

# Q FEVER

Montana's  
Experience

# Q FEVER

- **Causative agent: *Coxiella burnetii***
  - Shed in birthing fluids, excreta, milk
  - Exists in a spore-like form in environment
  - Resistant to heat, drying, and many common disinfectants
  - Ubiquitous
  - Two distinct antigenic phases
    - Phase I
    - Phase II
      - This is important in serological studies in humans
- **Cattle, sheep, goats are primary reservoirs**
- **Zoonotic**

# TRANSMISSION

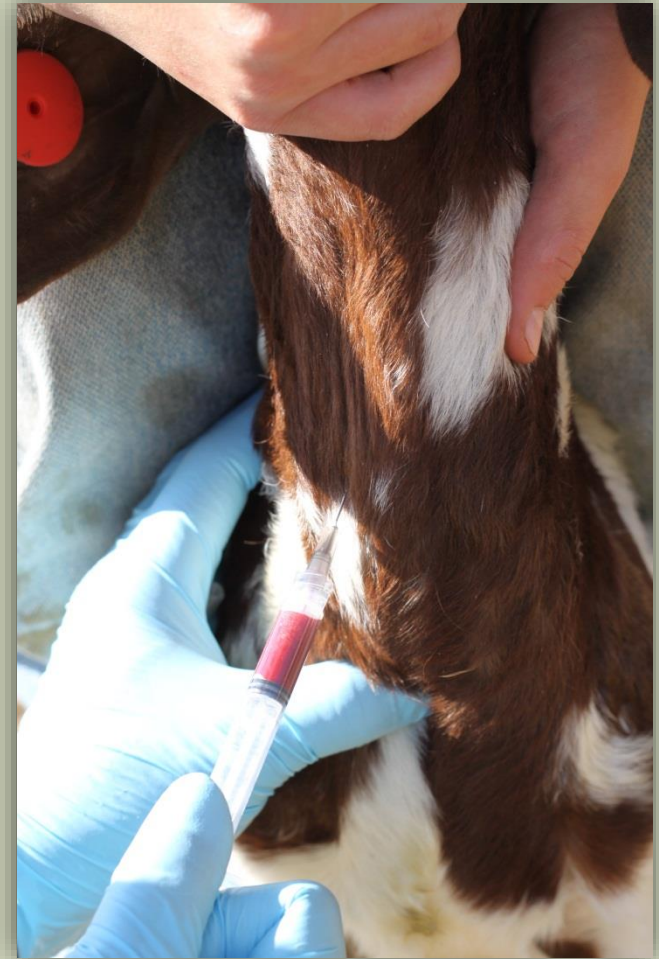
- To animals:
  - Direct contact
  - Inhalation
  - Ingestion
- To humans
  - Primarily through the inhalation of pathogen contaminated dust or aerosols.
  - Capable of traveling on wind currents for miles
  - Secondary routes of transmission include:
    - Tick bites
    - Consumption of raw milk
    - Sexual transmission
    - Exposure to wool, straw, or contaminated linens

# Q FEVER IN LIVESTOCK

- Sheep, cattle, and goats
  - May be asymptomatic
  - Reproductive failure
    - Abortions
    - Stillbirths
    - Retained Placenta
    - Infertility
    - Weak newborns
    - Low birth weights
  - Carrier state

# DIAGNOSIS

- Identification of organism
- PCR
- Serologic tests: IFA, ELISA, CF
- Isolation of organism
  - Hazardous - Biosafety level 3



# TREATMENT

- Tetracycline prior to parturition
  - To reduce shedding



# PREVENTION AND CONTROL

- **Good husbandry**
  - Tick prevention
  - Disposal of birth products
- **Separate new or sick animals**
- **Vaccination**
  - Human and animal
  - Not available in U.S.

# PREVENTION AND CONTROL

- **Pasteurization**
- **Disinfection**
  - 10% bleach
- **Eradication not practical**
  - Too many reservoirs
  - Constant exposure
  - Stability of agent in environment



# Q FEVER IN MT

- Diagnosis was first made in humans by a county health official.
- Through notification of state public health officials and ultimately CDC, it was determined the positive MT human cases were associated with exposure to livestock and were traceable back to a Q fever positive goat herd in Washington State.
- At this time, CDC and state public health asked for assistance from MDOL.

# Q FEVER IN MT

- MT Farm A and MT Farm B
  - Positive humans
  - Goat ownership
  - History of *illegal* importation of animals from positive Washington State herd
- MT Farm C
  - History of importation of animals from positive Washington State herd

# Q FEVER IN HUMANS

- Additionally, extended family, family acquaintances, and neighbors to the affected premises were identified as positive to exposure to the Q fever organism.
- A total of 9 humans were identified as positive Q fever cases with epidemiologic links to the positive Washington State herd.

# Q FEVER IN ANIMALS

- All animals on affected MT Farms were sampled
  - Adult female does/ewes: blood, vaginal swab, milk
  - All other goats/sheep: blood, rectal swab
  - Cattle and canines: blood
- Blood samples tested using ELISA
- All other samples tested using quantitative PCR

# Q FEVER IN ANIMALS

- **MT Farm B – 72 total animals/55 goats**
  - **Multiple abortions, weak kids, and ewe loss reported**
  - **33/55 goats ELISA positive**
  - **25/27 vaginal swabs PCR positive**
  - **All milk samples PCR positive**
  - **Genome equivalents per swab ranged from 544 – 2,018,400**

# ELISA VS. PCR

- What does a positive test result mean?
  - ELISA: History of exposure to the *C. burnettii* organism
  - PCR: Organism present in secretion. Does not distinguish viable vs. non-viable.
- What does a negative test result mean?
- Animals tested both ELISA + and PCR - and ELISA - and PCR + confounding our ability to make management recommendations.

# MT FARM B

- High rate of infection
- Ongoing shedding of high numbers of organisms
- High animal density on premises
- Environmental sampling revealed a high level of contamination
  - Birthing stall: 4,216,488 genomes/gram
  - Living room floor following carpet removal and bleach treatment: 2,076,198 genomes/gram
- Significant financial investment in quality of animals

# HERD MANAGEMENT PLAN

To quarantine or not to quarantine...

- Quarantines require that a condition for removal of quarantine be stipulated.
  - All animals ELISA negative?
  - All animals PCR negative? PCR testing is not routinely conducted by veterinary diagnostic labs. This service has been provided by a CDC laboratory.
  - Follow up-testing at three months post-kidding showed a decrease in number of organisms identified by PCR and many goats returning to ELISA negative status.



# HERD MANAGEMENT PLAN

## Q-Fever Herd Management Plan

*The purpose of this herd plan is to outline appropriate actions and management practices to protect public health by reducing exposure to Coxiella burnetii (the bacteria that causes Q fever), to educate potentially exposed persons regarding Q fever transmission, to limit the spread of Coxiella burnetii in Herd Owner's livestock, and to detect suspect animals as soon as possible. This herd plan is voluntary, is subject to review and revision, and is not intended to represent a legal contract. These management practices are necessary to protect public health and animal health and it is the responsibility of the Herd Owner to comply with these standards.*

Reference Number:

Ranch Name:

Owner Name:

Address:

City, State, Zip:

Mailing Address:

Phone:

Email:

PIN:

Manager:

Other Information:

Herd Owner Agrees To:

**BEST MANAGEMENT PRACTICES:**

- The highest risk for human illness is due to contact with contaminated birth products (e.g., placentas, fetuses, amniotic fluids). Birth products and soiled bedding materials should be immediately removed using gloves, placed in a sealed, double-bagged trash bag, and disposed of by incinerating or burying. If composted, keep in an area well away from people and animals for several weeks followed by turning the exposed surface inwards and allowing it to heat up for several more weeks. After stacking and composting for as long as possible, it may be spread on land used for livestock and crops.

- 1 -

Initials: \_\_\_\_\_ Owner \_\_\_\_\_ DOL \_\_\_\_\_

- Mutual agreement between MDOL and MT Farm B regarding the management of Q Fever at the affected premises. Includes:
  - Best Management Practices
  - Record Keeping
  - Animal Movement Recommendations
  - Surveillance/Testing Recommendations
  - Education

# PUBLIC HEALTH

- Environmental contamination
- Movement of PCR + animals
- Consumption of raw milk
- Sale of animal by-products
  - Goats milk soap



# ONGOING SURVEILLANCE

- CDC Funded Study of MT Farm B over two year period
  - Spring 2011
  - Fall 2011
  - Spring 2012
  - Fall 2012
  - Winter 2012
  - Spring 2013
- By following these animals over 3 kidding cycles, we hope to observe how serologic status and shedding patterns change over time.



# NASPHV Q FEVER COMMITTEE

- Comprised of industry, animal health officials, public health officials, and academia.
- Provide recommendations for a coordinated response to an outbreak.

# QUESTIONS

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