Opportunistic Disease Surveillance in Culled Wild Fallow Deer (*Dama dama*)

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Exact nature of the risk not assessed

Aim

- To assess the **biosecurity risk** posed by a population of fallow deer near Mudgee, NSW, with respect to:

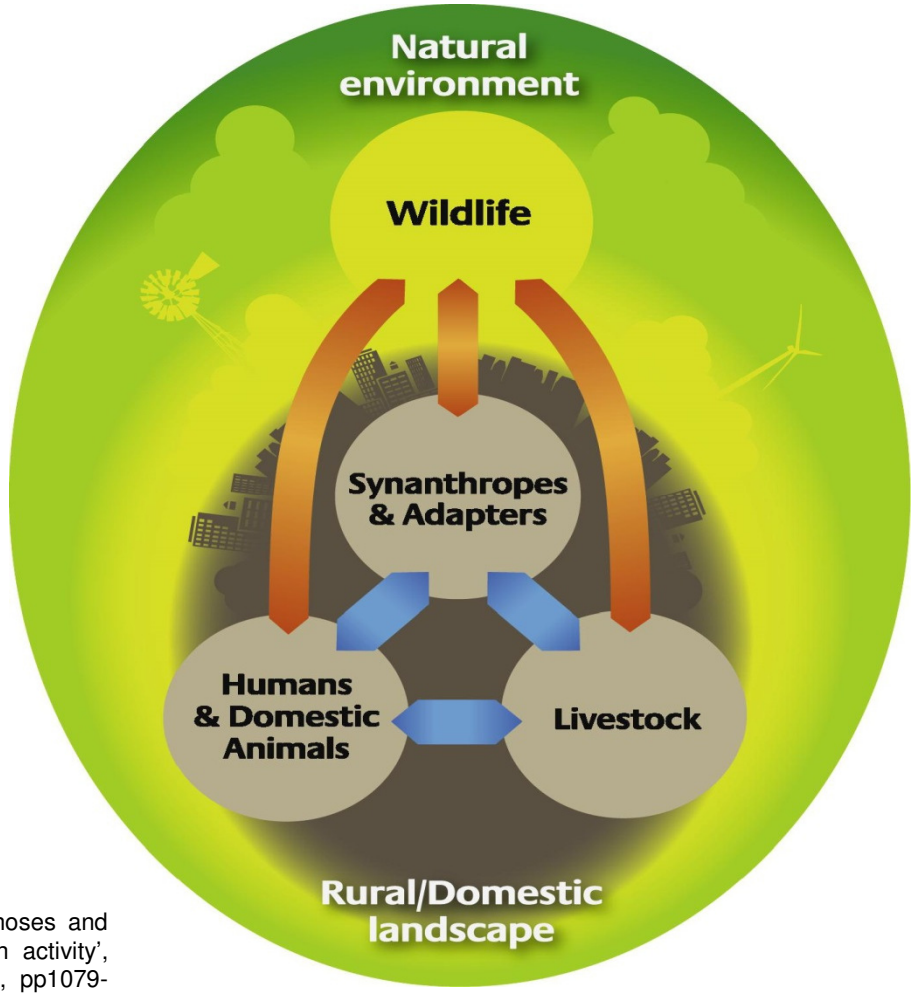
    1. **Livestock diseases**
    2. **Zoonotic diseases**

“One Health”

“A **collaborative, multisectoral,** and **trans-disciplinary approach** — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the **interconnection** between **people, animals, plants,** and **their shared environment.**”

(Centers for Disease Control and Prevention)

Source: Thompson (2013) 'Parasite zoonoses and wildlife: One health, spillover and human activity', International Journal for Parasitology, 43, pp1079-1088



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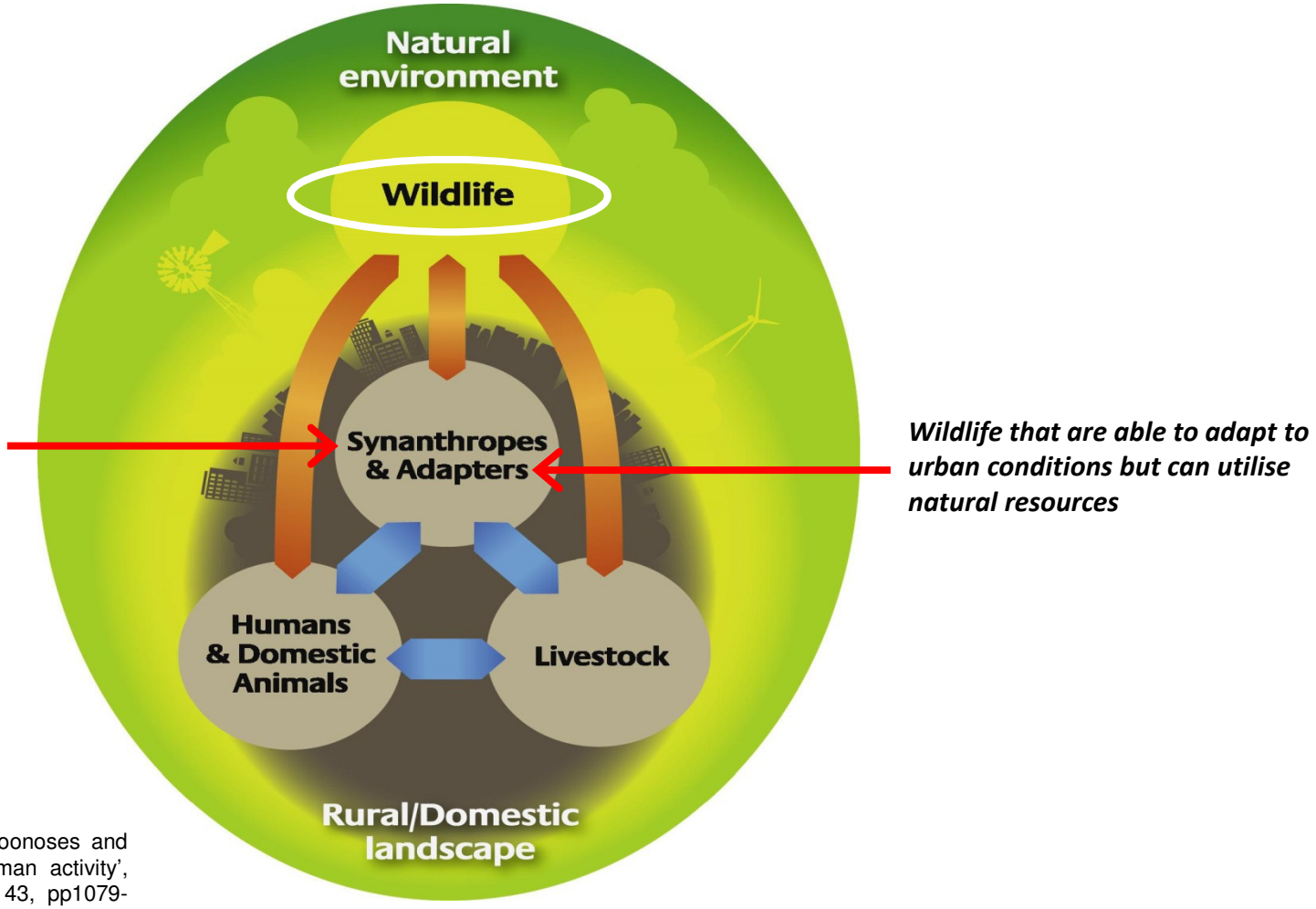

Wildlife that are ecologically associated with domestic environments

Wildlife that are able to adapt to urban conditions but can utilise natural resources

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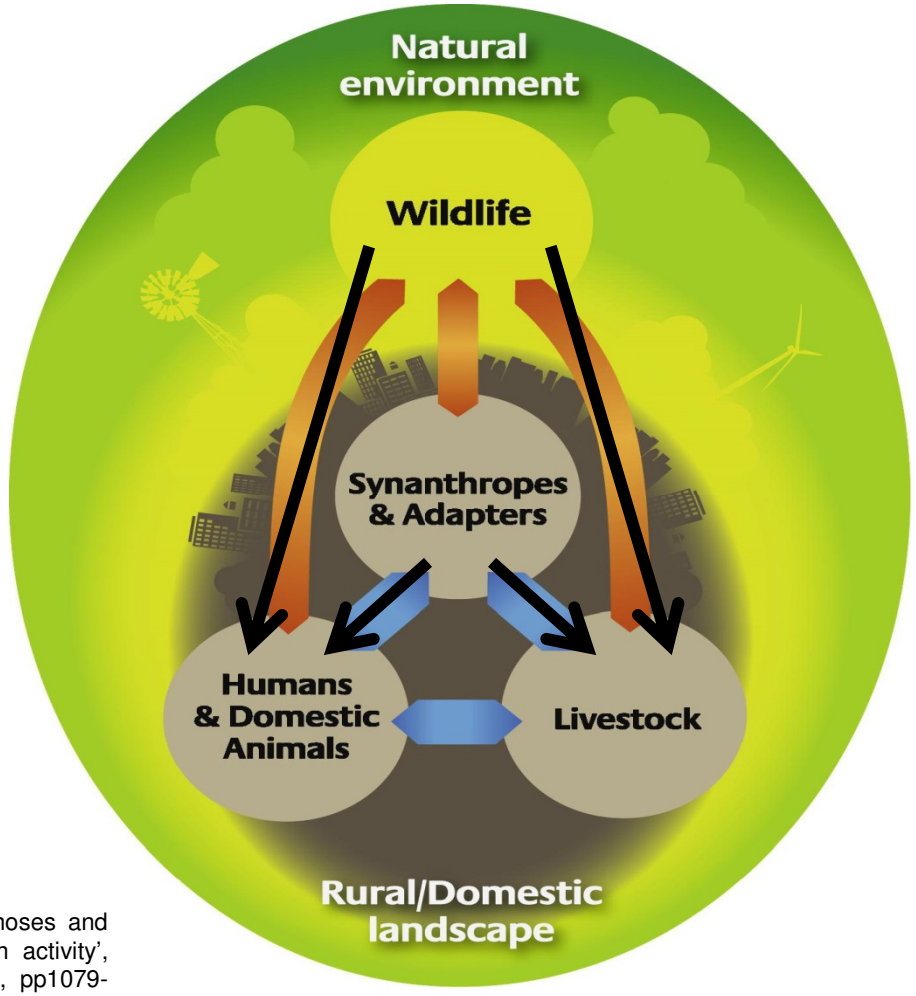

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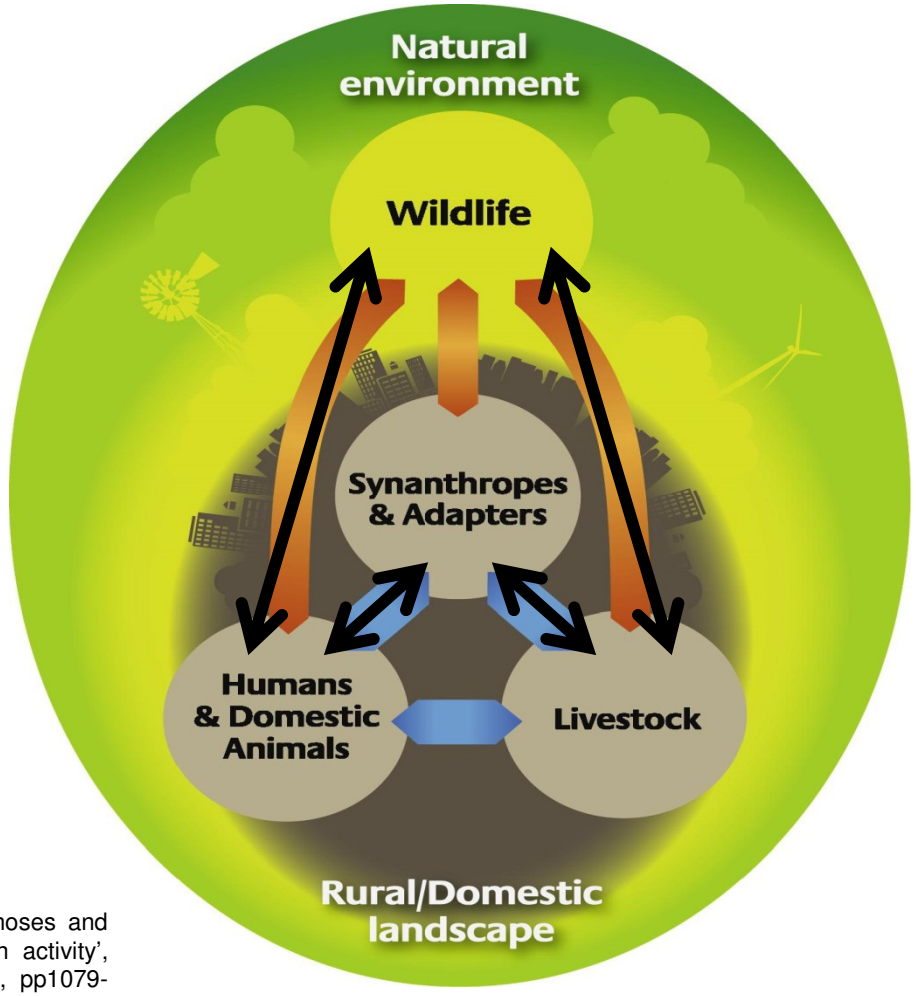

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Wildlife – Biosecurity Risk

- The majority of recently emerging infectious diseases affecting humans are of animal origin (70 – 75%, FAO).
  - E.g. Brucellosis in QLD and NSW.
- Increasing interaction between wildlife, livestock, and human populations increases the risk of disease transmission.
  - E.g. Hendra virus.

3 CPW Fact sheet

SUSTAINABLE WILDLIFE MANAGEMENT AND **ANIMAL HEALTH**

What is still to be learned?

- The role of wildlife in disease ecology for specific diseases and how these spread to livestock and humans and vice versa, including key disease reservoirs and transmission vectors.

Convention on Biological Diversity · CIFOR · CITES · CMS · Food and Agriculture Organization of the United Nations · CIC · IFB · International Trade Centre · IUCN · IUFRO · TRAFFIC · UNEP · OIE

Potential Disease Risks

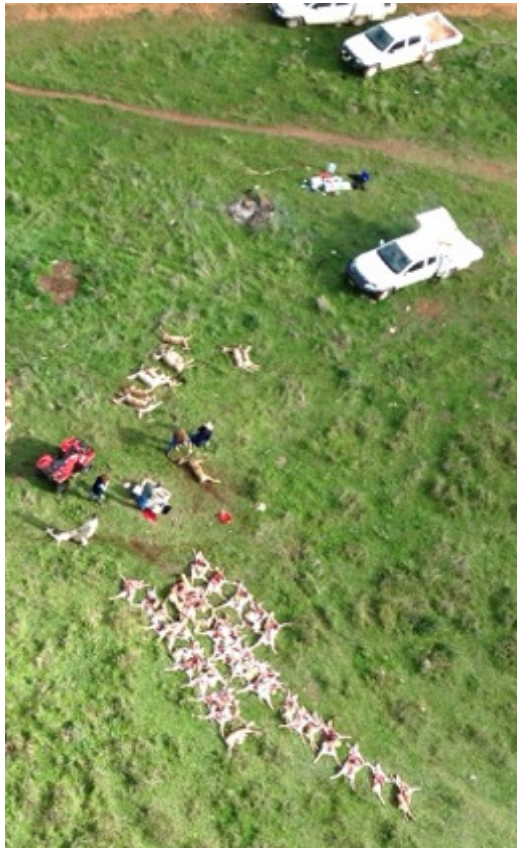
- A large number of livestock and human pathogens can infect and be transmitted by deer.
- For this study, the following were considered:
    1. **Johne's Disease** – *Mycobacterium avium* subspecies *paratuberculosis*
    2. **Pestivirus** – *Bovine Viral Diarrhoea Virus*
    3. **Leptospirosis** – *Leptospira interrogans* serovars *hardjo* and *pomona*
    4. **Q fever** – *Coxiella burnetii*
    5. **Cattle tick** – *Boophilus microplus*
    6. **Footrot** – *Dichelobacter nodosus*

Method

Method

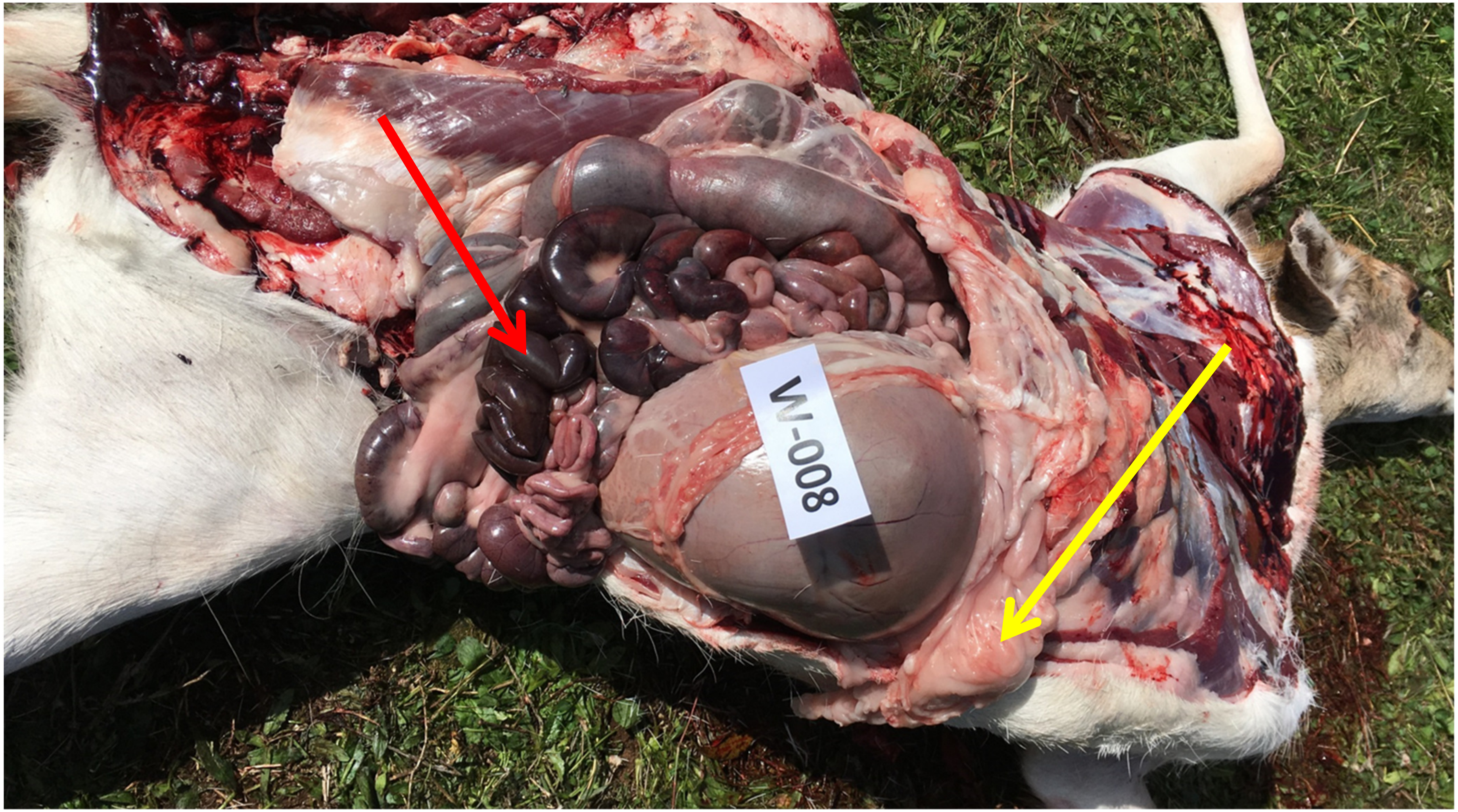
1. **General observations recorded** (age, sex, condition)
2. **Visual inspection, necropsy** (external and internal)
   - Cattle tick
   - Footrot
   - Obvious gross pathology
3. **Sample collection**
   - Pericardial fluid → *L.hardjo*, *L.pomona*, and Q fever serology
   - Faeces → HT-J PCR
   - Various tissue samples (if gross pathology present) → Histopathology
   - (Spleen → ?Q fever PCR)
   - (Ear notch/tail hairs → ?Pestivirus antigen)

Method



Results

- External examination
  - All animals in good body condition
  - No evidence of cattle tick or footrot
  - No obvious external gross pathology
- Basic necropsy
  - 1 animal with severely haemorrhage in a segment of small intestine (?torsion)
  - 1 animal with a single abdominal cyst – appearance consistent with a cestode cyst (*Taenia hydatigena* or *Cysticercus bovis*)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Results

Pathogen/ Test	Samples Tested	Samples Positive
***Mycobacterium avium* subspecies *paratuberculosis* (Johne's disease)** HT-J PCR	**73**	**0**
***Leptospira interrogans* serovar Pomona** MAT	**42**	**0**
***Leptospira interrogans* serovar Hardjo** MAT	**42**	**0**
Bovine Viral Diarrhoea Virus (BVDV) AGID	**42**	**5 (11.9%)**
***Coxiella burnetii* (Q fever)** CFT	**37**	**0**

Discussion

- In general, sampling logistics worked well.
  - Helicopter winching VS vehicle access (+ and –)
- Good body condition highlighted grazing pressure.
- Insufficient sample size for statistically significant results, but meaningful nonetheless.

Discussion

- Gross and laboratory findings suggest this deer population does not pose a biosecurity risk as a reservoir of: Johne's disease, Q fever, *L.pomona*, *L.hardjo*, cattle tick, or footrot.

Discussion

- 11.9% BVDV seroprevalence most likely represents exposure from cattle (P Kirkland, pers. comm.).
  - Disease transmission happens both directions – not just *from* wildlife.
  - Biosecurity risk to a naïve cattle herd?
  - *Indicates sufficiently close contact for transmission of other diseases.*

Conclusion

- Disease prevalence data from deer populations is a necessary component of assessing the nature and scale of the biosecurity risk they pose, but is currently lacking.
- The population in this study does not appear to pose a significant biosecurity threat (for the diseases tested).
- In this study, BVDV results suggest sufficiently close contact between cattle and deer for disease transmission – i.e. they are a potential reservoir for infectious disease “spillover” events.
- Further research:
  - Level of contact between livestock and deer.
  - Prevalence studies of other populations (where populations are distinct, results cannot be extrapolated).

Acknowledgements

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