

**QUEENSLAND
MUSEUM**

Q fever

DISCOVER MORE



**Queensland
Government**

Contents

3 Introduction

- 3 Queensland Museum
- 3 The history of Q fever

4 What is Q fever?

- 5 Which animals can carry Q fever?
- 5 Transmission to humans
- 6 Transmission methods – Direct and indirect exposure
- 7 Symptoms of Q fever
- 8 Who is most at risk of getting Q fever?
- 9 Diagnosis and treatment
- 9 Complications

10 Prevention

- 10 Personal hygiene for prevention
- 11 Vaccination

11 The Australian Immunisation Register

12 Q fever case statistics

- 12 Australian cases of Q fever 1991–2024
- 13 Australian cases of Q fever 1991–2024 by age and gender
- 14 Further studies – Queensland focus: notable evolving epidemiology

16 Queensland Museum Health and Safety Resources

16 Further reading and resources

- 16 For children
- 16 Articles and case studies
- 17 Organisations and interest groups

17 Glossary of terms

18 References



Introduction

Queensland Museum

In early 2019, two Queensland Museum (QM) workers contracted Q fever. Queensland Museum entered into an Enforceable Undertaking (EU) with the Office of Industrial Relations (Case 270) and agreed to resolve the risks within the Queensland Museum and provide benefits to workers, industry and the community. Queensland Museum has improved how we manage work health and safety (WHS) across the organisation, and we intend to share what we have learned with the museum and taxidermy industries and the broader Queensland community through educational toolkits and resources.

In accordance with the EU deliverable 3.4.3 (a and b), these educational resources will profile Q fever and other zoonotic diseases found in domestic and non-domestic animals. Queensland Museum aims to increase public awareness of zoonotic diseases and educate the community about minimising the risks to themselves, families, friends and colleagues. This comprehensive document on Q fever is the first in this series of education resources.

Refer to the Queensland Museum website for further details:

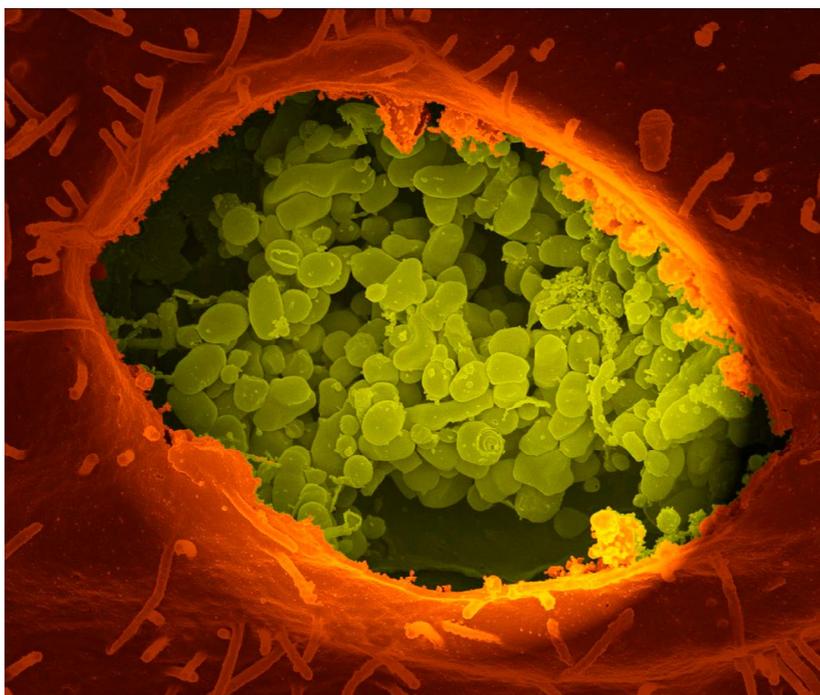
www.museum.qld.gov.au/learn-and-discover/health-and-safety-resources

The history of Q fever

Q fever was first recognised in 1935 following an outbreak of unexplained fevers among Brisbane abattoir workers. Australian pathologist Edward Holbrook Derrick, having only recently been appointed director of the Queensland Health Department's Laboratory of Microbiology and Pathology, named the undescribed infectious disease Q (for 'query') fever, intended as a temporary name (Derrick, 1937).

His research involved learning how to transmit the infectious agent of the disease to guinea pigs (the standard experimental animal in most Australian laboratories at that time) in order to learn more about its zoonotic origins. However, the organism itself that causes Q fever was identified by the work of Sir Frank Macfarlane Burnet, a medical scientist in Melbourne, and American microbiologist Herald R Cox, known for his work studying rickettsia, a group of organisms that cause typhus.

In 1939, Derrick named the Q fever bacterium *Rickettsia burnetii* in honour of Burnet. It was later moved from *Rickettsia* to a new genus *Coxiella*, named for Cox on account of its similarities with the rickettsial family.



The bacterium *Coxiella burnetii*.

What is Q fever?

Q fever is an infectious disease caused by the obligate intracellular gram-negative bacterium *Coxiella burnetii*, which can infect humans, cattle, goats, sheep and many other mammals, as well as ticks. It can cause a severe flu-like illness, and it occurs worldwide (except in New Zealand).

Q fever is a zoonotic disease, meaning that it can be transmitted from animals to humans. A person can be infected by exposure to animals carrying the bacterium. It is a vaccine-preventable disease, with Australia being the only country currently vaccinating at-risk populations.

Due to its public health significance, Q fever is a notifiable disease in all Australian states and territories under the National Notifiable Diseases Surveillance System (NNDSS, 2024a), and, in Queensland, under the *Public Health Act 2005* (Queensland Government, 2005). According to tracking data from the NNDSS, more than 450 cases of the disease are notified in Australia annually. While Queensland has the highest incidence of Q fever in Australia, followed by New South Wales, the infection has been detected in all parts of Australia, including Tasmania (Graves, n.d.).

Q fever organisms are resistant to heat, drying, sunlight and many common disinfectants, allowing them to survive for more than a year in the environment (Q Fever Australia, n.d.). The bacteria can survive in dust and soil for months or years (Department of Health, 2021), so Q fever can be acquired through exposure to contaminated farm products such as wool, hair, straw or hay. *Coxiella burnetii* bacterium has survived seven to nine months on wool at 15 to 20°C (University of Queensland, n.d.).

Which animals can carry Q fever?

Cattle, sheep and goats are the primary spreaders of Q fever (Wildlife Health Australia, 2023). However, a wide range of both domestic and wild animals can carry the infection, including camels, llamas, alpacas, rodents, kangaroos, wallabies, bandicoots (and other Australian wildlife), cats, dogs, horses, rabbits, pigs, foxes and some birds (Queensland Health, 2024; WHA, 2023; To et al., 1998; Mathews et al., 2023). There has been a steady increase in the number of Q fever notifications where the potential source of human infection is attributed to Australian wildlife, particularly kangaroos and wallabies (WHA, 2023).

Q fever is recognised as an Australian endemic tick-borne disease. Ticks are an important vector in the transmission cycle between animals and humans. Several species of Australian ticks are known to carry the bacterium *Coxiella burnetii*, including two species that regularly bite humans: *Ixodes holocyclus*, the paralysis tick; and *Amblyomma triguttatum*, the ornate kangaroo tick (Tolpinrud et al., 2024b; Barker and Walker, 2014). Tick faeces can remain infectious, even in a dried state in the dust and soil, for approximately two years (Q Fever Australia, n.d.; Tolpinrud et al., 2024a).

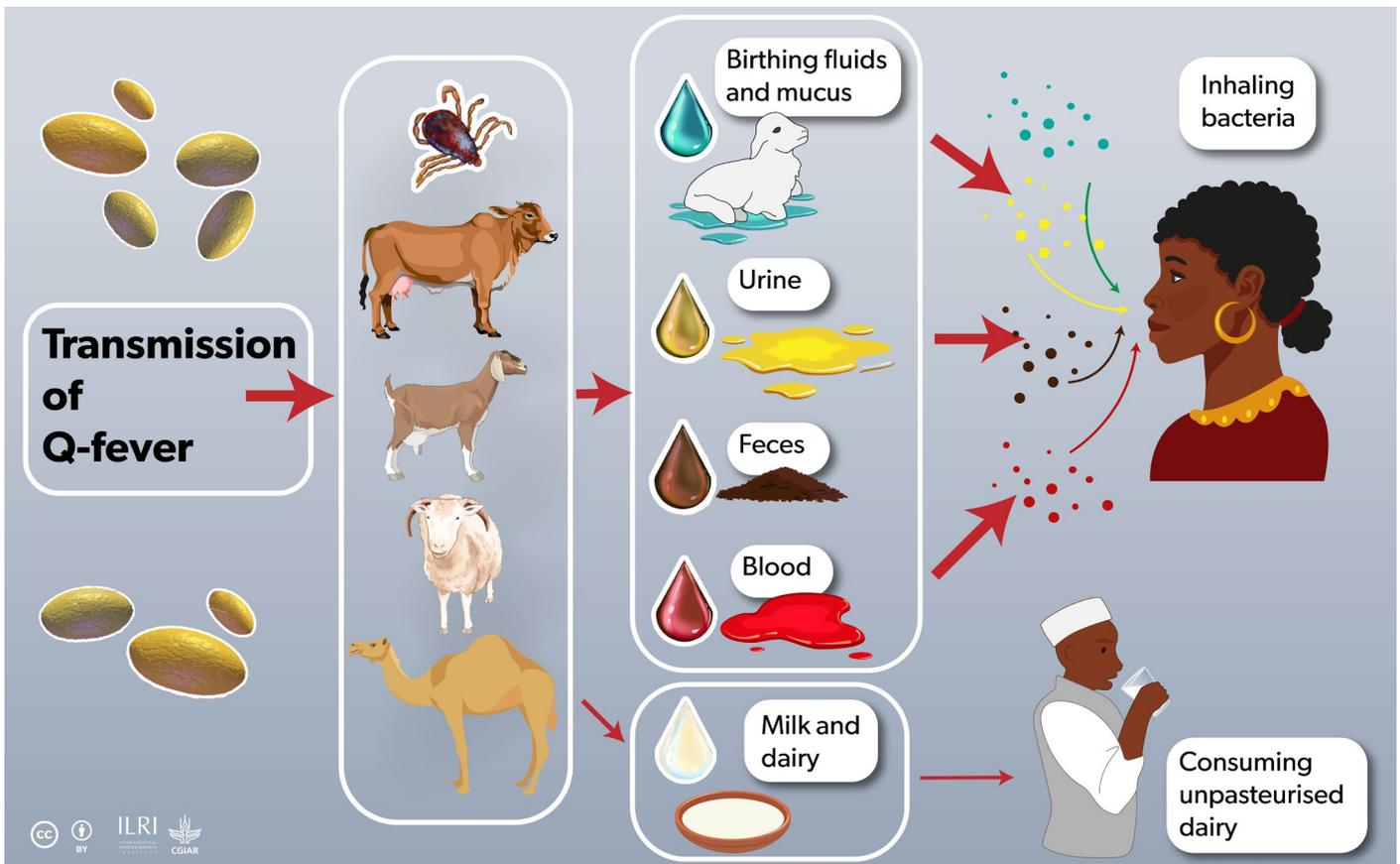
Transmission to humans

The bacterium that causes Q fever can be transmitted to humans through either direct or indirect exposure to infected animals, animal products or contaminated materials. Humans can become infected by breathing in dust particles contaminated by infected animal faeces, urine, milk and birth products, but other routes of infection can include contact with contaminated milk, meat, wool, hides, soil, grass, straw or clothing. Contact with animal birthing products carries a particularly high risk.

Person-to-person transmission of Q fever is rare but can occur through transfusion or from mother to baby during pregnancy and nursing (Dept of Health, 2021). People who have been infected with Q fever are not required to isolate or quarantine from others.



Above: examples of animals that can be infected with Q fever.
Left: kangaroo tick.



Transmission of Q fever.

Transmission methods – Direct and indirect exposure

Direct exposure to Q fever can occur in situations where humans are in proximity to infected animals and animal products and may come into contact with the animals themselves or with their fluids. Examples could include:

- contact with animal faeces, urine, milk or blood (WorkSafe Queensland, 2024)
- drinking raw (unpasteurised/unsterilised) milk
- observing or assisting with animal births, or coming into contact with animal birth products/fluids (tissue, placenta, blood, mucus). Aerosolised particles from areas contaminated with heavily infected placentas have shown the organism will continue to be released, contaminating the environment for up to two weeks following the birth of young (Australian Q Fever Register, n.d.)
- Slaughtering or butchering infected animals (or being present during this process)
- Handling infected animal tissue, fluids or excretions, animal products or materials (direct contact on broken skin, such as cuts or needlestick injuries, carries particularly high risk)
- Contact with contaminated wool, hides, straw, manure fertiliser and clothing worn while butchering/ slaughtering animals
- Being bitten by infected ticks, breathing in tick excreta, removing ticks from animals, crushing ticks with bare hands, or performing aerosol-generating activities such as shearing that may result in exposure to ticks
- Herding, shearing or transporting animals. (Dept of Health, 2021)

Indirect exposure to Q fever can occur through airborne transmission and other mechanisms, meaning that animals do not need to be physically present for there to be a risk of Q fever infection. The bacterium that causes Q fever can produce a 'spore-like form' and can survive in harsh conditions for many months in a dried state, either in the ground or attached to buildings, machinery, stock transport vehicles, straw, wool, hides or work clothing. These can be a constant — and often hidden — source of infection (Australian Q Fever Register, n.d.).

The wind can also blow these 'spores' (as well as dust, droplets and air particles) around for many kilometres. The risk of infection is higher in rural and regional parts of Australia, as there are more animals living in the shared environment with people (Graves, n.d.). People who do not work with directly with animals can still inhale dust, droplets or particles carrying dried animal matter from an infected environment or premises by:

- visiting, living or working in or near a high-risk animal industry or environment (e.g. neighbouring livestock farms; abattoirs; sale yards or stock yards housing cattle, sheep or goats; meat works; agricultural exhibitions and shows; land fertilised with untreated animal manure)
- contamination via clothes, boots or equipment belonging to family members working in high-risk, animal-handling occupations
- undertaking horticulture or gardening in environments where dust, potentially contaminated by animal urine, faeces or birth products, is aerosolised from the ground (e.g. lawn mowing in areas where animal droppings may be present).

Recent studies have expanded our understanding of the increase in the incidence of the disease in people in other occupations and circumstances. For example: wildlife carers and zoo workers; cat and dog breeders; people living on livestock transport routes or in proximity to abattoirs and feedlots; people mowing in areas with native animal droppings; from tick bites; and urban dwellers exposed to native animals, especially kangaroos and other macropods (Hutchinson and Ostini, 2024).

Symptoms of Q fever

In animals

Animals with Q fever don't usually look sick, but they can spread the bacteria to humans. In rare instances, infected animals can experience abortion (particularly goats), stillbirth, infertility and pneumonia.

In humans

Many people infected with Q fever have no symptoms. People who do become sick often have a severe flu-like illness. Symptoms usually begin about two to three weeks after exposure to the bacteria, depending on the size of the infecting dose; however, this incubation period can range from as little as four days to up to six weeks (Dept of Health, 2021).

Those who do have Q fever symptoms (mild or severe) may experience:

- fever (high temperature)
- chills or sweats (profuse perspiration)
- fatigue (tiredness)
- headaches (often behind the eyes)
- sore throat
- muscle aches
- nausea, vomiting or diarrhea
- chest pain
- upper respiratory problems
- weight loss
- cough.

If flu-like symptoms persist and there has been exposure to animals, consult a doctor for further testing.

Who is most at risk of getting Q fever?

Anyone who works with animals, animal products and waste produced from animals is considered high risk for exposure to Q fever.

This applies especially to the following occupations:

- farm workers (cattle, sheep, goat farmers and graziers)
- abattoir, slaughterhouse and tannery workers
- meat workers and meat-packing plant workers
- veterinarians, as well as veterinary nurses, assistants and students, and others working with veterinary specimens
- wildlife workers (high-risk Australian native wildlife)
- agricultural college staff and students (working with high-risk animals)
- wool workers (shearers, sorters and pelt/hide processors)
- laboratory workers (working with biological specimens or high-risk veterinary specimens)
- animal shooters and hunters (Dept of Health and Aged Care, 2023)
- dog and cat breeders (and anyone regularly exposed to animals who are due to give birth)
- pet food manufacturing workers
- dairy industry workers and those who work with raw milk
- laundry workers handling clothing from at-risk workplaces
- people involved in regular mowing in areas frequented by livestock or wild animals (council and grounds workers, golf course workers, mowing businesses) (Dept of Health and Aged Care, 2022 and 2023; WorkSafe Qld, 2024; NSW Health, 2023; Dept of Health, 2021)
- educational workers where agricultural or feral animals (or their products) are handled or housed or roam in close proximity to work areas (e.g. the University of Queensland Gatton campus or other rural agricultural campuses) (UQ, n.d.).

People who are infected with Q fever during pregnancy may be at risk for miscarriage, stillbirth, or low infant birth weight. The disease can particularly be severe in newborn babies (Darling Downs Health 2024).

Some people may be at an increased risk of chronic Q fever after acute infection, including those who are elderly and/or immunosuppressed, and people with chronic cardiac conditions.



Posters from NSW Health's Q fever toolkit.



Q fever is diagnosed by examining a blood sample after a pre-screening skin test.

Diagnosis and treatment

Q fever is diagnosed by a doctor through examination of a blood sample from the patient and a skin test.

A diagnosis is based on a combination of symptoms and whether the person may have come into contact with the bacteria in the previous six weeks.

Most people who are infected with *Coxiella burnetii* have no or mild symptoms and will recover without antibiotic treatment. For those who develop more severe symptoms, early treatment is effective over approximately two weeks with a course of oral antibiotics. Chronic Q fever is more difficult to treat and usually requires a longer course of antibiotic therapy, often for several months).

Complications

As the organism is circulated through the body in the blood stream, any organ system can potentially become involved, including the central nervous system, heart muscle and tissue, lungs, liver, kidneys and testes (Australian Q Fever Register, n.d.). This may result in complications such as:

- long-lasting fatigue (tiredness) — acute Q fever patients can develop post-Q fever fatigue syndrome, causing prolonged ill health and debilitating fatigue that lasts more than 12 months.

In a very small number of cases (less than 4%), Q fever leads to a more serious illness known as chronic Q fever, sometimes after a number of years. Death from acute Q fever is very rare and occurs mainly in the elderly or those whose health is compromised by illness or disease. The most common symptoms of chronic Q fever are:

- organ damage through inflammation of the liver (hepatitis), inflammation of the bone or bone marrow (osteomyelitis) or infection of the bone (osteitis) (Australian Q Fever Register, n.d.)
- infection of the lungs (pneumonia)
- inflammation of the inner lining of the heart (endocarditis), which can be fatal if not treated.

Prevention

People who live and work around livestock or wildlife are at greater risk of contracting Q fever and other zoonotic diseases. Q fever can have serious long-term health implications, so it is important to take precautions to minimise the risk of contracting the disease (Animal Health Australia, 2023).

Currently, Australia is the only country with a licenced Q fever vaccine for humans. Q-Vax® is a whole-cell formalin inactivated vaccine produced using purified Phase One *Coxiella burnetii* Henzerling strain. It has been available in Australia since 1989 and is highly effective in preventing *Coxiella burnetii* infection in humans.

Because of the airborne transmission of *Coxiella burnetii*, Q fever vaccination remains the most effective strategy for preventing Q fever. It is recommended for high-risk occupational groups such as farmers, veterinary personnel, abattoir, wildlife and zoo workers (Mathews, 2023).

Personal hygiene for prevention

Cleanliness and good personal hygiene is essential when dealing with animals (particularly with sheep, cattle and goats). Following these hygiene strategies will help prevent transmission of the bacteria that causes Q fever.

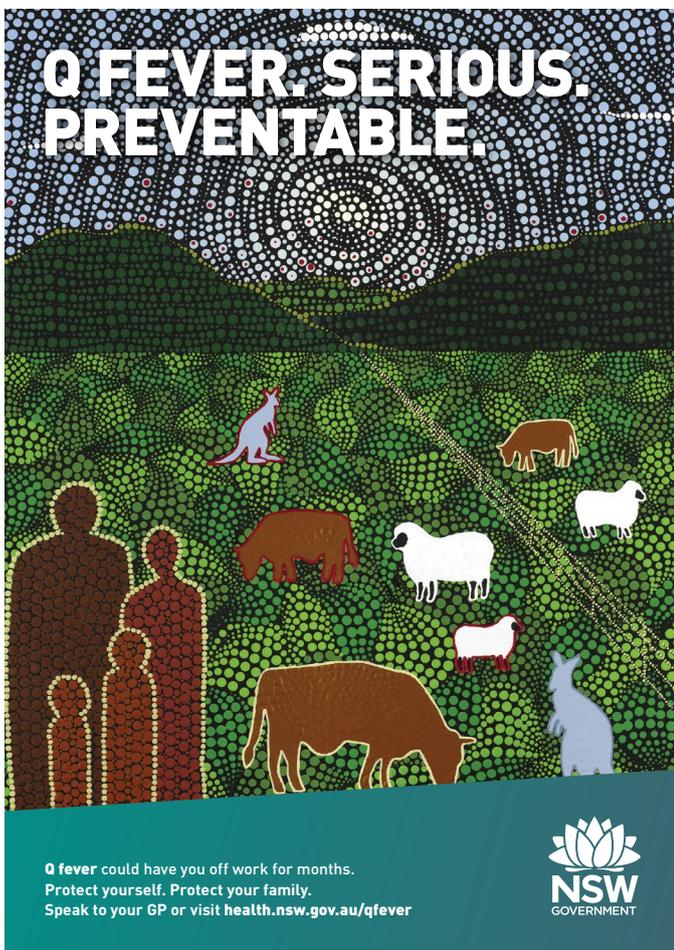
- Wash hands and arms thoroughly in soapy water (for at least 20 seconds) after any contact with animals and before eating and drinking (Dept of Health, 2021).
- Eat and drink only pasteurised products. As Q fever can be transmitted to humans through contaminated milk, pasteurisation of milk and milk products reduces the likelihood of exposure to the bacteria.
- Wear personal protective equipment (PPE) when doing high-risk activities, making sure all equipment is correctly fitted and used according to the manufacturer's instructions.
- Shower and change clothes and shoes after high-risk activities or being around animals. Wash clothes in detergent (disinfectant if heavily soiled with animal matter) to reduce the risk of infection to your household.
- Cover open wounds when handling or disposing of animal products and waste.

Prevention in higher-risk animal handling occupations

- Vaccination is recommended for farmers, abattoir and meat workers, vets and vet nurses, zoo and wildlife workers (NSW Health, 2023). People in these occupations should know and understand Q fever symptoms, treatment and control measures, including the correct use of personal protective equipment (PPE) while undertaking work. Visit WorkSafe Queensland for more information on PPE.
- A P2 disposable face respirator can be worn for protection against health hazards from the environment when working around animals, handling and disposing of animal products and waste, and mowing or gardening in areas where there are livestock or native animals. P2 respirators offer a higher level of efficiency than other face masks (filtering at least 94% of particles in the air), and can filter out more of the dust and liquid mist particles. To be effective, a respirator must be fitted according to the manufacturer's instructions and form a tight seal around the mouth and nose. Instructions may be on the label or on the manufacturer or supplier website (NSW Health, 2023; Graves, n.d.).
- Remove dirty clothing, coveralls and boots worn during high-risk jobs and wash these in outdoor wash areas. Avoid taking these items home in order to reduce the risk of infection to your household. If items do need to be taken home, bag and wash them separately (these items should only be handled by those who have had Q fever before or are vaccinated against Q fever).



A P2 respirator/mask offers the highest level of efficiency to protect against Q fever.



Poster from NSW Health’s Q fever toolkit.

The title of the work is ‘Hidden in plain sight’. The artist, Garry is a proud Aboriginal man of Dharawal descent raised amongst the La Perouse community in Sydney’s Eastern Suburbs.

Vaccination

- A safe and effective vaccine (Q-Vax®, injection 0.5 mL) is the **best way to prevent Q fever** (Dept of Health and Aged Care, 2023).
- Vaccination is recommended for anyone aged 15 years and over who work in at risk occupations or at risk or exposure to Q fever.
- The vaccine is given as a single dose. Booster doses are not recommended.
- The vaccine and skin testing are not currently government funded. However, some costs may be tax deductible for at-risk occupations.
- Your Q fever vaccination will be recorded on the **Australian Immunisation Register (AIR)** by your GP or vaccine administrator.

To check who should or should not be vaccinated for Q fever, please refer to **current information from Queensland Health** or speak with a healthcare provider.

Mathews et al. (2023) have conducted further research on vaccine uptake in ‘at risk’ workers (farmers, vets and vet nurses, goat producers etc.) in the international journal **Vaccine**.

Ongoing vaccine research

In May 2024, the National Centre for Immunisation Research and Surveillance, in conjunction with the University of Sydney and the Children’s Hospital at Westmead, launched a **research study** to assess the safety and effectiveness of Q fever vaccination in Australian children aged 10–15 years, with the aim of increasing vaccine eligibility and protecting more at-risk younger Australians in future (NCIRS, 2024).

The Australian Immunisation Register

The Australian Immunisation Register (AIR) is a national register that records all vaccines administered in Australia. Q fever vaccination is recorded on the Australian Immunisation Register by your GP or vaccine provider.

Q fever case statistics

Statistics on Q fever (and other notifiable diseases) in Australia are tracked at both a national and state level to look at trends and patterns in the data and inform public health policy and vaccination programs. Visit the links below to see data by year, state, disease type and name, and patient age and gender.

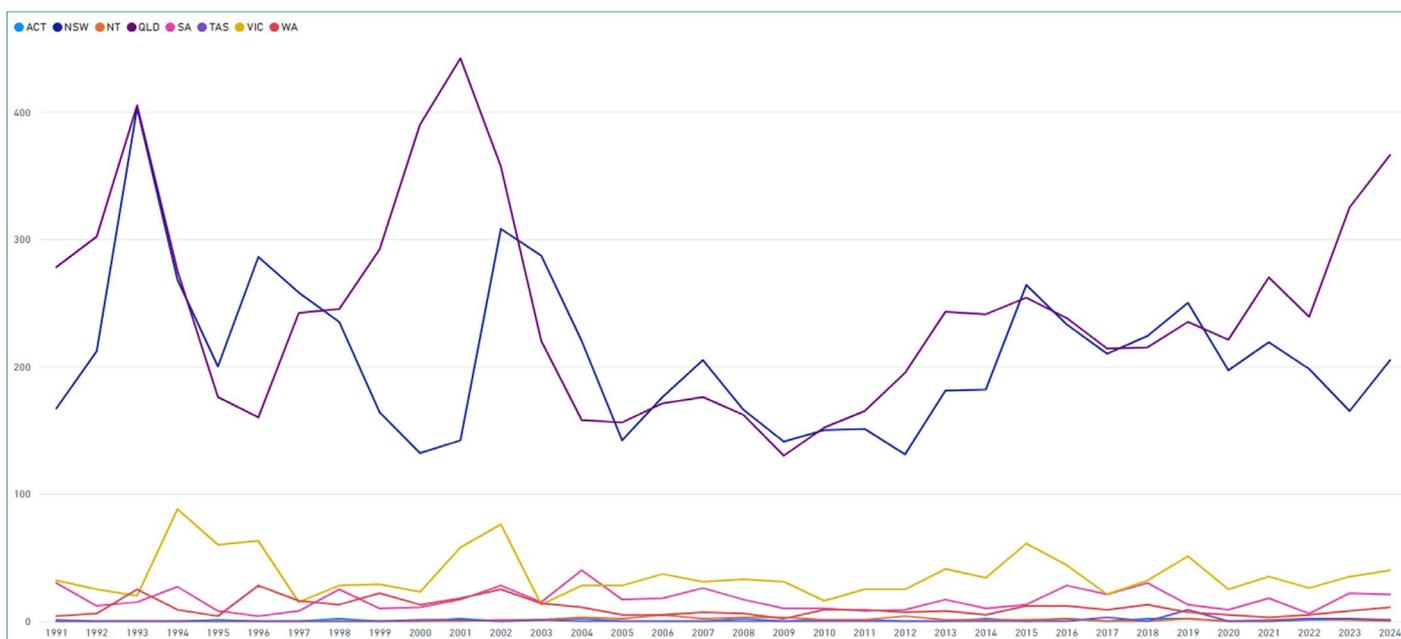
[National Notifiable Disease Surveillance System \(NNDSS\)](#)

[Queensland Health notifiable conditions annual reporting](#)

Australian cases of Q fever 1991–2024

Notable trends:

- Higher spikes typically occur every 10–15 years nationwide; however, yearly cases rarely drop to less than 400 per year.
- Queensland and NSW cases are notably higher over the 2021–2024 period than all other states.
- Over the last 10 years (2014–2024), Q fever notifications have been steadily increasing, which has renewed calls for the Q fever vaccine to be more accessible and affordable.
- NNDSS confirmed only four deaths due to Q fever have been recorded – the exact cause of exposure is not recorded.



Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
ACT	1	0	0	0	1	0	0	2	0	0	2	0	1	2	0	0	2	0	1	1	0	0	2	0	2	0	2	2	0	0	1	1	1	
NSW	167	212	403	268	200	286	258	235	164	132	142	308	287	220	142	176	205	166	141	150	151	131	181	182	264	233	210	224	250	197	219	198	165	205
NT	0	0	0	0	0	0	0	0	0	0	0	1	1	3	2	5	2	3	3	1	1	4	1	1	1	2	0	0	2	0	1	2	1	0
QLD	278	302	405	275	176	160	242	245	292	390	442	357	220	158	156	171	176	162	130	152	165	195	243	241	254	238	214	215	235	221	270	239	325	366
SA	30	12	15	27	8	4	8	25	10	11	17	28	15	40	17	18	26	17	10	10	8	9	17	10	13	28	21	30	13	9	18	6	22	21
TAS	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9	0	0	2	2	1
VIC	32	25	20	88	60	63	15	28	29	23	58	76	13	28	28	37	31	33	31	16	25	25	41	34	61	44	21	32	51	25	35	26	35	40
WA	4	6	25	9	4	28	16	13	22	13	18	25	14	11	5	5	7	6	2	9	9	7	8	5	12	12	9	13	7	5	3	5	8	11
Total	512	557	868	667	449	541	539	548	517	570	680	795	552	462	350	412	447	389	317	339	360	371	491	475	605	559	478	516	569	457	546	479	559	645

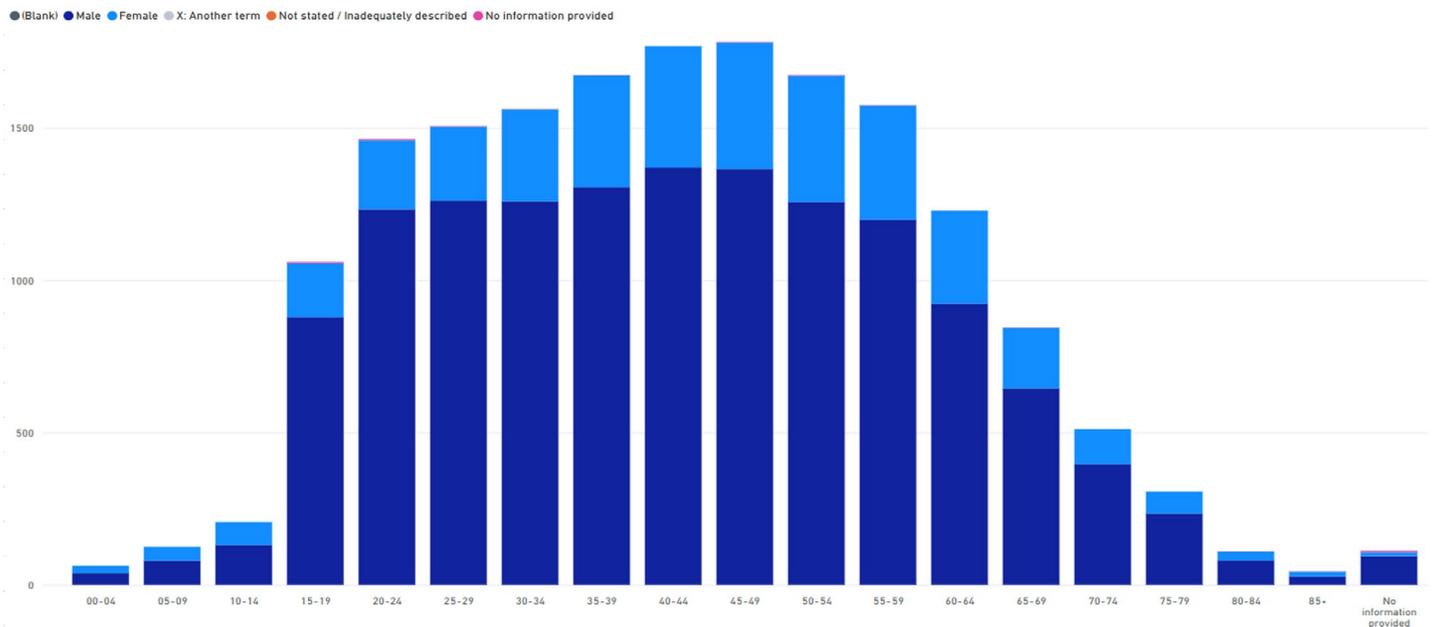
Australian cases of Q fever 1991–2024. Source: [NNDSS](#)

Australian cases of Q fever 1991–2024 by age and gender

Notable trends:

- A consistently higher proportion of males contract Q fever. This may suggest higher numbers of males working in higher-risk environments, and/or that a smaller number of female infections to Q fever have been reported.
- Most reported cases of Q fever (in both males and females) occurred in people aged between 20 and 60.
- Both of the above trends indicate that a higher level of workforce participation or activity is causing higher numbers of cases in high-risk environments.

Age Group	Male	Female	X: Another term	Not stated / Inadequately described	No information provided	Total
00-04	0	38	25	0	0	63
05-09	0	79	46	0	0	125
10-14	0	130	76	0	0	206
15-19	0	879	177	0	4	1,060
20-24	0	1,233	227	0	1	1,464
25-29	0	1,261	244	0	1	1,507
30-34	0	1,259	302	2	1	1,564
35-39	0	1,306	367	0	0	1,674
40-44	0	1,370	399	0	0	1,769
45-49	0	1,366	415	0	0	1,783
50-54	0	1,257	415	0	0	1,674
55-59	0	1,199	375	0	0	1,575
60-64	0	923	306	0	0	1,229
65-69	0	645	199	0	0	845
70-74	0	396	115	0	0	511
75-79	0	234	72	0	0	306
80-84	0	80	29	0	0	110
85+	0	27	16	0	0	44
No information provided	0	94	13	0	0	112
Total	0	13,776	3,818	2	3	17,621



Australian cases of Q fever 1991–2024 by age and gender. Source: [NNDSS](#)

Further studies – Queensland focus: notable evolving epidemiology

Macropods and Q fever

Macropods, particularly kangaroos and wallabies, are implicated as potential sources of Q fever infection in humans. According to Wildlife Health Australia, and also a 2019 study conducted on a beef cattle station near Roma, there has been a steady increase in the number of Q fever notifications attributed to sources other than livestock (WHA, 2023; Tolpinrud et al., 2024a). The study looked at tissue distribution of *Coxiella burnetii* and antibody response in macropods co-grazing with livestock in Queensland and found that the prevalence of *Coxiella burnetii* bacteria was high among red and eastern grey kangaroos that also grazed on the property.

The mode of transmission of *Coxiella burnetii* between kangaroos is relatively poorly understood. The most likely routes of excretion appear to be faecal and urogenital, and also possibly in nasal secretions. *Coxiella burnetii* DNA has previously been detected in kangaroo faeces and bladder tissue, although it is unknown whether these findings represent viable bacteria. However, shedding of viable *Coxiella burnetii* has been demonstrated in faeces, urine and genital swabs in other species, and it is plausible that the same is true for kangaroos.

Although it is currently unknown whether the bacteria detected in the excretions and secretions of the kangaroos represent viable bacteria, careful consideration should be given to the possible public health implications of the spillover of Q fever to humans who live, work or recreate in the area. Incorporating sustainable wildlife management practices into urban planning, such as wildlife corridors and preservation of suitable habitats, could be beneficial to limit the risk of zoonotic disease spillover to humans and domestic animals (Tolpinrud et al., 2024a).

Urban expansion in fast growing Queensland regional areas means that farmland is being converted to residential estates. Along with persistent dry and windy conditions, living in close proximity to wildlife such as kangaroos and wallabies is a potential increased risk factor for Q fever (NCIRS, 2024; NNDSS, 2024b; Roughan et al., 2023).

The public health implications and risk of spillover to humans could be significant. Appropriate preventative measures, such as education and vaccination, should be considered for at-risk groups of people who have direct or indirect contact with kangaroos.



Eastern Grey Kangaroo.

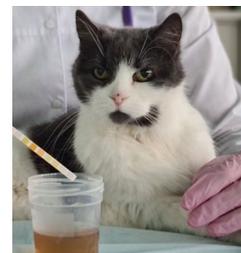
Native marsupials and introduced animals

Studies conducted in northern Queensland found that many Q fever patients reported no contact with cattle, sheep or goats, which are known to be the typical reservoirs (sources) of infection. Wildlife has been proposed as a potential alternative reservoir for Q fever in these cases (Rabinowitz and Conti, 2009:191–194).

Studies determined the seroprevalence (the level of a pathogen in a population, as measured in blood serum) of *Coxiella burnetii* in Australian native animals and introduced animals in northern and south-eastern Queensland. Australian native marsupials sampled included the brushtail possum and common northern bandicoot; introduced species sampled included dingoes, cats, foxes and pigs. The serological evidence of infection in these species has public health implications, due to these animals increasingly moving into residential areas.

- **Bandicoots:** In Australia, bandicoots have been found to carry the organism and were first associated with an outbreak of Q fever in Queensland in 1958. Possums have been identified as reservoirs of leptospirosis in Australia. Many species that are reservoirs for leptospirosis are also reservoirs for Q fever (Rabinowitz and Conti, 2009:222–226). Therefore, possums may potentially be reservoirs of Q fever.
- **Dingoes:** The positive seropositivity in dingo samples originating from south-east Queensland indicated these animals may be a potential reservoir for Q fever in peri-urban areas.
- **Cats:** The detection of *Coxiella burnetii* antibodies in a relatively large percentage of feral cat samples indicates this species may constitute an important reservoir for *Coxiella burnetii* in south-east Queensland.
- **Foxes:** The high seroprevalence in fox sera sampled indicates further investigation of this species as a reservoir for Q fever may be warranted.
- **Pigs:** The incidence of feral pig incursion in urban areas has been increasing in Queensland. Feral pigs also constitute the most popular game animal in Queensland. The detection of antibodies to *Coxiella burnetii* in these animals indicates they may be a potential reservoir for Q fever for recreational and professional pig hunters, and primary producers who take measures to eradicate feral pigs.

Housing shortages in Queensland have resulted in residential areas expanding into wildlife habitats throughout the state. There has also been an increase in demand for semi-rural housing estates in northern Queensland. These developments would increase the exposure of the human population and companion animals to wildlife and feral animals.



Long-nosed bandicoot and introduced animals.

Queensland Museum Health and Safety Resources

Queensland Museum Educational Resources 2024

www.museum.qld.gov.au/learn-and-discover/health-and-safety-resources#educational-resources

Further reading and resources

Australian Government (n.d.) **Australian Immunisation Register (AIR)**, Services Australia website, accessed 16 October 2024.

Animal Health Australia (2023) **Animal Health in Australia Annual Report**, Animal Health Australia, accessed 11 October 2024.

DAF (Department of Agriculture and Fisheries) (2018) **Animal health, pests and diseases**, DAF website, accessed 11 October 2024.

Darling Downs Health (2024) **Darling Downs Health**, DDH website, accessed 12 October 2024.

Department of Health (Tasmania) (2024) **Infectious diseases guides and fact sheets**, Department of Health website, accessed 11 October 2024.

Queensland Health (2018) **Disease prevention in animal contact areas**, Queensland Health website, accessed 11 October 2024.

Queensland Health (2020) **Zoonotic and other diseases**, Queensland Health website, accessed 11 October 2024.

WorkSafe Queensland (2017) **Managing infection risks at petting zoos** [landing page linking to PDF], WorkSafe website, accessed 11 October 2024.

For children

Michigan State University (n.d.) **Be a Zoonotic Disease Detective** [activity book], Michigan State University, accessed 11 October 2024.

UNMC (University of Nebraska Medicine) College of Public Health (n.d.) **Be a Zoonotic Disease Detective** [kids magazine], UNMC, accessed 11 October 2024.

Articles and case studies

Black J (1993) *Microbiology: principles and applications*, 2nd edn, Prentice Hall.

Communicable Diseases Network Australia (CDNA) (2018) **Q fever: CNDA National Guidelines for Public Health Units**, Department of Health and Aged Care, accessed 11 October 2024.

Communicable Diseases Branch (2019) **Q fever notifications in Queensland, 2016** [landing page linking to PDF], Queensland Health, access 11 October 2024.

Daly R, House J, Stanek D and Stobierski MG (2017) 'Compendium of measures to prevent disease associated with animals in public settings, 2017', *Journal of the American Veterinary Medical Association*, 251(11):1268–1292, doi:10.2460/javma.251.11.1268

Graves S, Gerrard J and Coghill S (2020) 'Q fever following a tick bite', *Australian Journal of General Practice*, 49(12), doi:10.31128/AJGP-01-20-5195.

Hamad G and Ranmuthugala G (2023) 'Q fever awareness in Australia: a scoping review', *Australian and New Zealand Journal of Public Health*, 47(6), doi:10.1016/j.anzjph.2023.1000099

Nothling L and Cooper L (14 March 2024) '**Q fever case spike in Qld drives renewed push for more accessible vaccine for "nasty" bacterial disease**', ABC, accessed 11 October 2024.

Roughan M, Hodge E, Khan A and Chor J (2023) 'Evolving epidemiology of Q fever in Wide Bay', *Communicable Diseases Intelligence*, 47:36, doi:10.33321/cdi.2023.47.36.

Sexton-McGrath K (19 November 2020) '**Q fever diagnosis for woman after tick bit while camping near Cairns prompts health warning**', ABC, accessed 11 October 2024.

Tolpinrud A, Dobson E, Herbert CA, Gray R, Stenos J, Chaber A-L, Devlin JM and Stevenson MA (2024) 'Characterising eastern grey kangaroos (*Macropus giganteus*) as hosts of *Coxiella burnetii*', *Microorganisms*, 12(7):1477, doi:10.3390/microorganisms12071477.

Q Fever Facts (n.d.) **Jason, acute Q fever sufferer** [case study], Q Fever Facts website, accessed 11 October 2024.

Q Fever Facts (n.d.) **Geoff, chronic Q fever and post Q fever fatigue syndrome sufferer** [case study], Q Fever Facts website, accessed 11 October 2024.

Organisations and interest groups

QFIG (Q Fever Interest Group), The University of Queensland

Q Fever, World Organisation for Animal Health

Glossary of terms

Acute	Experience to a severe or intense degree
Antibiotics	Medicines that fight bacterial infections in people and animals
Chronic	Persisting for a long time or constantly recurring
Debilitating	Making someone very weak and infirmed
EU	Enforceable Undertaking
Formalin	Extending specimen stability period for cell counts
Immunosuppressed	Having a weakened immune system
Leptospirosis	A zoonotic disease affecting people and animals spread by animal urine
Macropods	A plant-eating marsupial of the Australasian kangaroo and wallaby family
NNDSS	National Notifiable Diseases Surveillance System
PPE	Personal protective equipment
QM	Queensland Museum
Symptomatic	A symptom or a sign
Transmission	Action or process of transmission of a virus
WHS	Work health and safety

References

- Animal Health Australia (2023) **Zoonotic Disease**, Animal Health Australia, accessed 15 October 2024.
- Australian Q Fever Register (n.d.). **About Q fever**, Australian Q Fever Register website, accessed 14 October 2024.
- Barker S and Walker A (2014) 'Ticks of Australia: The species that infest domestic animals and humans', *Zootaxa* 3816(1):1–144, doi:10.11646/Zootaxa.3816.1.1.
- Black JG (1990) *Microbiology: Principles and applications*, 2nd edn, Prentice Hall.
- Department of Health (2021) **Australian endemic tick-borne diseases – Q fever**, Australian Government, accessed 14 October 2024.
- Department of Health and Aged Care (2022) **Q fever**, Australian Government website, accessed 15 October 2024.
- Department of Health and Aged Care (2023) **Q fever**, Australian Immunisation Handbook website, accessed 15 October 2024.
- Derrick EH (1937) "'Q" fever, a new fever entity: clinical features, diagnosis and laboratory investigation', *Medical Journal of Australia*, 2(8):281–299, doi:10.5694/j.1326-5377.1937.tb43743.x.
- Eastwood K, Graves SR, Massey PD, Bosward K, van den Berg D and Hutchinson P (2018) 'Q fever: A rural disease with potential urban consequences', *Australian Journal of General Practice*, 47(3), doi:10.31128/ajgp-08-17-4299.
- Graves S (n.d.) **Microbiology and Epidemiology of Q fever**, University of Queensland website, accessed 14 October 2024.
- Hutchinson P and Ostini R (2024) 'Southern Queensland general practitioners' knowledge and attitudes towards Q fever and behaviours in the management of the disease', *Australian Journal of General Practice*, 53(5), doi:10.31128/ajgp-10-22-6598.
- Mathews KO, Norris JM, Phalen D, Malikides N, Savage C, Sheehy PA, Bosward KL (2023) 'Factors associated with Q fever vaccination in Australian wildlife rehabilitators', *Vaccine*, 41(1):201–210, doi:10.1016/j.vaccine.2022.10.082.
- Metro South Health (2023) **Q fever symptoms poster** [PDF], Metro South Health website, accessed 15 October 2024.
- National Centre for Immunisation Research and Surveillance (2024) **New study launched to increase Q fever vaccine eligibility for more children in Australia**, NCIRS website, accessed 15 October 2024.
- National Notifiable Disease Surveillance System (2024a) **Diseases on the National Notifiable Disease List**, Department of Health and Aged Care website, accessed 15 October 2024.
- National Notifiable Disease Surveillance System (2024b) **National Communicable Disease Surveillance Dashboard**, Department of Health and Aged Care website, accessed 15 October 2024.
- NSW Health (2023). **Q fever awareness toolkit**, NSW Health website, accessed 15 October 2024.
- Q Fever Australia (n.d.) **Q Fever Australia**, accessed 14 October 2024.
- Queensland Government (2005) **Public Health Act 2005: Public Health Regulation 2018**, State of Queensland, accessed 15 October 2024.
- Queensland Health (2024) **Q fever**, Queensland Government website, accessed 14 October 2024.
- Rabinowitz P and Conti L (eds) (2009) *Human–Animal Medicine: clinical approaches to zoonoses, toxicants and other shared health risks*, Saunders, Maryland Heights, Missouri.
- Roughan M, Hodge E, Khan A and Chor J (2023) 'Evolving epidemiology of Q fever in Wide Bay', *Communicable Diseases Intelligence*, 47, doi:10.33321/cdi.2023.47.36.
- Sloan-Gardner TS, Massey PD, Hutchinson P, Knope K and Fearnley E (2017). 'Trends and risk factors for human Q fever in Australia, 1991–2014', *Epidemiology and Infection*, 145(4):787–795, doi:10.1017/S0950268816002843.
- To H, Sakai R, Shirota K, Kano C, Abe S, Sugimoto T, Takehara K, Morita C, Takashima I, Maruyama T, Yamaguchi T, Fukushi H and Hirai K (1998) 'Coxiellosis in domestic and wild birds from Japan', *Journal of Wildlife Diseases* 34(2):310–316, doi:10.7589/0090-3558-34.2.310.
- Tolpinrud A, Dobson E, Herbert C, Gray R, Stenos J, Chaber A-L, Devlin J and Stevenson M (2024a) 'Characterising eastern grey kangaroos (*Macropus giganteus*) as hosts of *Coxiella burnetii*', *Microorganisms*, 12(7):1477, doi:10.3390/microorganisms12071477.
- Tolpinrud A, Tadepalli M, Stenos J, Legnereux L, Chaber A-L, Devlin J, Caraguel C and Stevenson M (2024b) 'Tissue distribution of *Coxiella burnetii* and antibody response in macropods co-grazing with livestock in Queensland, Australia', *PLoS ONE*, 19(5):e0303877, doi:10.1371/journal.pone.0303877.
- University of Queensland (n.d.) **Q fever risk management guideline**, UQ website, accessed 14 October 2024.
- Wildlife Health Australia (2023) **Q fever in Australian wildlife** [factsheet], Wildlife Health Australia website, accessed 14 October 2024.
- WorkSafe Queensland (2024) **Q fever**, WorkSafe website, accessed 14 October 2024.

Photographs:

All images © Queensland Museum, Gary Cranitch except:

Cover, p.4 (sheep), p.4 (dog), p.8, p.9, p.14 (cat) © Shutterstock

p.3 © [Wikimedia Commons](#)

p.4 and p.14 (feral pig) © Queensland Museum, Bruce Cowell

p.4 (tick) © Jean & Fred Hort

p.5 International Livestock Research Institute (CC BY-NC-ND 2.0)

p.7, p.10 © NSW Health