### Q Fever (Coxiella burnetii)

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<th>Animal Group(s) Affected</th>
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<td>Ruminants, cats, dogs, lagomorphs, birds, marsupials, marine mammals, human</td>
<td>Two patterns: 1) wild animals and ticks, 2) domestic ruminants independent of wildlife cycles. Shed in high numbers within amniotic fluid and placenta. Excreted in milk, urine, feces. It also may be spread through wind and dust.</td>
<td>Mammal infections may be subclinical or lead to fever, anorexia, late term abortions, infertility, retained placenta, metritis.</td>
<td>Highly infectious. Humans – acute form has moderate morbidity (50%), generally low mortality (1-2%). Mortality with endocarditis is up to 65%.</td>
<td>Tetracycline antibiotics if showing clinical signs</td>
<td>Appropriate disposal of placenta, aborted fetuses</td>
<td>Yes; most often an acute febrile illness, but chronic manifestation, such as endocarditis can occur.</td>
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**Fact Sheet compiled by:** Diana Boon  
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**Susceptible animal groups:** Peri-parturient ruminants (goats, sheep, cattle, pigs), cats, dogs, and wild animals (lagomorphs, and birds). Host range includes wild and domestic mammals, arthropods (ixodid and argasid ticks), and birds.

**Causative organism:** *Coxiella burnetii* (obligate intracellular Gram-negative bacteria)

**Zoonotic potential:** Yes, with acute and chronic presentations

**Distribution:** Global

**Incubation period:** Depends on number of infective organisms, but usually 2-3 weeks. Two patterns of transmission: via free-ranging animals and ticks, or between domestic animals with no wild animal involved. Tick bites are important for spread to animals, but rarely spread infections to humans. Human to human transmission is rare.

**Clinical signs:** Peri-parturient ruminants present subclinical disease, infertility, or anorexia, retained placenta, metritis, or late term abortion. Often sporadic abortions in herds can be seen that are followed by recovery without complications. In humans, acute Q fever is characterized by marked pyrexia, severe headache, myalgia, pneumonia, and similar flu-like signs while the chronic form is manifested as endocarditis, granulomatous hepatitis, optic neuritis, osteomyelitis and/or prolonged fever and chronic fatigue syndrome.

**Post mortem, gross, or histologic findings:** Necrotizing placentitis with large number of organisms in trophoblasts, but otherwise it is non-specific. Immunohistochemistry for *C. burnetii* can be performed on affected tissue(s) – mammary glands, supramammary lymph nodes, placenta, uterus, aborted fetus. The organism has a predilection for macrophages and monocytes.
**Q FEVER (Coxiella burnetii)**

**Diagnosis:** IFA antibody tests can be used to screen for exposure or to identify recent infection using paired sera. Antibodies to phase 1 antigens predominate in chronic infection, whereas those to phase 2 antigens predominate in acute infection. A complement fixation test is also available but is less sensitive. Antibodies to both phase 1 and phase 2 antigens can persist for several years after the initial infection. Other means of diagnosis include: direct isolation using cell culture (which requires highly specialized facilities, PCR, and immunohistochemical staining of placenta/aborted tissues for organisms. Smears of placental cotyledon, vaginal discharge, and lung, liver, or stomach contents of aborted fetus stained with Stamp, modified Ziehl-Neelson, Gimenex, Giemsa, or modified Koster stain in order to detect organisms, but diagnosis using this method should be supported with serologic test results and clinical findings.

**Material required for laboratory analysis:** Placenta, vaginal discharges, and liver, lung, or stomach contents of aborted fetuses, and from milk, colostrum, and feces. At risk personnel (contact with reproductive organs, infected carcasses, and fur or wool) should wear adequate protective equipment to protect against small droplet and aerosol exposure.

**Relevant diagnostic laboratories:** State diagnostic laboratories or NVSL (Ames, Iowa) but submit to CDC (Atlanta, GA) for confirmation as needed. Positive test results are automatically reported to CDC if human case(s) involved.

**Treatment:** Tetracyclines are generally used to treat animals if showing clinical signs. Other active antimicrobials include azithromycin, fluoroquinolones, or trimethoprim-sulfa drugs. In humans, prolonged combination antimicrobial drug therapy is required for treatment of chronic Q fever.

**Prevention and control:** Vaccination is not commercially available in US. In wildlife settings, precautions against tick bites should be taken. Ruminants – particularly those in guest contact roles or domestic animals – can be screened for antibodies to *C. burnetii*, especially if in a breeding program. Obtain history of recent abortions if acquiring new animals from sending facility. Segregation of pregnant and periparturient animals from any new acquisitions for several weeks post-partum and appropriate quarantine of newly acquired animals and appropriate disposal of birth tissues and aborted fetuses by incineration or burying are recommended. At risk personnel (contact with reproductive organs, infected carcasses, and fur or wool) should wear adequate protective equipment to protect against small droplet and aerosol exposure. Pasteurization of milk products inactivates the organism.

**Suggested disinfectant for housing facilities:** Susceptible to ethanol, glutaraldehyde, gaseous formaldehyde, 10% bleach solution but bacteria are extremely hardy and resistant to heat, drying, and many common disinfectants.

**Notification:** Notifiable within the US if associated with human infection. The organism also is considered a potential bioterrorism agent due to heat resistance, high infectivity, and ability to aerosolize.

**Measures required under the Animal Disease Surveillance Plan:** Currently reported as present and sporadic to OIE every 6 months.

**Measures required for introducing animals to infected animal:** Infected animal(s) should be kept separated until the birth process is complete or acutely affected clinical animals have completed antibiotic therapy. The key is to maintain a properly cleaned facility and dispose of placental tissue, aborted fetuses, and feces appropriately by incineration or burying.

**Conditions for restoring disease-free status after an outbreak:** The organism is enzootic in most areas where domestic ruminants (cattle, sheep, goat) are found, and because of environmental persistence, eradication is difficult. The highest seroprevalence appears to be in sheep (~42%). If eradication is desired, repeated testing should be performed, potentially over several years, as the antibodies can persist for an extended period of time after the initial infection. Approximately 20% of seronegative animals will
continue to shed, so testing for restoring disease free status becomes problematic.

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**References:**

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