Epidemiology of Brucellosis in Ruminants: the Basics and Dynamics of the Disease

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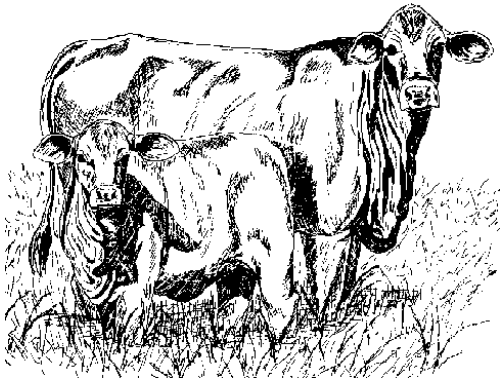
Presentation Outline

- Basic Epidemiology of Brucellosis
- Reservoirs and Routes of Transmission
- Outbreak Investigations
- Surveillance and Control Programs
- Summary

Basic Epidemiology of Brucellosis



- **Host-Agent-Environment**
  - **Host species: most mammals**
    - **Hoofstock: cattle, goats, sheep**
    - **Swine and other mammals**
  - **Agents: *Brucella* spp.**
    - **Host preferences, but <u>not</u> specific**
  - **Environmental conditions:**
    - **Allows direct contact with materials contaminated when *Brucella* are shed**

Reservoirs of Brucellosis

- Reservoir hosts:
  - Host allows pathogen to survive, grow, and multiply without compromising significantly reproduction and survival
  - Maintains infection within their species population
  - Capable of transmitting infection to other species

Reservoirs of Brucellosis

- **Primary Livestock Reservoirs of *Brucella***
  - ***B. abortus*:**
    - Cattle, Buffalo
  - ***B. melitensis***
    - Goats
    - Sheep
  - ***B. ovis***
    - Sheep
  - ***B. suis***
    - Swine
- **Wildlife Reservoir of *Brucella* in Africa**
  - ***B. abortus*:**
    - African Buffalo

Reservoirs of Brucellosis

- ***Brucella* in Africa Wildlife**
  - **Bovidae***
    - African buffalo*
    - Bushbuck
    - Eland
    - Impala
    - Kob
    - Lechwe
  - **Bovidae** (cont).
    - Waterbuck
    - Wildebeeste
  - **Others:**
    - Giraffe
    - Zebra
    - Hippopotamus

* - high potential for reservoir status

Routes of Transmission

- Primary Routes of Shedding for Brucellosis
  - Urogential system
    - Uterine discharges: HIGHLY INFECTIOUS
    - Milk
    - Semen
  - Shedding not constant, consistent

Routes of Transmission

- Routes of Transmission for Brucellosis
  - Ingestion of contaminated materials
  - Contact through
    - Mucous membranes
    - Open wounds
    - Conjunctiva
  - Vertical transmission – questionable

Maintenance of Brucellosis

- Shedding
  - Abortion – reproductive fluids
  - Milk
    - After abortion
    - Continue through life of the animal
- Transmission
  - Ingestion of milk
  - Ingestion of contaminated materials

Outbreak Investigations

- Steps for conducting outbreak investigations
  - Establish and verify existence of outbreak
    - Reported cases
    - Routine surveillance
  - Define and identify cases
    - Consistent case definition
    - Laboratory confirmation

Outbreak Investigations

- Steps for conducting outbreak investigations
  - Epidemiological Investigation
    - Data collection: demographics, clinical data, risk factors
    - Examination of cases and premises
    - Characterize outbreak
      - Populations affected
      - Geographic extent
      - Dates and Trends over Time

Outbreak Investigations

- Steps for conducting outbreak investigations
  - Formulate & evaluate hypotheses
    - Source of infection
      - Primary case
      - Imported cases
    - Modes of Transmission and Exposures
      - 'Abortion storms'
      - Venereal exposure

Outbreak Investigations

- Outbreak Control
  - Control measures
    - Control source of pathogen – Identify infected animals
    - Interrupt transmission – Quarantine, culling
    - Control host response to exposure – vaccination
  - Monitoring to evaluate effectiveness of control measures
    - Directed Surveillance
      - Passive and Active Surveillance

Summary

1. Brucella spp. have many domestic and wildlife reservoirs

2. Outbreak Investigation is an important tool for studying disease dynamics

Summary (cont.)

3. Establishing surveillance systems is a key to monitoring disease status and planning for control measures

4. In both outbreak investigation and surveillance, use of appropriate diagnostic tests is critical

THANK YOU!