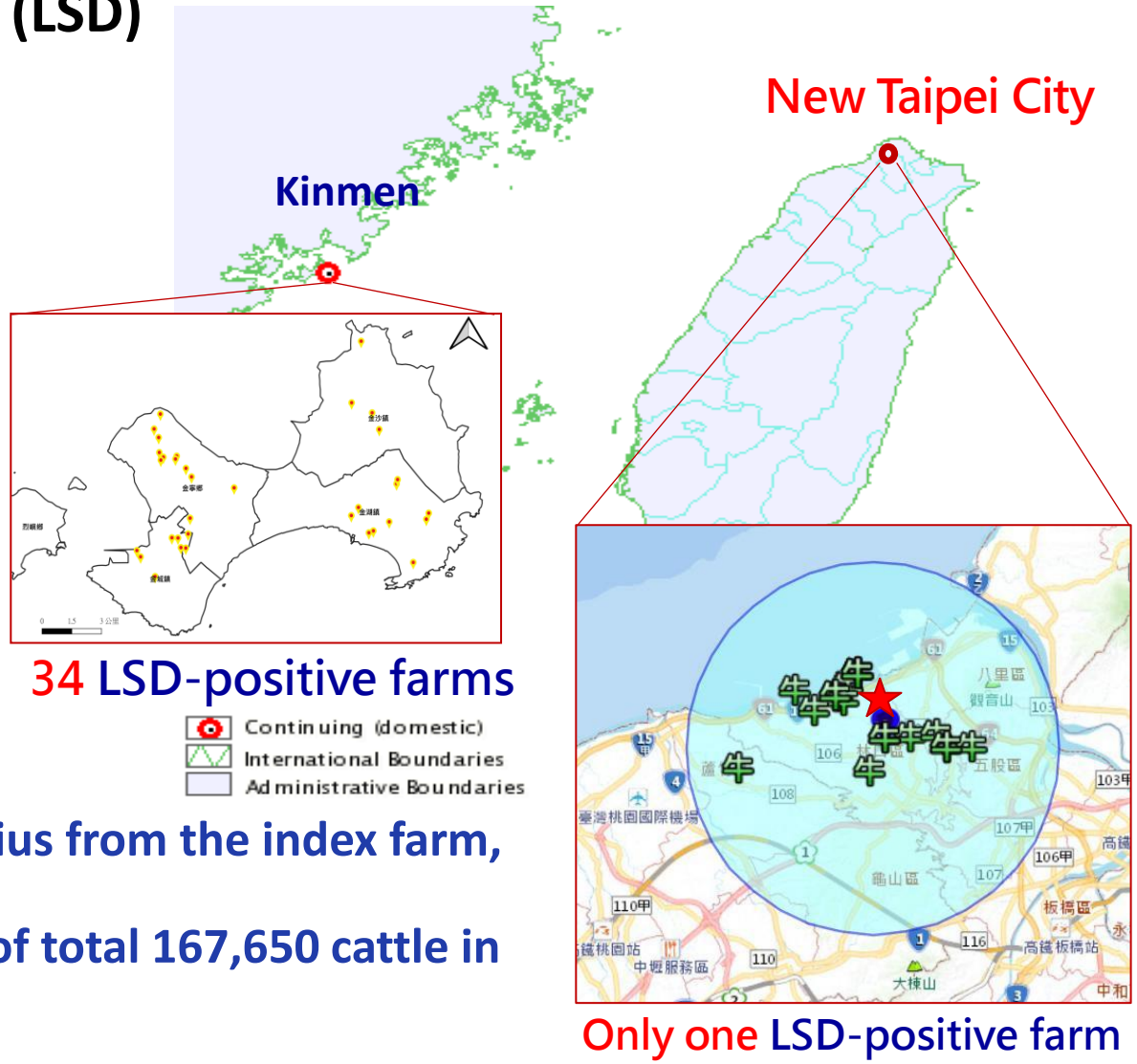
➢ **LSD is one of the notifiable listed-A diseases in Chinese Taipei.**

➢ **In Kinmen**

- ✓ **34 farms were confirmed and 269 confirmed and suspected cattle were culled, then remaining 6,342 cattle were vaccinated in 2020.**
- ✓ **At present only newborn 6-month-old calves must be vaccinated.**

➢ **In New Taipei City**

- ✓ **Only one LSD case on Taiwan main island was confirmed by PCR diagnosis on April 15, 2021.**
- ✓ **Index farm killed and disposed of 31 cattle.**
- ✓ **There are 12 cattle farms located within 10 km radius from the index farm, the cattle were all in good health at that time.**
- ✓ **Completed health inspection and LSD vaccination of total 167,650 cattle in 2021.**
- ✓ **No LSD outbreak since May, 2021.**



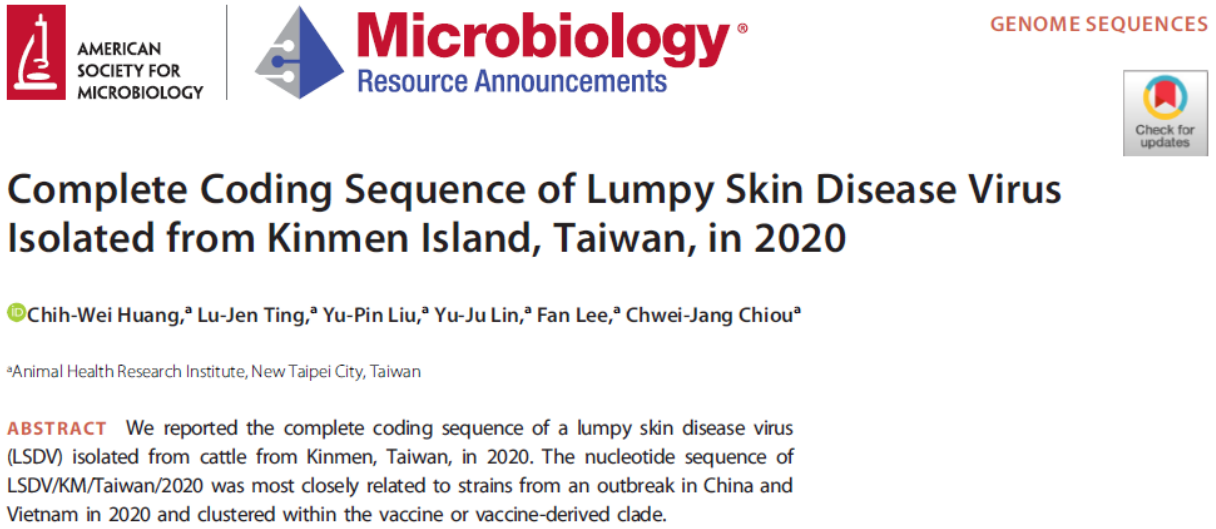
34 LSD-positive farms

Only one LSD-positive farm

Laboratory capacity

- **Antigen detection:**
  - ✓ A **real-time PCR** based on WOAH Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, CHAPTER 3.4.12, has been set up and applied (ORF 068, Balinsky *et al*., 2008).
  - ✓ A dual **DIVA real-time PCR to differentiate between virulent and vaccine strains of LSD** has been developed as an in-house method.
- **Virus isolation**: by primary sheep testicle (not for routine diagnosis).
- **Whole genome sequencing**:

  complete coding sequence of LSDV/KM/Taiwan/2020 isolate (GenBank accession number OL752713) obtained by NGS technique (Huang *et al*., 2022).



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GENOME SEQUENCES

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Complete Coding Sequence of Lumpy Skin Disease Virus Isolated from Kinmen Island, Taiwan, in 2020

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ABSTRACT We reported the complete coding sequence of a lumpy skin disease virus (LSDV) isolated from cattle from Kinmen, Taiwan, in 2020. The nucleotide sequence of LSDV/KM/Taiwan/2020 was most closely related to strains from an outbreak in China and Vietnam in 2020 and clustered within the vaccine or vaccine-derived clade.

Response to Lumpy Skin Disease

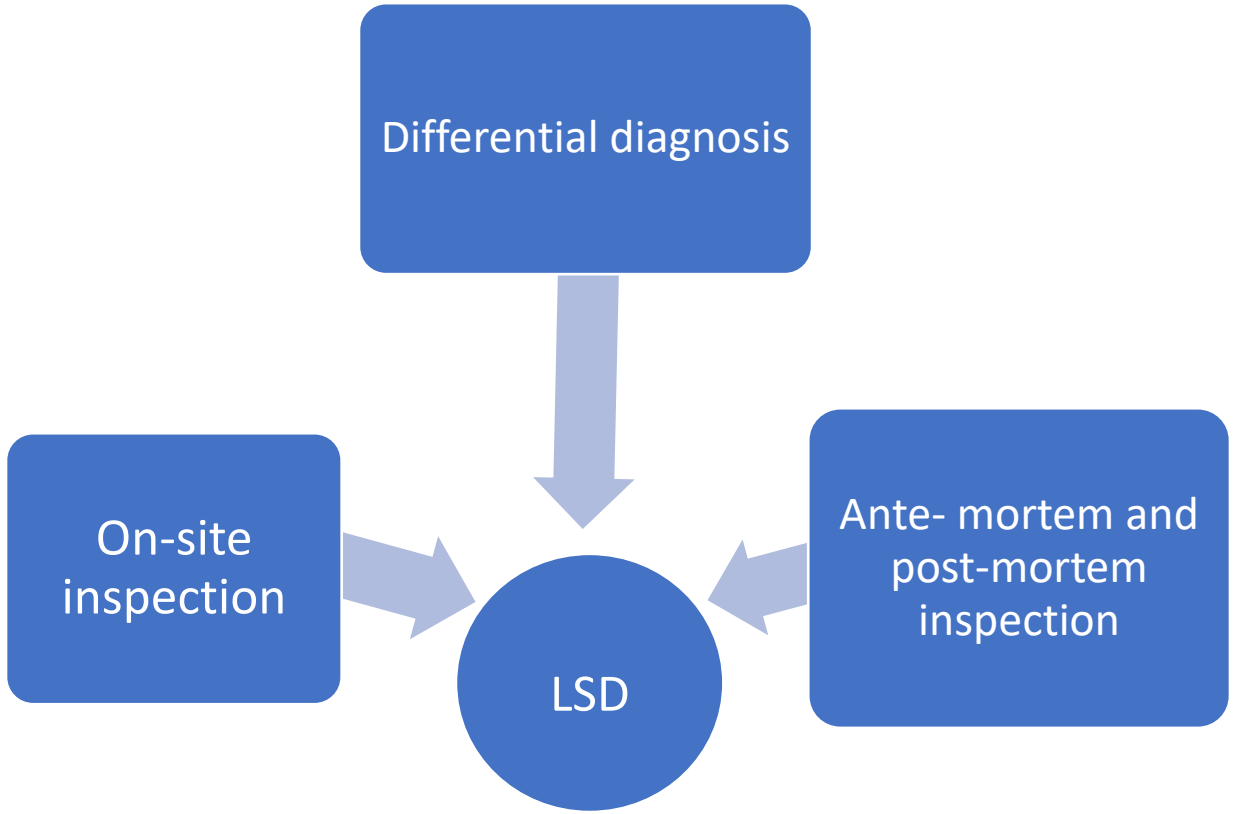
Surveillance

- Animal surveillance

➢ To monitor LSD, **on-site inspection** will be carried out by Local Animal Disease Inspection Authorities (LADIAs), and any suspected LSD cases will be sampled for diagnosis, accompanied by movement control of the origin farm.

➢ Meat inspectors perform **ante- and post-mortem inspections** on cattle, and their carcasses in the slaughterhouse for LSD monitoring.

➢ **Suspect cases**: use molecular method to rule out LSD in 24 hours.



- Animal surveillance-example

- A suspected LSD case found in slaughterhouse (05/2024), based on clinical signs.
- Cattle slaughtered at that day, and specimens sent to Veterinary Research Institute (VRI) immediately.
- Applied molecular method to rule out LSD within 24 hours.
- Final diagnosis: dermatophytosis (ringworm), and bovine leukemia virus and pseudocowpox virus laten infection.

Surveillance

- Vectors surveillance
  - Investigation period: 2020-now, annually and seasonal.
  - Investigation area: Taiwan main island, Kinmen island, and Penghu island.
  - Target hosts: cattle, goat, and horse farms.
  - Target vectors: mosquito, biting midge, stable fly, and fly.
  - Target virus: African horse sickness virus (AHSV), LSDV, Orthbunyavirus, Orbivirus, Ephemerovirus.
  - Methods for vector sampling: light traps and sweeping net.
  - Methods for virus detection: molecular methods.
  - Methods for data analysis: vector densities, GIS analysis, virus positive record.





Surveillance

- Preliminary results for vectors surveillance-LSDV
  - 2020: LSDV detected in a Kinmen cattle farm, in *Musca domestica*, by qPCR technique.
  - 2021: LSDV detected in New Taipei cattle farms, in *Stomoxys sitiens*, *Drosophila melanogaster*, and *Musca domestica,* by qPCR technique.
  - 2022 tilled July, 2024: no LSDV was detected in vectors.
    - ➢ High Ct value (low viral load) in positive vector insects, therefore vectors are considered mechanical transporters.
- Preliminary results for vectors surveillance-other virus
  - Akabane virus, Chuzan virus, bovine ephemeral fever virus were detected in the sampled vectors.
  - Peaked from March to June.
  - AHS remain negative in the sampled vectors from 2021 tilled now.

Control and preventive measures

- **LSD emergency vaccines from the EU**
  - ➢WOAH RRAP assisted on resourcing LSD emergency vaccines from the EU.
  - ➢LSD emergency vaccines (10,000 doses/400 vials, 25 doses/vial) donated by the EU arrived in Kinmen on July 22, 2020.

Control and preventive measures

- **LSD vaccination in Kinmen**

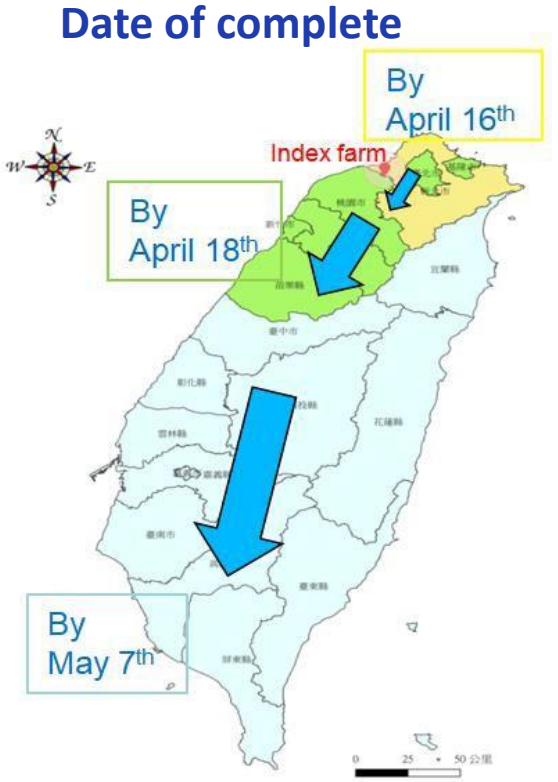
  - A LSD-vaccination team was composed of 50 members, including the staff from LADIAs, the teachers and students of veterinary colleges, and private veterinarians.
  - The vaccination was operated from July 23 to August 4, 2020 .
  - Kinmen County boosted LSD vaccine in 5,503 cattle in 2021.





Control and preventive measures

- **LSD vaccination for an emergency case of New Taipei City**



- Vaccine demand: 45,000 doses stockpile + 180,000 doses from vaccine bank.
- Vaccination priority:
  - ✓ The cattle farms located within a radius of 10 km from the index farm (completed on April 16, 2021).
  - ✓ New Taipei City → Northern counties → Central and Southern counties.
  - ✓ Dairy cows → meat cattle.
- Vaccination team: composed of teachers and students of veterinary colleges, and private veterinarians to assist LADIAs implementing LSD vaccination.
- Completed health inspection and LSD vaccination of total 167,650 cattle in Taiwan, Penghu and Matsu Islands in 2021.




Other measures

- Vector sampling: conducted in the cattle farms for LSDV early warning monitoring.
- Vector control: Strengthen guidance for livestock owners to hang bug zappers for 24-hour light trapping, and weeding the surrounding environment of the all cattle farms to reduce the chance of hiding the vector.
- Strengthening the quarantine measures for imported cattle at the border.
- Enhancing public awareness, prevention, inspection, surveillance, early warning and laboratory diagnosis for LSDV.

Contingency plans

- Scenario: when LSD cases were confirmed, depending on the severity of outbreak, Animal and Plant Health Inspection Agency (APHIA) will report to Executive Yuan, to establish an Emergency Operation Center, and to conduct emergency measures.
- Law: according to Article 14 in "Disaster Prevention and Protection Act" .
- For VRI: stocks pile 50,000 doses LSD vaccine, and contracts vaccine bank 130,000 doses for emergency use.
- For farmers: elevates the awareness for LSD, promotes spontaneous animal health inspection, and encourage actively reporting disease outbreaks.
- For LADIAs: conduct regular health inspection on cattle farms, and passive surveillance of infectious animal diseases.
- For slaughter house: conduct antemortem and postmortem inspection; if suspected cases were found, tracing back to the origin farms.
- Establishing differential diagnosis methods.

A new LSD case at the end of August 2024

Case history

- A new case in Kinmen island.
- One farm (open field grazing) and 7 cattle detected out of 244 cattle.
- Vaccination in last summer with unclear vaccination record.
- Cattel shown typical clinical signs: firm, hard nodules on head, tail, trunk, limbs, vulva region, and nasal mucosa. Nodules were 1.5~2 cm^2, sunken in the middle, some with ulcer, and can go beyond subcutaneous layer.
- LSD nucleic acid was detected in the 7 cattle and some vectors.

A new case in August 2024

●Control measures

- Slaughtered the 7 positive cattle.
- Immediate transferred 3000 doses vaccine and 800 blow tubes to Kinmen island.
  - Booster vaccination of the remaining cattle at the positive farm.
  - Booster vaccination of 28 farms (478 cattle) within 3 km^2 of the positive farm.
- Vaccination team formed, composed of official vets and those from the University.
- Enforce vector control and re-sample insect vectors.
- Enforce on site inspection of all farms in Kinmen county.
- Enforce slaughter inspection and disinfection of transportation vehicles in Kinmen and the main island.
- Suspend the exportation of fresh and frozen meat products and live cattle to the main island.
- Support staffs, vaccination teams, and travelers should complete disinfection of their sole before entering the main island from Kinmen, to reduce the risk of LSD transmission.

●No new LSD cases found so far and the epidemic is under control

Impact of the actions

Conclusions

- Comprehensive vaccination campaign and multi-sectors cooperation is crucial to the control of the LSD outbreak, which depends on early detection and rapid response.
- Strengthen the cleaning and disinfection (C&D) measure and vector control in all cattle farms and relevant ports.
- Continue to strengthen multi-sectoral collaboration and join the LSD international conference and learning the experiences.

Challenge and possible solutions

- How to related vector data to disease occurrence? For example, vector densities, temporal and spatial distribution?
- Possible solution: work together with entomologists and ecologists!

Thank you

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Expectations for the VBDs workshop (Not Included in the Presentation)

- Please share your expectations for the VBDs workshop
  - To know more experts in this fields.
  - To gain experiences from other members, especially the challenges they encountered.
- What specific information about VBDs you expect to obtain from experts

  Understand the relationship between density of virus – carrying vectors and disease occurrence.
- What disease experience you expect to gain from member countries/territories

  Bovine ephemeral virus surveillance.