

Frequently Asked Questions Regarding *Coxiella burnetii* in Small Ruminants and Q Fever in Humans

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Infosheet

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1. WHAT IS COXIELLA BURNETII?

Coxiella burnetii (*C. burnetii*) is a bacterium that is commonly found in domesticated and wild animals throughout the world. These highly infectious bacteria can be spread from animals and their environment to humans. (Rodolakis. 2006. Q fever, state of art: Epidemiology, diagnosis and prophylaxis. Small Ruminant Research)

C. burnetii is very hardy and resistant to heat and drying conditions. The bacteria can survive for long periods of time in the environment, and may be spread by wind and dust. A dilution of bleach (final concentration of 0.05% hypochlorite), 5% peroxide or a 1:100 solution of Lysol® may be effective disinfectants. The bacteria are destroyed in milk by high temperature pasteurization.

(Q fever. 2007. Center for Food Security & Public Health, http://www.cfsph.iastate.edu/Factsheets/pdfs/q_fever.pdf; Centers for Disease Control and Prevention, 2011, <http://www.cdc.gov/qfever/>)

C. burnetii infection in animals is not a federally reportable disease in Canada.

(Canadian Food Inspection Agency, 2011, <http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/eng/1303768471142/1303768544412>)

In Ontario, veterinary laboratories and veterinarians who use a lab outside of Ontario must notify the Ontario Ministry of Agriculture and Food (OMAF) following a diagnosis of *C. burnetii*. OMAF will work with the flock/herd veterinarian and producer to answer any questions they may have regarding *C. burnetii* and discuss biosecurity practices aimed at limiting the spread of disease. Since *C. burnetii* can be spread from animals to humans, OMAF will also work with public health officials to assess the risk to people exposed to *C. burnetii*, answer any questions they may have and encourage them to see their family physician if they have concerns regarding their health.

(Ontario Ministry of Agriculture and Food, 2013, <http://www.omafra.gov.on.ca/english/food/inspection/ahw/aha-regs-guidelines.htm>)

2. WHAT ANIMALS CAN BE INFECTED WITH *C. BURNETII*?

Cattle, sheep and goats appear to be commonly infected with *C. burnetii*. However, other animals such as cats, dogs, rabbits, horses, pigs, rodents, wildlife, birds and ticks are often infected and can spread the bacteria to other animals and humans. It is difficult to prevent animals from becoming infected and there are no formal control programs or vaccines licensed in Canada. (Centers for Disease Control and Prevention website, 2011, <http://www.cdc.gov/qfever/>; Ontario Ministry of Health and Long-Term Care, 2003, <http://www.health.gov.on.ca/english/providers/pub/disease/qfever.html>)

3. WHAT ARE THE SIGNS OF *C. BURNETII* INFECTION AND DISEASE IN ANIMALS?

Most animals do not show signs of disease; however, infected sheep and goats may abort in late gestation or deliver stillborn or weak offspring. Pregnant cats and dogs may also have an abnormal birthing event. Antibiotic treatment of individual animals is not effective at decreasing bacterial shedding and has not been proven to prevent further abortions.

(Rodolakis. 2006. Q fever, state of art: Epidemiology, diagnosis and prophylaxis. Small Ruminant Research)

4. IN WHAT ANIMAL SECRETIONS ARE THE BACTERIA SHED?

Infected animals shed high numbers of the bacteria in the placenta and birthing fluids at the time of an abortion or normal delivery. Higher numbers of organisms are shed if the birth was abnormal. *C. burnetii* organisms are also shed in the milk, feces, semen and urine, whether after an abnormal birthing event or from infected animals not showing signs of disease. When infected fluids dry out, the spore-like form of the bacteria can remain alive in the resulting dust for long periods of time.

(Rodolakis. 2006. Q fever, state of art: Epidemiology, diagnosis and prophylaxis. Small Ruminant Research; Rousset, et al. 2009. *Coxiella burnetii* shedding routes and

antibody response after outbreaks of Q fever-abortion in dairy goat herds. Applied Environmental Microbiology)

5. HOW LONG ARE THE BACTERIA SHED IN THOSE SOURCES?

Shedding is most prevalent just after birth and tends to decrease thereafter but there are differences between species. *C. burnetii* can be shed in vaginal discharge(s) for 14 days in goats and up to 71 days in sheep. In manure, the bacteria can be shed up to 20 days in goats, up to 8 days after lambing in sheep and 14 days in cattle. In milk, the bacteria can be shed for up to 2 months in goats and sheep but shedding is intermittent and shed persistently up to 13 months in cattle. These numbers describe the longest observed times of shedding the bacteria during the follow-up of naturally or experimentally infected herds/flocks.

(Arricau-Bouvery and Rodolakis. 2005. Is Q fever an emerging or re-emerging zoonosis? Veterinary Research)

6. HOW DO PEOPLE BECOME INFECTED WITH C. BURNETII BACTERIA?

People most commonly contract Q fever when they breathe in air contaminated with the *C. burnetii* organism from animals aborting or birthing—but also from dried contaminated materials that become air-borne when cleaning the barn or spreading manure. People also become infected through direct contact between infected materials (tissues, fluids, wool, straw, manure, etc) and skin abrasions or mucous membranes (e.g. infected material being splashed into the eye), by drinking unpasteurized milk or via tick bites; but most infections are contracted by breathing in air containing the bacteria. Very few organisms are required to cause infection in a human.

(Q fever. 2006. Center for Food Security & Public Health Factsheet, http://www.cfsph.iastate.edu/FastFacts/pdfs/qfever_F.pdf; Canadian Centre for Occupational Health and Safety, 2009, <http://www.ccohs.ca/oshanswers/diseases/qfever.html>; Australian Q fever Register, Meat and Livestock Australia, 1997, <http://www.qfever.org/aboutqfever.php>)

7. WHAT IS Q FEVER?

Q fever (the Q stands for Query) is the disease in humans caused by *C. burnetii*. The disease has a worldwide distribution, with the exception of Antarctica and possibly New Zealand.

(Q fever. 2006. Center for Food Security & Public Health Factsheet, http://www.cfsph.iastate.edu/FastFacts/pdfs/qfever_F.pdf)

8. WHAT ARE THE SIGNS OF Q FEVER IN HUMANS?

Most people (up to 60%) do not develop any signs of illness due to Q fever. In approximately 38% of cases, Q fever strikes as a sudden illness—“acute” Q fever—with flu-like symptoms. Signs may include: high fever, headache, fatigue, muscle pain, sore throat, chills, chest pain and occasionally pneumonia. Generally, people become ill 2-4 weeks after contacting the bacteria. The illness usually lasts 1 to 2 weeks and is self-limiting. Roughly half the people with “acute” Q fever become ill enough to seek medical attention. Chronic Q fever is an uncommon and serious condition that develops in 2% of infected individuals where the infection has persisted for more than six months. It tends to occur in individuals who are immunocompromised or have pre-existing damage to their heart valves. Research is mixed as to the effects of Q fever infection on pregnant women and their fetus. The antibiotic doxycycline is the first line of treatment for people with severe illness. People who recover fully from infection may have life-long immunity against re-infection. Please see your physician if you have health concerns.

(Public Health Agency of Canada website, 2011, <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/coxiella-burnetii-eng.php>; Canadian Centre for Occupational Health and Safety, 2009, <http://www.ccohs.ca/oshanswers/diseases/qfever.html>; Q fever. 2007. Center for Food Security & Public Health, http://www.cfsph.iastate.edu/Factsheets/pdfs/q_fever.pdf; Ontario Ministry of Health and Long-Term Care website, 2003, <http://www.health.gov.on.ca/english/providers/pub/disease/qfever.html>)

9. HOW PREVALENT IS C. BURNETII IN RUMINANTS AND Q FEVER IN HUMANS IN ONTARIO?

In 2009, bulk tank samples from approximately 28% of Ontario’s dairy cow producers and approximately 95% of the province’s goat milk producers were collected and tested for *C. burnetii*. The herd-level prevalence of *C. burnetii* in raw cow milk was 62% and 24% in raw goat milk. A 2013 study of 148 farms in Ontario found that the proportion of sheep flocks and goat herds with one or more animal testing positive for antibodies to *C. burnetii* was 42% (21/50) (meat sheep); 64% (14/22) (dairy sheep); 44% (15/34) (meat goat); and 79% (33/42) (dairy goat). The proportion of farm workers who had serological evidence of past infection with *C. burnetii* was 67% (116/172).

(Meadows, et al. 2013. Seroprevalence of Q fever (*Coxiella burnetii*) and associated risk factors in Ontario

sheep flocks, goat herds and their farm workers. Proceedings of the Small Ruminant Research Day, January 31st, 2013, University of Guelph, Ontario; Ontario Ministry of Agriculture, Food & Rural Affairs: Dairy Goat Digest, 2009, <http://www.omafra.gov.on.ca/english/livestock/goat/news/dgg0908a2.htm>)

Q fever is a reportable disease in people in Ontario. Between 2000 and 2010, the number of reported human cases varied between 1 and 12 cases per year, with the average being 6 cases per year.

(Ontario Ministry of Health and Long-Term Care, 2011)

10. WHAT IS THE RISK OF CONTRACTING Q FEVER?

Q fever is an occupational concern for workers who have contact with animals, animal products or animal waste. People at risk include farmers, farm workers, veterinarians, abattoir workers, shearers, dairy service providers, building contractors and laboratory personnel. Most human infections are associated with exposure to cattle, sheep and goats, particularly when exposures include animals which have recently given birth – exposure to abnormal animal birth events (abortions, stillbirths, delivery of weak offspring) increases the risk of human infection. Less commonly, human infections may be associated with cats, dogs and other animals. While healthy individuals can contract acute Q fever, those at highest risk of developing chronic Q fever are those with heart valve problems or suppressed immune systems. It is possible to be exposed to the bacteria via inhalation at the time of milking, if an infected animal has recently given birth (first 14 days but possibly up to 28 days).

(Canadian Centre for Occupational Health and Safety, 2009, <http://www.ccohs.ca/oshanswers/diseases/qfever.html>); Q fever. 2007. Center for Food Security & Public Health, http://www.cfsph.iastate.edu/Factsheets/pdfs/q_fever.pdf)

11. IS THE RISK OF CONTRACTING Q FEVER GREATER FROM SMALL RUMINANTS THAN CATTLE?

The exact source of Q fever infection in humans is often unknown; however, sheep and goats are more frequently involved in human disease than other animal species, likely because of the higher level of shedding of the bacteria in birth fluids.

(Rodolakis. 2006. Q fever, state of art: Epidemiology, diagnosis and prophylaxis. Small Ruminant Research)

12. CAN Q FEVER BE TRANSMITTED FROM PERSON TO PERSON?

Person to person transmission occurs rarely, if ever.

(Canadian Centre for Occupational Health and Safety, 2009, <http://www.ccohs.ca/oshanswers/diseases/qfever.html>)

13. IS THERE A VACCINE THAT CAN PROTECT ANIMALS FROM C. BURNETII INFECTION?

The Coxevac® vaccine (CEVA Sante Animale) is provisionally licensed for use in cattle and goats in Europe. In a recent study it was shown to decrease the number of abortions due to *C. burnetii* and to decrease the amount of bacterial shedding into the environment. Unexposed replacement breeding stock must be vaccinated annually prior to breeding.

(Hogerwerf et al. 2011. Reduction of *Coxiella burnetii* prevalence by vaccination of goats and sheep, the Netherlands. Emerging Infectious Diseases)

Although the vaccine is not licensed in Canada, veterinarians do have access to it through an application to the Canadian Centre for Veterinary Biologics (CFIA). The flock/herd veterinarian is required to write a letter indicating owner name, location of the farm where the vaccine is to be used, the animal species to be vaccinated and the reason for deciding to use the Coxevac® vaccine (ie. incidence of disease, test results, preventive measures taken to date). In Canada, there is a 60 day meat withdrawal time following the use of the vaccine.

14. WHAT ABOUT HUMAN VACCINATION?

A vaccine to protect against Q fever is available in Australia (Q-VAX®, CSL). People must be tested to make sure they are not already immune to Q fever before they are vaccinated with Q-VAX, otherwise they can have a severe reaction to the vaccine. Testing involves a blood test and a skin test. If both tests are negative, and the person is not allergic to eggs, they can then be vaccinated with Q-VAX. However, the vaccine is not readily available in Canada.

(Canadian Centre for Occupational Health and Safety, 2009, <http://www.ccohs.ca/oshanswers/diseases/qfever.html>)

15. AS A HERD OWNER, IF C. BURNETII IS SUSPECTED OR CONFIRMED IN THE HERD/FLOCK, WHAT COMMUNICATIONS SHOULD BE TAKEN WITH REGARDS TO EMPLOYEES AND/OR SERVICE PROVIDERS VISITING THE FARM?

Owners have a duty of care to educate their employees about Q fever and inform service providers of the risk of disease when *C. burnetii* is known or suspected in the herd/flock, particularly when abortions are occurring.

16. WHAT PERSONAL PRECAUTIONS CAN A PERSON WORKING WITH RUMINANTS, PARTICULARLY SMALL RUMINANTS, TAKE?

There are a number of protective measures that can and should be taken by people working with small ruminants.

- √ During kidding and lambing, disposable gloves and sleeves should always be used when handling kids/lambs and birth products. It is preferable that birthing should occur indoors out of the wind and in a location that can be thoroughly cleaned and disinfected.
- √ Wash hands thoroughly and several times a day with an effective disinfectant soap after any contact with animals and before entering the house, handling food or smoking.
- √ Wash animal manure, urine, milk and other body fluids from equipment and disinfect where practical.
- √ All protective barn clothing (including hats) should be kept in the barn, and not worn back in the house or elsewhere. Clothing should be washed and dried using laundry procedures at high water temperatures.
- √ Visitors should wear farm coveralls or freshly laundered coveralls, farm boots or disinfected footwear. They should not visit ewes or does giving birth.
- √ Consume only pasteurized milk and milk products.
- √ Pregnant women and those most at risk of Q fever should not assist in lambing or kidding and should avoid contact with sheep and goats during the lambing/kidding season. Other high risk people include infants and young children, the elderly and those whose immune systems are weakened from poor health.
- √ Wildlife or pets should not be able to scavenge birth products. Bury and compost or dispose in a closed container.
- √ Regularly clean and disinfect lambing and kidding areas to prevent accumulation of potentially contaminated materials.

- √ Maintain a closed herd or flock. This means do not purchase, loan or borrow animals. Attending livestock shows and sales may also present a risk to the health of your flock/herd.
- √ Contact your veterinarian and investigate abortion and stillbirth events.
- √ Increase awareness of *C. burnetii* and Q fever across the agricultural industry through education.

IF Q FEVER IS KNOWN OR SUSPECTED IN A HERD OR FLOCK:

- √ Contact your flock/herd veterinarian for more advice on control measures to protect your family's health.
- √ A N95 or higher mask, gloves and protective clothing should be used when assisting with births and abortions. N95 masks must be fitted properly—contact your local public health unit or a workplace health and safety service at Health and Safety Ontario.
- √ Bury and properly compost (according to local regulations) placentas and aborted fetuses. Do not burn as it may increase the risk of aerosol spread.
- √ Isolate aborted animals until discharges cease; restrict access to these isolation areas.
- √ Access to the barn containing infected animals should be restricted, particularly to children and infants, pregnant women, the elderly or those with compromised immune systems.
- √ Manure should be thoroughly composted for at least 90 days before spreading on infected farms. When spreading, the conditions should not be windy. Do not spread manure on pastures.

(Q Fever—The Basics. 2010. Ontario Veterinary College; Canadian Centre for Occupational Health and Safety, 2009 <http://www.ccohs.ca/oshanswers/diseases/qfever.html>; Q fever: information for farmers. 2010. Health Protection Agency, UK, http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1210834106356)

17. IF YOU ARE CONCERNED ABOUT YOUR HEALTH, WHAT SHOULD YOU DO?

If you are at all concerned about your health, please contact your physician or local public health unit and discuss the likelihood of Q fever infection. We recommend providing them with this document.