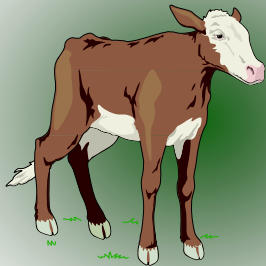
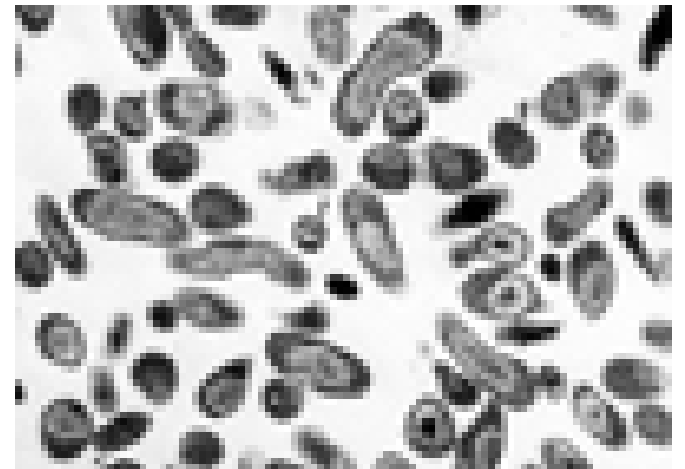


Tim Kram
Diagnostic Serology Team Lead

Q Fever



"Query" Fever





Etiologic Agent



Coxiella burnetii

- Obligate intracellular pathogen
- Forms environmentally resistant spores
- BSL-3 pathogen
- Member of gamma subdivision or Proteobacteria
 - Historically a member of the Rickettsiales
 - Probably misclassified
 - Not closely related
 - Close to *Rickettsiella gyrlii*, *Legionella* spp., and *Francisella* spp.
 - Undergoes phase variation (phase I and Phase II)



Etiologic Agent

✦ Phase I

- Cells in phase I, which correspond to the smooth antigenic variants (smooth LPS) of other Gram-negative bacteria, are highly infectious and are found in naturally infected human beings, animals and arthropods

✦ Phase II

- Phase II, which corresponds to the rough variants (rough LPS) of other Gram-negative bacteria, is less infectious and is obtained after serial passages in cell culture systems or embryonated eggs



Occurrence

- ✦ Worldwide (except New Zealand)
- ✦ Outbreaks in abattoirs, dairies, research laboratories, wool processing plants
- ✦ Occupational disease
 - Veterinarians, abattoir workers, etc.



Reservoirs

🐛 Domestic animals

- Cattle, sheep, goats, cats
- Most prevalent in sheep and goats however

🐛 Some wild animal species

🐛 Ticks



Transmission

✦ Aerosol — common

- Breathing contaminated dust

- Placental tissues, birth fluids, and excreta of infected domestic animals

- Laboratory exposure

✦ Ingestion of unpasteurized milk or milk products

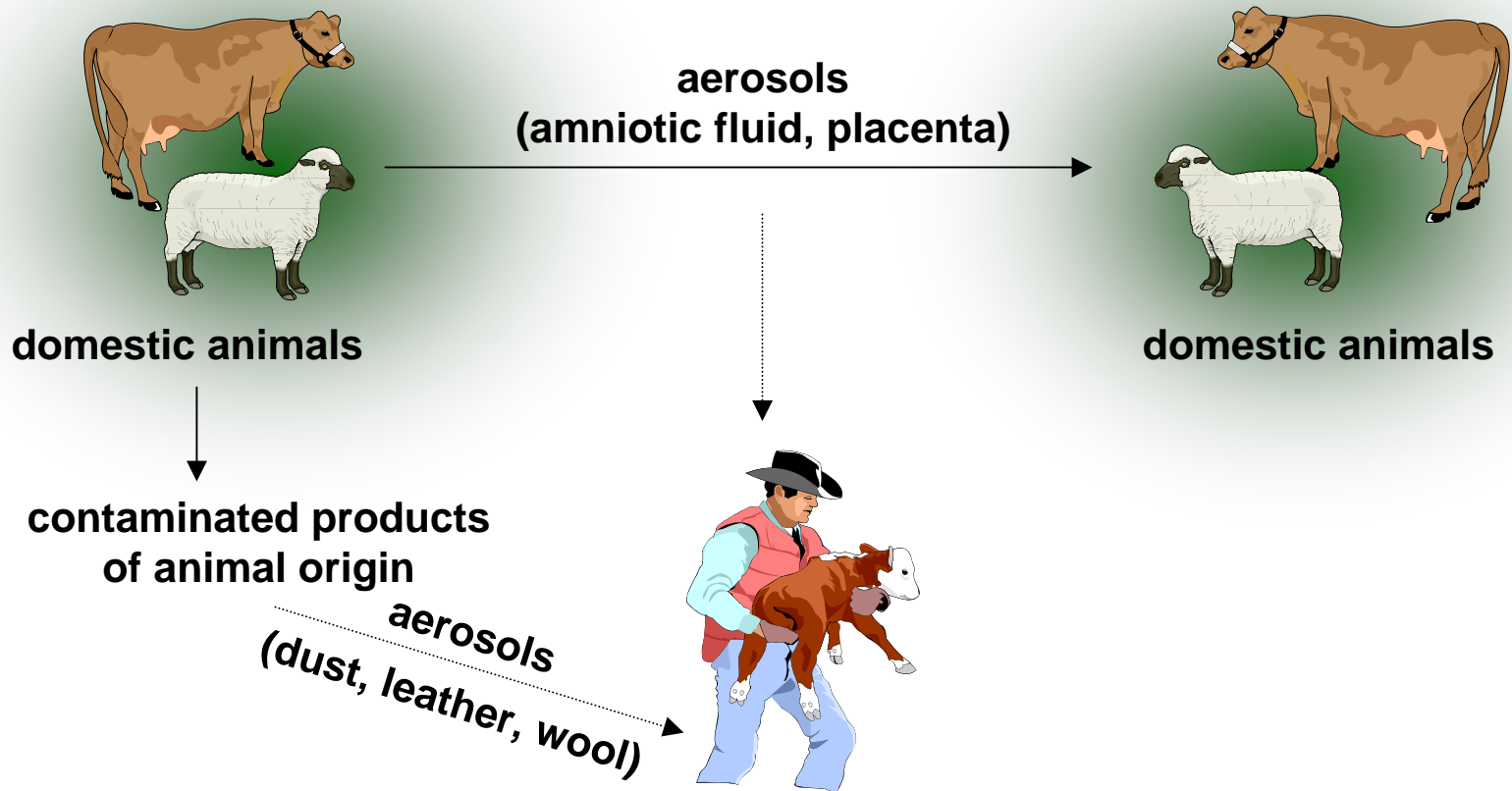
✦ Human to human transmission extremely rare



Transmission *(continued)*

- ✦ Direct contact — common
 - Infected animals and contaminated materials
 - Wool, straw, fertilizer, raw milk, blood, etc.
 - Contaminated environment
 - Organisms persist for 6 months or longer
 - Highly resistant to disinfection, high temperatures, low pH, and drying
- ✦ Tick bite (various species) — rare

Domestic Transmission Cycle





Disease in Humans

✦ Primary Q Fever

- Frequently asymptomatic or undetected
- <1% mortality in untreated cases

✦ Chronic Q fever

- Develops 1 – 20 years after initial illness or exposure
- Gradual onset of endocarditis, etc.
- Much more serious than primary Q fever
 - 10 – 60% mortality rate



Control

- ✂ Hygienic farm management
 - Clean barns
 - Proper disposal of potentially infective animal material
 - Vaccination of dairy cattle (Australia)
 - USAMRID experimental vaccine only
 - Not FDA approved in the United States
- ✂ Not practical to eradicate infection from herds
 - Low success rate
 - Cost prohibitive (~ \$10,000.00 per dose)



Control (continued)

- ✦ Milk pasteurization
- ✦ Vaccination of researchers and people at occupational risk



Serodiagnosis

- ✦ DSHS uses an IgG specific IFA technique against both phase I and II antigens
- ✦ Single Q fever titers $\geq 1:256$ is evidence of a prior infection but does not confirm that it was recent
- ✦ Fourfold or greater change in antibody titer to *C. burnetii* phase I or phase II antigens in paired serum specimens ideally taken 3-6 weeks apart



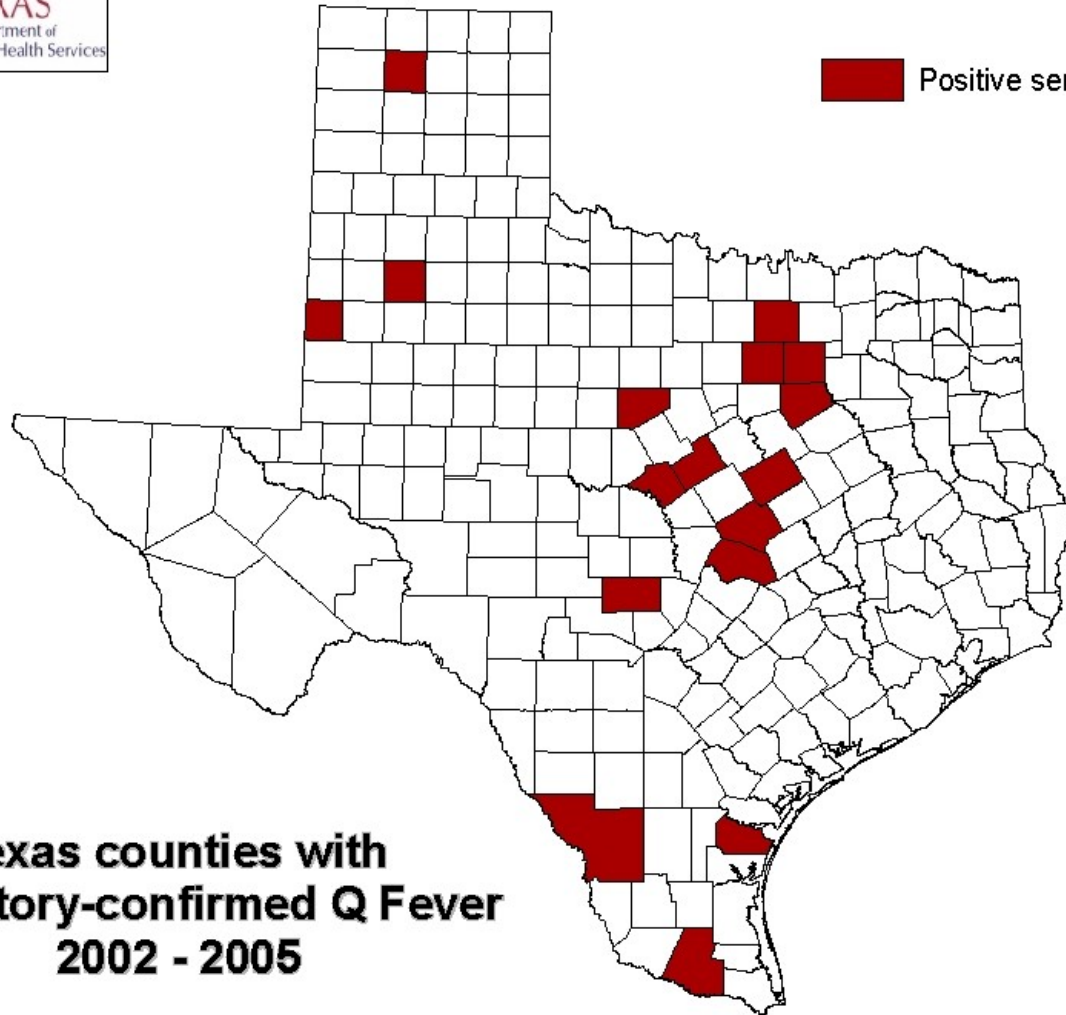
Serodiagnosis

- ✦ Reactions to both Phase I and II antigens often seen in test sera
- ✦ In acute Q fever the Phase II antibody is usually higher than the Phase I titer
- ✦ In chronic Q fever Phase I titers rise in later specimens while Phase II titers fall or remain constant

Positive Serology in Texas 2002-2005



Positive serology



**Texas counties with
laboratory-confirmed Q Fever
2002 - 2005**



Useful References

Maurin and Raoult, 1999: Maurin M, Raoult D. Q fever. *Clin Microbiol Rev.* 1999; 12(4): 518 - 553. [PubMed: 10515901].

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<http://www.cdc.gov/ncidod/dvrd/qfever/>