

# Exotic disease focus: Q fever

Q fever is caused by infection with *Coxiella burnetii* bacteria, and is an important zoonotic disease. While it may cause severe and sometimes fatal disease in humans, clinical signs of *C. burnetii* infection in animals are mild and often inapparent.

## Status in New Zealand

*Coxiella burnetii* is not present in New Zealand animals. It is a notifiable organism under the Biosecurity Act 1993 and infection of humans is notifiable under the Health Act 1956 as a rickettsial disease. Studies have been undertaken in New Zealand cattle<sup>(1)</sup>, sheep<sup>(2)</sup>, farm dogs<sup>(1)</sup> and deer<sup>(3)</sup>, and no evidence of *C. burnetii* has been found<sup>(4)</sup>. Animals with a clinical presentation consistent with *C. burnetii* infection are investigated by MAFBNZ's incursion investigators, and to date no investigations have detected evidence of this organism<sup>(5)</sup>. Human cases are occasionally reported in New Zealand. Investigations have indicated that all such cases are likely to be due to overseas exposure<sup>(6,7)</sup>.

## Status overseas

*C. burnetii* infection is common in animals overseas and it is thought to be present in almost every country. The organism could be introduced to New Zealand in live animals, in some untreated animal products, or on equipment used with animals. Importation of live animals, animal genetic material and equipment used with animals is restricted to reduce the risk. Measures applied include quarantine and testing of live animals (except dogs and cats) and animal genetic material, and inspection and treatment of equipment that might potentially be contaminated. *C. burnetii* could also be introduced to New Zealand in humans exposed overseas.

## Species affected and methods of transmission

The species important for transmission to humans overseas are cattle, sheep and goats, although alpacas, dogs and cats are among the other domestic species that may be infected. Dogs are expected to be an excellent sentinel animal if sheep and cattle are infected<sup>(1)</sup>. Rabbits, horses, pigs, camels, buffaloes, rodents, pigeons, geese and other birds may also carry *C. burnetii*. Antibodies to the organism have also been found in a variety of other species, including wildlife.

*C. burnetii* is transmitted by exposure to body fluids (urine, milk, blood), faeces, amniotic fluid and placentae of infected animals, and items such as wool, straw and equipment contaminated with fluids from infected animals. Aerosols of body fluids and contaminated dust have been implicated, and faeces from infected ticks contain significant levels of bacteria.

*C. burnetii* is also thought to be maintained in a cycle between animals and their ticks, although ticks are not necessary for the organism to persist. Some ticks may act as a vector between wild and domestic animals, and also spread the disease within a herd

New Zealand livestock are free of Q fever, and this helps protect the human population from this important zoonotic disease. Know the clinical signs, and contact MAF Biosecurity New Zealand (MAFBNZ) if you cannot confirm the cause of abortions or infertility in animals and have ruled out common causes.

or flock. Transmission to humans by ticks is rare. *Haemaphysalis longicornis*, a tick present in New Zealand, could potentially act as a vector for *C. burnetii*<sup>(8)</sup>.

The organism is resistant to heat and desiccation and can persist in the environment for many months. It has a small infective dose, and infection will spread rapidly through a group of naïve stock.

In countries where the disease is present, humans with occupational exposure to livestock (particularly slaughterhouse workers, veterinarians, shearers, wool-classers, farmers and farm workers) are at increased risk of contracting Q fever. Those working in high-risk occupations in countries where Q fever occurs should take precautions to reduce their risk of infection. A human vaccine is available in Australia. Further information about occupational safety and health precautions relating to *C. burnetii* is available at the websites listed below.

## Common clinical signs of disease

### Animals

Most *C. burnetii* infections in animals are unapparent, with no clinical signs. Clinical disease, when it occurs, affects the reproductive system and causes abortions, stillbirths, retained placentas, infertility, weak newborns and low birthweights. Mastitis may occur in dairy cattle. Q fever infection in parturient dogs may lead to early death of pups. Chronic infection may occur, with organisms shed intermittently for several days after parturition.

### Humans

Human infections with *C. burnetii* are seen as sporadic cases or outbreaks. As with animals, most human infections are asymptomatic or present initially as a mild, self-limiting, flu-like illness lasting one to two weeks. However, about 2% of cases develop severe disease requiring hospitalisation, and those infected acutely may develop chronic disease.

Acute infections can include a mixture of respiratory and gastric symptoms such as fever, chills, non-productive cough, severe headache, malaise, anorexia, muscle aches, nausea and vomiting. Severe cases may develop pneumonia and/or hepatitis.



*Coxiella burnetii*, the cause of Q fever. Image: Rocky Mountain Laboratories, NIAID, NIH.

Chronic Q fever may develop months to years after an acute infection with *C. burnetii* and is characterised by an infection that persists for longer than six months. The most common clinical sign is an endocarditis of the aortic or mitral heart valves. The case fatality rate for patients with chronic disease is about 65%.

### Main endemic differential diagnoses

In animals, the differential diagnosis for *C. burnetii* infection should include common causes of abortion and infertility, such as:

- bacterial infection (e.g. leptospirosis, campylobacteriosis, ovine brucellosis, listeriosis or salmonellosis)
- pestivirus infection (bovine viral diarrhoea virus, border disease)
- protozoal infection, such as neosporosis or toxoplasmosis
- mycotic abortion
- severe deficiency in vitamins A, E or selenium
- exposure to toxins (nitrates, macrocarpa, pine, ponderosa or cypress).

### Indications that further investigation may be required

If common causes of abortion and infertility in animals have been ruled out and the cause of disease is not clear, MAFBNZ should be notified so that testing for *C. burnetii* and other exotic diseases can be conducted if required. Exotic diseases should be carefully considered as potential differential diagnoses for cases where the cause of disease cannot be identified, especially in animals that have been imported (including dogs and cats).

All suspected *C. burnetii* infections of animals must be notified to the MAFBNZ Exotic Disease and Pest Emergency Hotline, 0800 80 99 66.

If humans exhibit symptoms of Q fever, they should seek medical advice, and inform the medical professional of any contact with animals in New Zealand or overseas. Additionally, when a human

Q fever infection is diagnosed it is important that cases are notified to the Medical Officer of Health so further investigation into the source of infection can be carried out.

### Further information

[www.qfever.org/aboutqfever.php](http://www.qfever.org/aboutqfever.php)  
[www.cdc.gov/ncidod/dvrd/qfever/](http://www.cdc.gov/ncidod/dvrd/qfever/)  
[www.uq.edu.au/ohs/pdfs/alert-qfever.pdf](http://www.uq.edu.au/ohs/pdfs/alert-qfever.pdf)

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- (2) Reichel MP, Ross GP. Targeted survey for exotic ovine abortifacients in New Zealand. *Surveillance* 25(3), 9, 1998.
- (3) Reichel M, Timbs D. No serological evidence of brucellosis, chlamydiosis, or Q fever in New Zealand farmed deer. *Surveillance* 26(2), 7, 1999.
- (4) Worthington RW. New Zealand is free from Q fever. *Surveillance* 28(4), 3-4, 2001.
- (5) Stone M, McDonald W. Investigation of the *Coxiella burnetii* status of a Northland farm. *Surveillance* 32(4), 3-6, 2005.
- (6) Greenslade E, Beasley R, Jennings L, Woodward A, Weinstein P. Has *Coxiella burnetii* (Q fever) been introduced into New Zealand? *Emerging Infectious Diseases* 9, 138-40, 2003.
- (7) Anonymous. Notifiable disease surveillance. *New Zealand Public Health Surveillance Report* 2(4), 2004.
- (8) Heath ACG. Vector competence of *Haemaphysalis longicornis* with particular reference to blood parasites. *Surveillance* 29(4), 12-14, 2002.