Summary of the history of PPR in Asian wildlife, the epidemiology of the disease in wildlife and possible role of wildlife

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Pestes des petits ruminants virus

Paramyxoviridae – morbillivirus – Negative strand RNA

Naïve populations 90% morbidity
Up to 100% case fatality

Principle hosts? – sheep *Ovis aries* & goats *Capra hircus* & wild caprinae

Other hosts? – antelope, buffalo, suids
Global Reports PPR in Wildlife

Pathogenesis in reported wildlife cases in Asia

- Highly infectious, acute, febrile, systemic disease (viraemia) entering via respiratory tract localised in lymph nodes and then disseminating, with clinically obvious oculonasal serous to mucopurulent discharge, crusting, pneumonia and respiratory distress, ulcerative keratitis and conjunctivitis/opacity, gingival necrotic ulceration, watery diarrhoea, dehydration, death. Lameness reported.

Antibody produced in response to infection. Antibody titres rise day ~ 3-4 until ~ day 21. Antigen detectable (IC ELISA, LFD, PCR) for ~3-4 days but detection possible by PCR of RNA fragments in faeces/swabs for >100 days.

cELISA is not validated for wildlife species e.g. buffalo (Caron A personal communication) but as with rinderpest the field evidence suggests the test is detecting infection in wildlife but prevalence statistic based on domestic animal cut-off may be incorrect to some extent.
IUEPPR Infection Studies (Wildlife)

FLI Berlin Claudia Schulz
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- Goat to pig & wild boar
- Pig to pig and pig to goat
- Wild boar to goat
What can we learn from the wildlife disease in Asia?
Middle and Near East, South, Central Asia

- Captive ungulate outbreaks in populations 1987 lineage III & 2008-9 IV — significant morbidity and mortality. Hippotragines, caprines & gazelles able to transmit infection readily. Bushbuck, impala, duiker also reported susceptible (Furley et al 1987; Kinne et al 2010; Munir 2013).

- Bharals (*Pseudois nayaur*) in Tibet (Bao et al 2010)

- Wild goats (*Capra aegagrus*) reported infected in Kurdistan in 2010 (rt PCR & by cELISA). The genotype resembled wild strain present in the region for over 10 years (Hoffmann et al 2012).

- Goitered gazelle (*Gazella subgutturosa*) PPRv antibody detected by cELISA - H in 10/85 in Turkey 2010; (VN neutralisation titres were low and probably equivocal except in 2 results) (Gur & Albaryak 2010).

- Sindh ibex PPR in truly free-ranging wildlife confirmed in Kir Thar National Park, Pakistan in 2010 (Abubakar et al., 2011)

- Iran outbreaks 4 northern and central provinces of Iran (Marashi et al 2017 DOI: http://dx.doi.org/10.3201/eid2304.161218)

- Mongolia saiga, siberien ibex, goitered gazelle, 2017 (Pruvot et al 2020)

Central Asian antelopes

400,000 – 2,700,000

40,000 - 140,000

67,000 - 72,000

http://www.largeherbivore.org
Key Epidemiological Questions!

• How susceptible are different species in Asia and what determines susceptibility?
  • Large host range
  • Stress from land degradation, poor nutrition, disturbance and competition from livestock and people

• Are wildlife biologically competent maintenance hosts?
  • Evidence suggests that many species can host virus and perhaps some might maintain virus in large population sizes

• What is the mechanism and route of transmission between domestic and wild animals?
  • Studies in Africa suggest spill over from small ruminants where interface is present and shared resources but in good habitat wildlife are not clinically affected.
  • Asia wildlife outbreaks suggest intraherd and interherd aerosol transmission most likely, with pasture and resource sharing for interspecies transmission.
Importance of Wildlife Studies

• Wildlife is a sentinel in endemic areas & during vaccination eradication campaigns
• Virus can spread through wildlife populations in some circumstances whilst just represents spill over probable dead end hosts in others. We need to understand what determines both.
• Need more wildlife domestic animal virus isolates to understand viral population evolution.
• Successful eradication may depend on sorting out these known unknowns