Johne’s Disease: A Growing Concern

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Concern

- Impact to production, economics
  - Mortality ranges from 6.2-7.8 (up to 40%), Australia and Iceland flocks
  - 6.4-8.5% gross income margin, Australia

- Public and private lands for grazing contracts
  - Interspecies transmission risk
Johne’s Disease

- *Mycobacterium avium* spp paratuberculosis
  - Chronic, enteric wasting disease
  - Clinical signs develop within 6-12 months of infection
  - Death by 3-5 years of age
  - +/- edema and diarrhea
  - Negative impacts on fertility and milk production

- Strains
  - C type
  - S type (cattle and deer more resistant to this strain)
  - Bison type
Clinical Disease?

- **High bacterial counts** – >10 per macrophage, macrophage dominant infiltrate,
  - Granulomatous enteritis of the terminal ileum with cording of the sub serosal lymphatics
  - Shed hundreds of millions of bacteria per gram feces
  - Likely associated with a Th-2 humoral antibody response

- **Low bacterial counts** – 0-10 per macrophage, lymphocytic infiltrate, few macrophages
  - Cell-mediated immune response

- **Resistant** – no histological lesions, tissue culture negative after experimental infection
  - Th-2 humoral and CMI response
Transmission

- Fecal-oral (manure contaminated pasture, water, hay)
  - Most susceptible animals <1 year old
  - Minor route: contaminated colostrum or milk
  - (Pre-natal in cows – 9% subclinical vs 39% clinical; possibly greater in clinical sheep)
Environment

- Persistence
  - A year with shade (few weeks without shade)
  - Resistant to acidic soils and low temperatures
  - More susceptible to hot and dry climates
Diagnostics

Immunodiagnostics

• AGID
• ELISA (serum, milk)
• Others
  • Lymphocyte proliferation/transformation
  • Intradermal assay
  • IFN-γ, IL-10
Diagnostics

Microbial detection

- Culture – expensive, long turn around (~8 weeks)
- PCR – Se 30-60%, Sp 96.4%
- Pooled fecal samples for surveillance
- Tissue on necropsy
Epidemiology

- OJD is estimated to be present on 4.7% of sheep operations in the USA (APHIS, 2004), causing an estimated 4% increase in mortality in the affected flocks (Topp and Bailey, 2001).
Control

• Management
  • Test and cull have limited application due to cost of testing and value of individual animals
  • Culling ewes before high risk shedding occurs at lambing
  • Stocking rate in lambing paddocks

• Vaccine
  • Reduces clinical cases and bacteria shedding
    • With biosecurity and risk management
  • Injection site lesions (animals and human)
  • Cross react with tuberculin test
  • No DIVA for immunodiagnostic tests
Discussion…