NSW Zoonoses Annual Report 2016

Produced by:

COMMUNICABLE DISEASES BRANCH
Health Protection NSW
Locked Mail Bag 961
North Sydney NSW 2059
Email: hprot@doh.health.nsw.gov.au
www.health.nsw.gov.au/infectious/pages/default.aspx

This work is copyright. It may be reproduced in whole or in part for study and training purposes subject to the inclusion of an acknowledgement of the source. It may not be reproduced for commercial usage or sale. Reproduction for purposes other than those indicated above requires written permission from Health Protection NSW.

Suggested citation:
Communicable Diseases Branch. *NSW Zoonoses Annual Surveillance Report: 2016.* Sydney: Health Protection NSW, 2016.

© Health Protection NSW 2017

August 2017

Table of Contents

Overview

A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Worldwide, at least 61% of all human pathogens are zoonotic organisms, and during the past decade up to 75% of emerging pathogens were zoonoses.[1]

This report focuses on:

- Notifications of selected zoonoses in humans to NSW public health authorities during 2016
- Animal health events investigated in collaboration with the NSW Department of Primary Industries (DPI) and Local Land Services (LLS) requiring a public health response
- Post-exposure risk assessments and treatments delivered for the prevention of rabies and Australian Bat Lyssavirus (ABLV).

Beyond the scope of this report are numerous zoonoses transmitted through food, water or vectors – many of which are notifiable to NSW public health and animal health authorities (Appendix 2).

Surveillance findings on enteric and other zoonoses are routinely published in other reports available via the NSW Health website. A wealth of further information and resources are also available (Appendix 3).

2016 Highlights

- NSW observed a slight increase in the number of brucellosis and Q fever notifications in people in 2016 compared to the five year annual average. In the same period, fewer notifications of leptospirosis and continued low rates of psittacosis in people were reported.
- No human infections of anthrax, avian/animal influenza, Hendra virus, rabies/ABLV or tularemia were reported (Table 1, overleaf).
- Substantially higher numbers of people exposed to animals at risk of rabies and ABLV requiring assessment and prophylactic treatment were reported in 2016. While the number of wildlife workers exposed to bats in Australia decreased, the number of tourists exposed to potential rabid animals overseas increased.
- Sporadic animal infections with anthrax, brucellosis, Hendra virus, equine chlamydiosis and ABLV were reported in NSW, requiring public health investigation of exposures and interventions to prevent human infections.

Table 1: Incidence of selected zoonotic diseases in humans notified in 2016 compared to the previous 5 years (2011–2015), by Local Health District (LHD) of residence[a], NSW[b]

LHD	n (Rate per 100,000[c])							
	Brucellosis		Leptospirosis		Psittacosis		Q fever	
	5yr mean 2011-2015	2016	5yr mean 2011-2015	2016	5yr mean 2011-2015	2016	5yr mean 2011-2015	2016
Central Coast	0	0	<1 (0.30)	1 (0.29)	1 (0.51)	0	1 (0.41)	1 (0.29)
Far West	0	0	0	0	0	0	7 (22.58)	6 (19.56)
Hunter New England	3 (0.29)	4 (0.43)	4 (0.42)	3 (0.32)	1 (0.22)	1 (0.11)	46 (5.12)	54 (5.84)
Illawarra Shoalhaven	0	0	1 (0.42)	1 (0.25)	<1 (0.25)	0	10 (3.05)	16 (3.93)
Mid North Coast	0	0	1 (0.83)	0	<1 (0.47)	0	23 (10.79)	18 (8.16)
Murrumbidgee	0	0	4 (2.20)	0	1 (0.62)	0	10 (4.09)	14 (5.79)
Nepean Blue Mountains	0	0	<1 (0.27)	0	2 (0.84)	2 (0.53)	1 (0.37)	0
Northern NSW	<1 (0.34)	0	4 (1.30)	6 (1.97)	<1 (0.35)	0	34 (11.68)	32 (10.51)
Northern Sydney	<1 (0.11)	1 (0.11)	1 (0.11)	0	<1 (0.11)	0	3 (0.32)	2 (0.22)
South Eastern Sydney	0	0	2 (0.23)	0	<1 (0.12)	0	2 (0.34)	1 (0.11)
South Western Sydney	1 (0.22)	1 (0.10)	<1 (0.10)	0	<1 (0.11)	1 (0.10)	4 (0.39)	4 (0.41)
Southern NSW	0	0	1 (1.01)	0	0	0	12 (5.77)	16 (7.56)
Sydney	<1 (0.16)	0	<1 (0.16)	0	<1 (0.16)	0	1 (0.25)	0
Western NSW	0	0	2 (0.72)	1 (0.36)	1 (0.73)	3 (1.07)	29 (10.34)	61 (21.85)
Western Sydney	1 (0.20)	2 (0.21)	<1 (0.11)	1 (0.10)	<1 (0.11)	0	<1 (0.11)	0
NSW total	**6 (0.08)**	**8 (0.10)**	**21 (0.28)**	**13 (0.17)**	**7 (0.10)**	**7 (0.09)**	**180 (2.41)**	**225 (2.88)**

[a] *Exposures may have occurred outside the LHD of residence.*
[b] *There were no notifications of anthrax, avian or animal influenza, Hendra virus infection, Rabies/ABLV virus infection or tularemia in humans in NSW during this period.*
[c] *For population data source see Appendix 1.*

Brucellosis

Brucellosis is an infection that can be transmitted to humans from some animals such as cows, sheep, goats and pigs. *Brucella suis* remains a potential source of human infection in Australia, while other species have either been eradicated or never detected. Cases in NSW are rare and usually result from contact with feral pigs in the northwestern NSW, or from consuming unpasteurized dairy products while overseas.

Key points:

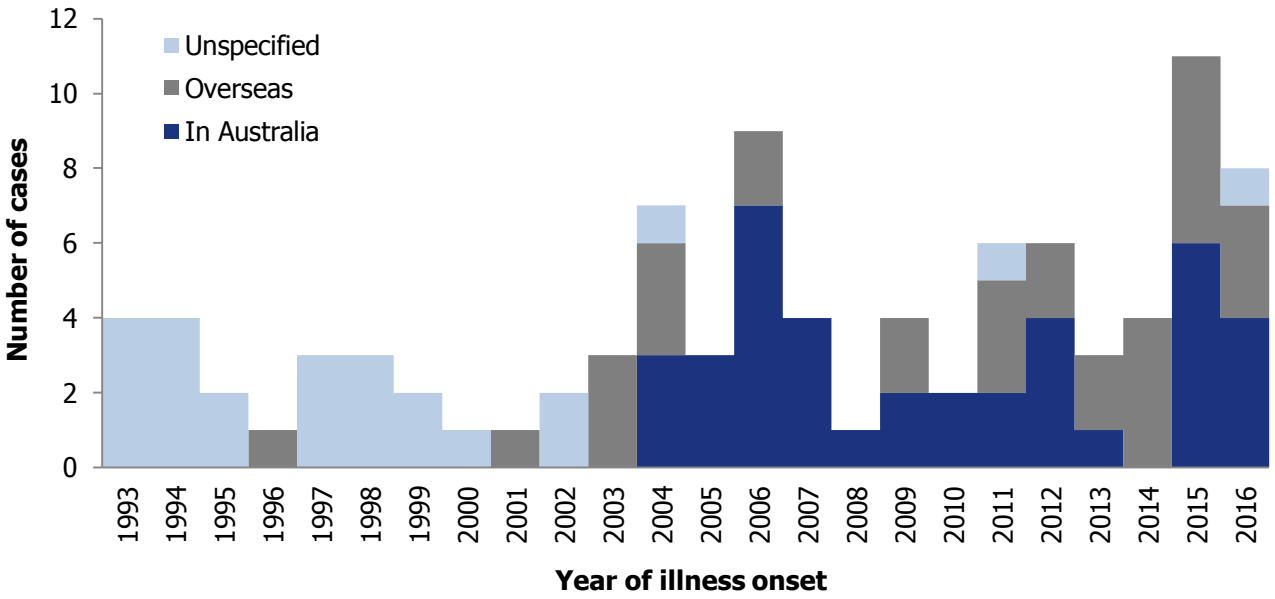
- 8 confirmed cases notified in 2016
- 4 locally acquired infections in Hunter New England LHD, predominantly from pig hunting
- 3 overseas acquired

During 2016, 8 (0.10 per 100,000) confirmed cases of brucellosis were notified in NSW (Figure 1).

Of the seven cases able to be interview, four were acquired in NSW, all adult males aged between 35–54 years (mean: 42 ± 8.5 years). One of the four locally-acquired cases identified as Aboriginal. All four cases reported hunting feral pigs and having direct contact with tissues and/or body fluids prior to onset of symptoms, with two also reporting hunting kangaroo. All four hunted or lived within northern Hunter New England LHD, three in the Moree Plains area and one in the Liverpool Plains area. Three cases were confirmed by culture, all of which were typed as *Brucella suis.*

The other three NSW residents acquired the infection overseas, in Afghanistan (n=1), the Philippines (n=1) and the United Kingdom (n=1). Cases were aged between 28–56 years (mean: 46 ± 15.6 years), and only one was male. Exposure history was only available for one case, who reported contact with cattle and consuming unpasteurised dairy products (milk and cheese). Only one case was confirmed by culture, in which *Brucella melitensis* was isolated.

Figure 1: Trends in brucellosis notifications by place of acquisition, NSW, 1993–2016



Leptospirosis

Leptospirosis is a disease of humans and animals caused by *leptospira* bacteria, found in infected animal urine and animal tissues. Although relatively rare in Australia, leptospirosis is more common in warm and wet areas such as northeastern NSW. Cases usually occur in people who have close contact with animals or who have been exposed to water, mud, soil, or vegetation contaminated by animal urine.

Key points:

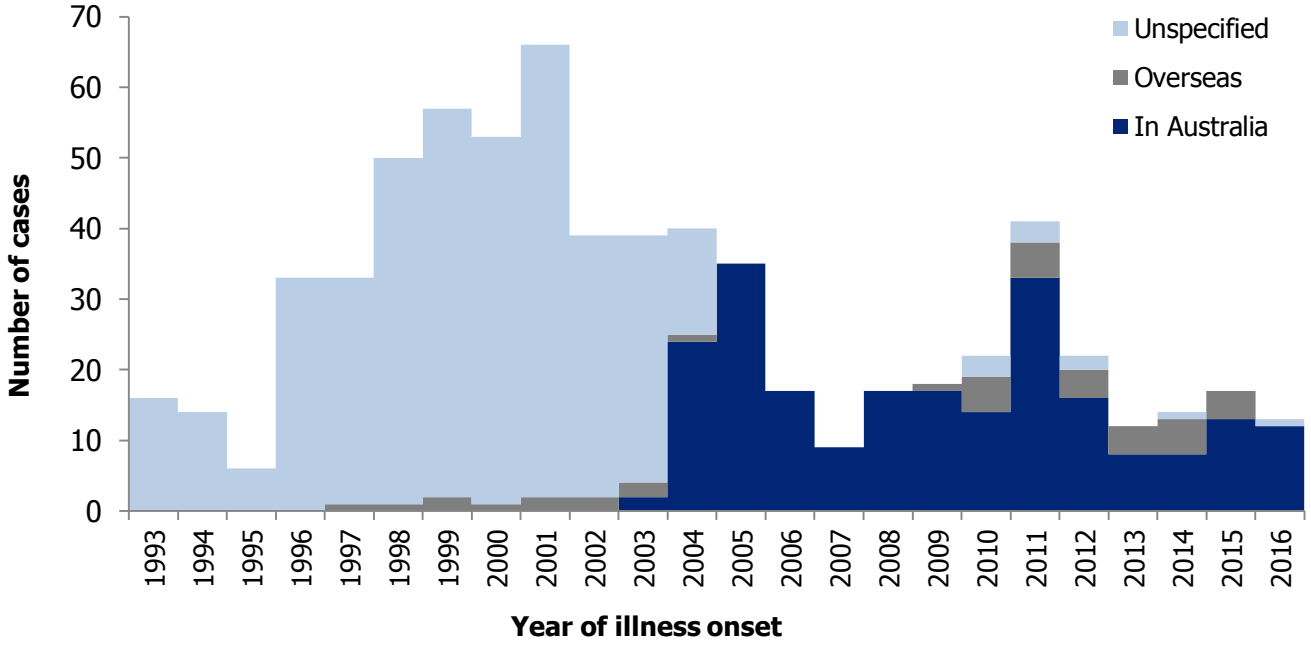
- 13 confirmed cases notified in 2016
- 9 infections acquired in NSW following direct or indirect exposure with urine or other body fluids from infected farm animals or rodents
- 3 infections acquired during travel to Queensland

During 2016, 13 (0.17 per 100,000) confirmed cases of leptospirosis were notified in NSW. This is comparable to rates observed during recent years, but substantially lower than 2011 when an outbreak linked to mouse plague occurred in southern NSW and prior to 2006 (Figure 2). Cases were predominately male (85%, n=11), ranging in age from 14–69 years (mean: 41 ± 14 years). No cases identified as Aboriginal.

Of the 12 cases interviewed, nine acquired infection within NSW. Exposures recalled by cases included: contact with farm animals (n=8), working on a farm (n=4), ingesting water from potentially contaminated sources such as tank/bore water (n=3), contact with rodents or environments potentially soiled by urine from rodents (n=3) and contact with potentially contaminated soil (n=2) or creek water (n=1).

Three cases were likely acquired during travel to Queensland. Two cases reported contact with potentially contaminated creek water; the other case reported direct contact with farm animals and consumption of tank water. No cases reported overseas travel during their infection period.

Figure 2: Trends in leptospirosis notifications by place of acquisition, NSW, 1993–2016



Psittacosis (Ornithosis)

Psittacosis is an uncommon disease caused by the bacterium *Chlamydia psittaci*. The bacteria can also cause disease in other animals which is usually called chlamydiosis. Most cases in NSW develop the disease by inhaling dust containing feathers, secretions and droppings from infected birds but more rarely can contract the disease from other animals, such as sheep, cattle and horses.

Key points:

- Seven confirmed cases notified in 2016
- Notification rates increased compared to 2015 but are consistent with the 5 year annual mean
- Four cases kept pet birds, three reported exposure to wild birds and two reported exposure to bird faeces that may have been aerosolised while mowing.

Since surveillance began in 2000, relatively high case incidence rates and sporadic outbreaks were observed from 2002–2006 in NSW, followed by a steady decline (Figure 3).

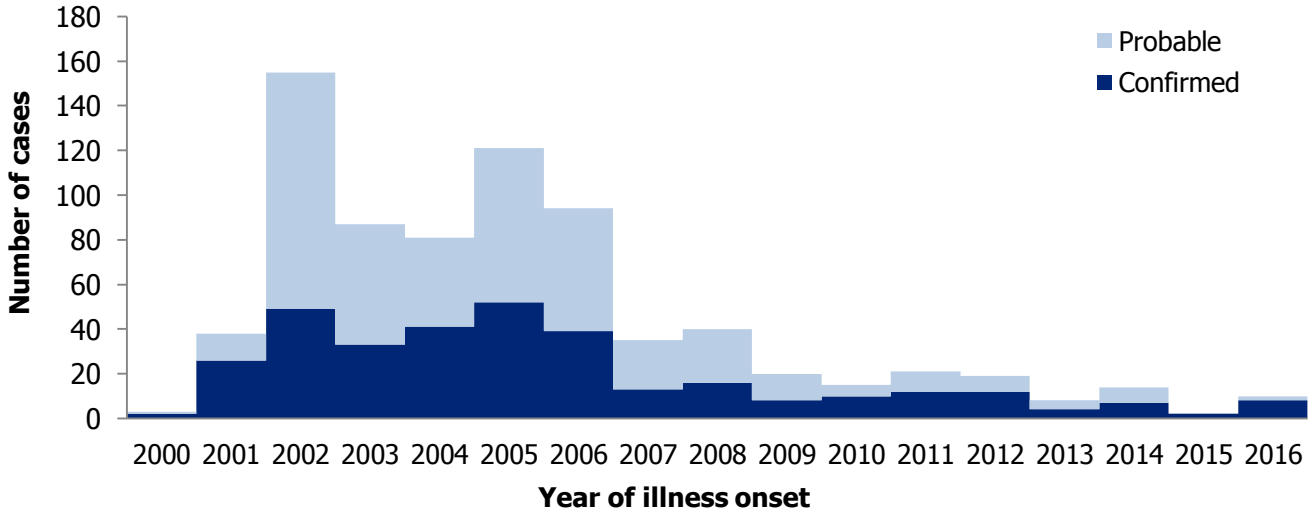
During 2016, seven (0.09 per 100,000) confirmed cases were notified in NSW. Two probable cases were also reported. These nine cases were predominately male (89%, n=8), ranging in age from 36–72 years (mean: 62 ± 10 years). One case identified as Aboriginal and Torres Strait Islander. All cases reported exposure to birds or had seen evidence of bird activity in the weeks prior to onset.

Four cases owned pet birds, but did not report any illness, deaths, introduction of new birds or visiting pet shops within the incubation period.

Three cases reported exposure to wild birds, of which two reported signs of illness and deaths among the wild flock before their illness. One case reported having direct contact with dead galahs and also using a ride on mower in the area where the birds were roosting.

The remaining two cases reported no direct contact with birds in the weeks before onset, however both reported seeing bird faeces during lawn mowing or house renovations, and it is possible they may have been incidentally exposed if the organism was aerosolised from bird faeces by mowing or other disturbance such as the use of power tools.

Figure 3: Trends in psittacosis notifications by case classification, NSW, 2000[a]–2016



[a] *Psittacosis notifications are not available prior to 2000.*

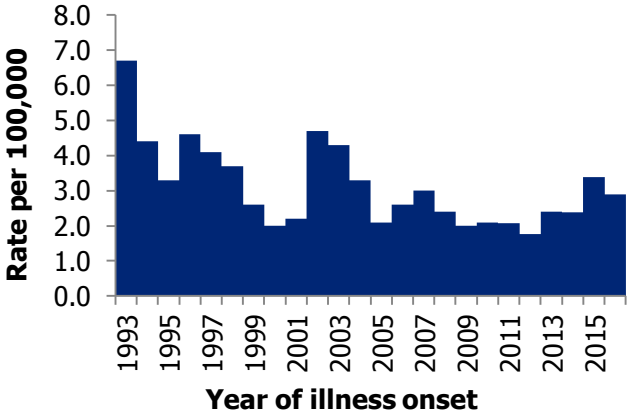
Q fever

Q fever is caused by the bacterium *Coxiella burnetii*. The main carriers of the disease are cattle, sheep and goats but other animals, including marsupials, can also be infected. People are usually infected by inhaling aerosols or dust when working with infected animals, animal tissues or animal products. The bacteria survive for long periods in the environment as they are resistant to heat, drying and many disinfectants.

Key points:

- 225 confirmed cases notified during 2016; a decrease from the previous year
- Adult males, Aboriginal people and populations in regional/remote areas were disproportionally affected
- Five cases were reported in children aged less than 16 years
- Most adult cases (74%) worked in a known high-risk occupation
- Most cases (85%) were exposed to animals or animal products, tissues or discharges

Figure 4: Trends in Q fever notifications, NSW, 1993–2016



During 2016, 225 confirmed cases of Q fever (2.88 cases per 100,000) were notified in NSW. This was lower than 2015 but significantly higher than the five year annual mean (180 cases, 2.41 cases per 100,000), and comparable to the rate observed in 2007 after the National Q fever Management Program (NQFMP, which funded screening and vaccination of targeted occupational groups) had ceased (Figure 1).

The most substantive increases were observed in Western NSW and Far West LHDs (Table 1). The highest incidence of disease was observed in regional remote areas of the state (Figure 6) – most especially Narromine Shire (n=11, 162 per 100,000), Guyra Shire (n=7, 151 per 100,000) and Lachlan Shire (n=9, 140 per 100,000) Local Government Areas (LGAs).

Figure 5: Q fever incidence rate by age, gender and Aboriginality, NSW, 2016

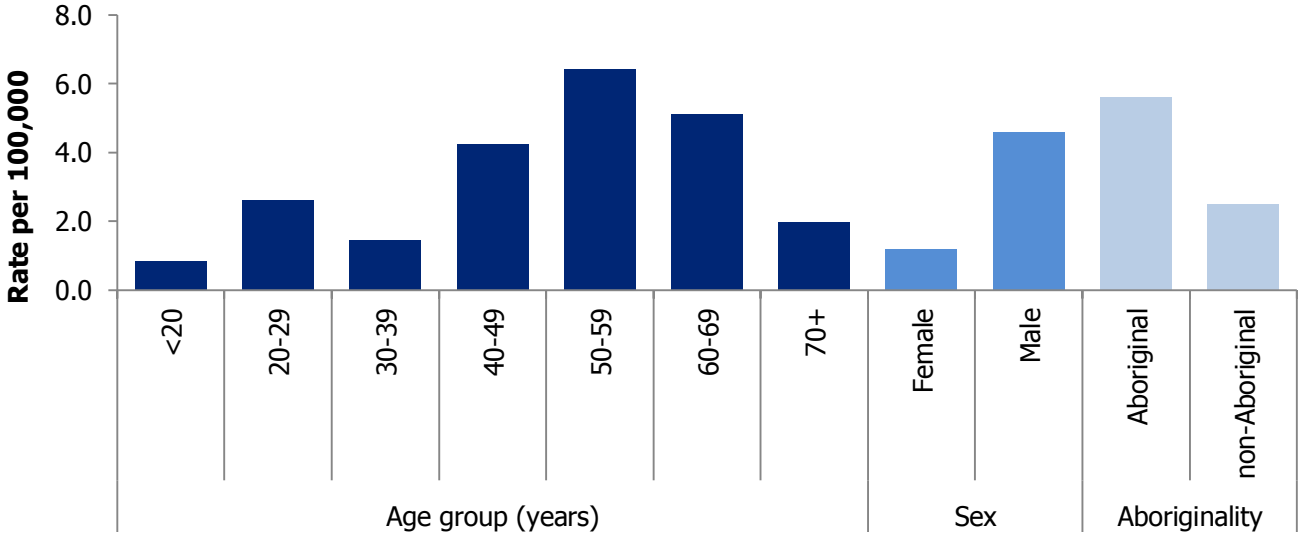
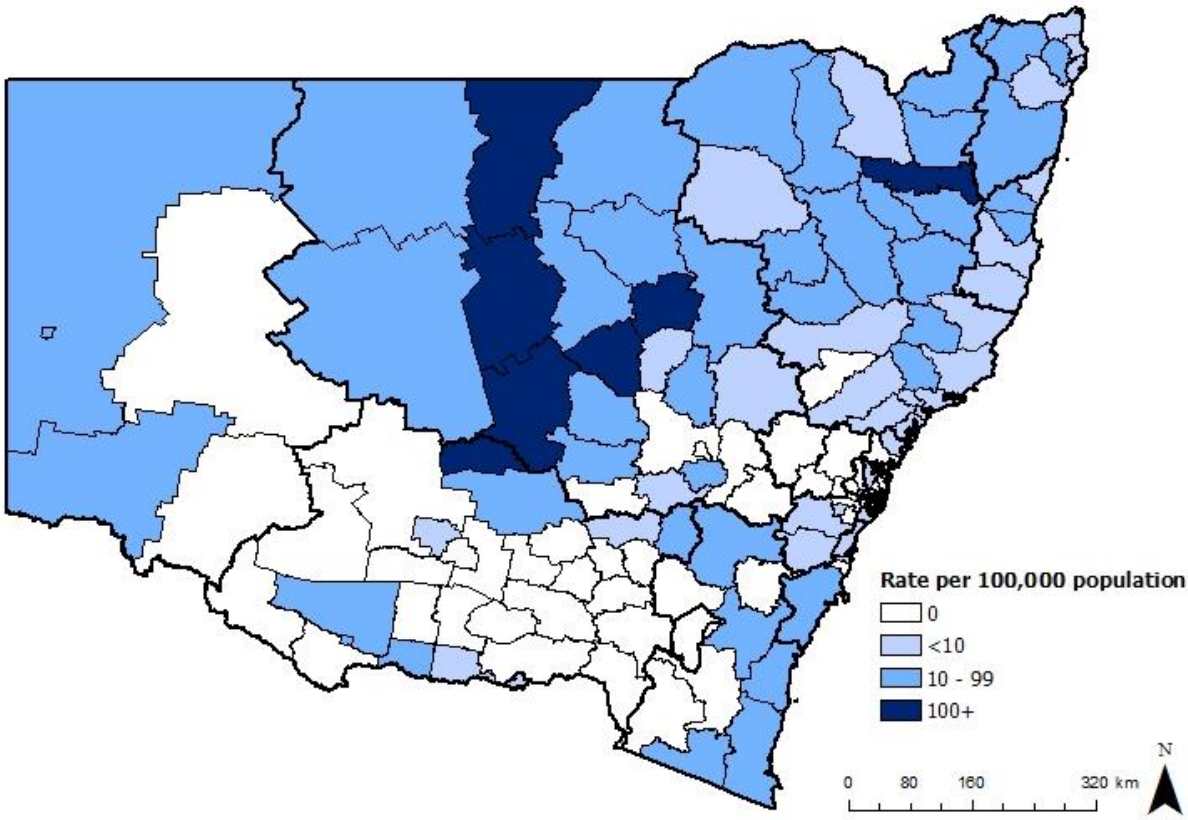


Figure 6: Q fever population incidence rate by Local Government Area (LGA), NSW, 2016



The majority of cases notified in 2016 were males (n=178, 79%), and cases ranged in age from 3–80 years (mean 48 ± 17 years) (Figure 3). Indigeneity was reported for 89% (n=200) of cases, wherein a disproportionate rate of disease was observed in Aboriginal NSW residents (n=13, 5.60 cases per 100,000) when compared to non-Aboriginal residents (n=187, 2.47 cases per 100,000).

Occupations were reported for 195 cases aged 16 years or over in 2016. Of these 74% (n=144) worked in high-risk occupations, including farmers or adults resident on a farm (n=101), shearers or wool classers (n=13), stockyard worker or stock transporters (n=11), abattoir and other meat industry workers (n=8), veterinary or wildlife workers (n=6), hunters (n=4) and competitive bull riders (n=1). The remainder of adult cases (26%, n=51) were retired, unemployed or worked in a non-animal related occupation. Five infections were reported in children under 16 years of age, all of whom were resident on a farm during the exposure period.

Exposure history was available for 197 cases in 2016. Of these, most (85%, n=167) reported one or more types of exposure to animals or animal products, including direct contact with animal tissues or discharges (n=87), and/or other or unspecified exposures to livestock or their products (n=80). The remainder reported only incidental exposures to native wildlife (8%, n=16), exposure to tick or other arthropod vectors (3%, n=6) or no discernible exposure to livestock or wildlife (4%, n=8).

Rabies and other lyssaviruses (including Australian Bat Lyssavirus)

Lyssaviruses are a group of viruses that includes rabies and bat lyssavirus. Lyssavirus is carried by bats in Australia and worldwide. Rabies is carried by terrestrial mammals in many overseas countries. Both are spread by bites and scratches, which affect the central nervous system and are usually fatal. These diseases can be prevented by rapid and thorough cleaning of the wound and post exposure prophylaxis.

Key points:

- No human cases notified in 2016
- 627 human exposures to potentially infected animals were assessed. 591 (94%) were provided with post exposure prophylaxis to prevent infection.
- 404 (68%) exposures requiring post exposure prophylaxis occurred overseas, of which 79% were in Southeast Asia and 56% were from monkey bites/scratches
- Of 187 (32%) local exposures to bats requiring post exposure prophylaxis, 18% occurred in persons who worked with (or cared for) bats, 69% were from flying-foxes. Six of these bats were considered positive for ABLV[a].
- 1,844 doses of vaccine and 1,980 vials of human rabies immunoglobulin (HRIG) were distributed as post exposure prophylaxis.

During 2016, while there were no human infections of classical rabies or ABLV, a total of 627 potential exposures to lyssaviruses were notified to public health units. This was the first increase in reported exposure events since 2013, which was largely driven by an increase in overseas exposures (Figure 7). Of all exposures, 591 (94%) were assessed as requiring post exposure prophylaxis with either rabies vaccine or HRIG.

Of 431 exposures overseas (69%), post exposure prophylaxis was initiated or continued for 404 people exposed to potentially infected animals (94%). Of these, a slightly higher proportion were in females (n=214, 53%) and travellers aged 25–39 years accounted for the greatest proportion (n=144, 37%) – mean age: 30 ± 16 years. The vast majority of overseas exposures requiring prophylaxis occurred in Southeast Asia (n=320, 79%); predominantly Indonesia or Thailand (Table 3). Most incidents involved bites or scratches from monkeys (n=210, 52%), followed by dogs (n=118, 29%) and cats (n=24, 6%).

Figure 7: Trends in local and overseas rabies and other lyssaviruses exposures, NSW, 2009–2016

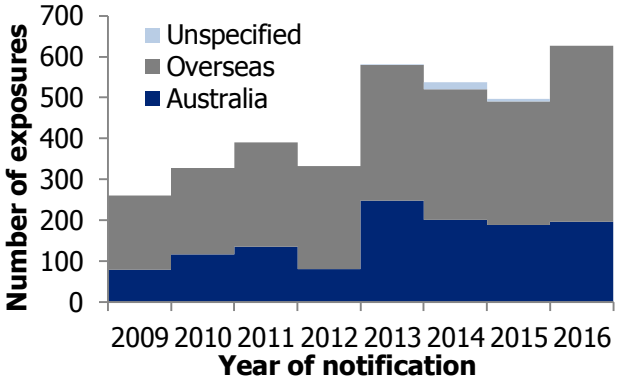


Table 3: Potential overseas exposures to rabies and other lyssaviruses by location, NSW, 2016

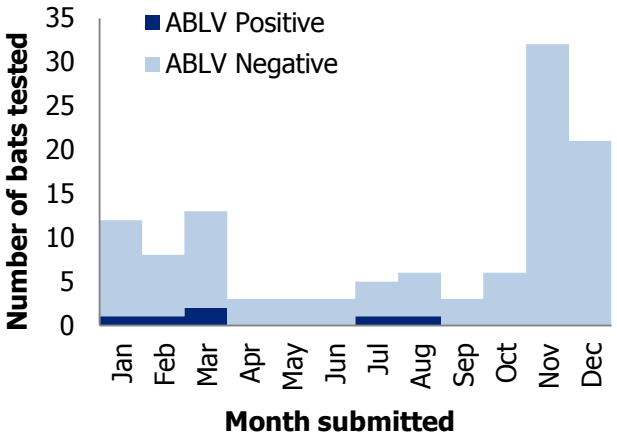
Location	n	%
Southeast Asia:	320	79
Indonesia (incl. Bali)	212	53
Thailand	59	15
Other[b]	49	12
India, Nepal, Sri Lanka, Bangladesh	32	8
China or Taiwan	20	5
Americas	12	3
Other regions or unknown	7	2
Europe (incl. Eastern and Southern)	4	1
Middle East	4	1
Africa	3	1
Russia	1	0
Japan	1	0
Total	**404**	**100**

[b] *Bhutan, Cambodia, Malaysia, Myanmar, Philippines or Vietnam*

[a] *See page 10*

Of 196 exposures to bats in Australia reported during 2016 (31%), 187 required post exposure prophylaxis (95%). Of these, slightly over half (51%, n=96) occurred in persons aged 40–69 years – mean age: 46 ± 19 years. A slightly higher proportion were in females (n=105, 56%). Occupation was reported for 167 exposures, of which 16% (n=32) were considered high risk occupations (including wild life workers/volunteers, veterinarians, etc.) and the remainder were members of the general public. The majority of bat exposures were megabats, which includes flying-foxes (n=129, 69%).

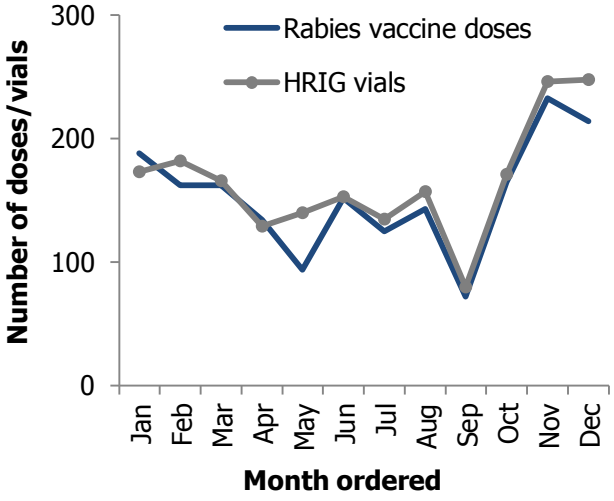
Figure 8: Number of bats tested for ABLV by month, NSW, 2016



Of 115 bats submitted for testing during 2016, six were considered ABLV positive for the purposes of post-exposure case management (see page 10). Submissions for testing peaked in November and remained high to the end of the year (Figure 8). This roughly corresponds to the bat birthing season (typically October to November each year). Four of the six ABLV positive bats were reported in the first three months of the year.

NSW Health provides post-exposure prophylaxis, including vaccination and rabies immunoglobulin, free of charge to people potentially exposed to rabies and ABLV following a risk assessment with their medical professional (see NSW Rabies and other lyssavirus infections control guidelines). Overall during 2016, NSW Health authorities distributed 1,844 doses of rabies vaccine and 1,980 vials of human rabies immunoglobulin (HRIG) to prevent infections, at a cost of approximately AUD 602,847. Distribution rates peaked in November and December 2016; corresponding with peak periods of overseas travel, bat testing and the bat birthing season (Figure 9).

Figure 9: Distribution of rabies vaccine and human rabies immunoglobulin (HRIG) by month, NSW, 2016



Outbreaks

One outbreak of *Cryptosporidium* infection was linked to a petting zoo which is described in the NSW OzFoodNet Annual Report 2016 (page 41).

Two clusters of Q fever were notified and investigated during 2016:

Southern NSW LHD: Two confirmed cases, one resident of NSW and one resident of the ACT, were linked to the one goat herd. The goat herd had been kidding in the previous month, although no abortions were reported. The NSW resident had given some goats from this herd to a friend in the ACT, after which both friends subsequently developed infection. Neither had been vaccinated against Q fever.

Hunter New England LHD: Two confirmed adult cases from the same family, who were likely to have been exposed while assisting with an animal birthing on a farm two weeks before the onset of symptoms. All children in the family were subsequently tested and found to be negative. Neither case had been vaccinated to prevent Q fever infection.

Animal health events notified to NSW Health

Key points:

- Sporadic cases of ABLV, anthrax, brucellosis and Hendra virus infection were reported in animal populations in 2016

Notifications of significant zoonotic animal health events to Department of Primary Industries (DPI) or Local Land Services (LLS) are rapidly communicated to NSW public health authorities. Depending on the disease and nature of the event, public health units (in collaboration with DPI, LLS and other relevant parties) will investigate human exposures and advise appropriate actions, which may include monitoring for symptoms and referral for laboratory testing and treatment. While animal health authorities work to confirm the diagnosis through laboratory tests at the Elizabeth Macarthur Agriculture Institute (EMAI) and the Australian Animal Health Laboratory (AAHL) and control spread in animal populations, public health authorities take steps to prevent human infections, such as providing education to reduce risk and post-exposure treatment, where indicated.

There were no incidents or clusters of highly pathogenic avian influenza, avian psittacosis, leptospirosis, terrestrial rabies or tularemia reported in NSW animal populations during 2016.

During 2016, NSW authorities collectively responded to the following animal health events:

ABLV – 115 bats were submitted for testing for one or more reasons: human exposures, exposure of a pet, or exhibiting signs suggestive of ABLV infection. ABLV infection was considered to be present in six flying foxes; five were confirmed in the laboratory using diagnostic tests specific to ABLV thereby meeting the definition of a confirmed infection, and one was diagnosed by histopathology. Of these, three were submitted following known significant human exposures. Five of the six flying foxes were either unwell or moribund and showing aggression or neurological signs (see also Rabies and other lyssaviruses).

Anthrax – was investigated on 132 occasions as the cause of death of stock, of which five incidents were confirmed. The first infection was confirmed in February 2016 in Carrathool Shire LGA and included ten cattle deaths. Two other incidents in cattle occurred in April in Cabonne Shire and Cobar Shire LGAs, and resulted in one and 11 cattle deaths, respectively. Two further incidents occurred in sheep in March and April, both in Cabonne Shire LGA, which resulted in 25 and one deaths respectively. Vaccination of all susceptible stock was undertaken shortly after infection was confirmed. In all events, public health units determined all potential human exposures to be low-risk and did not require prophylactic treatment.

Brucellosis – samples from 256 dogs were submitted for testing during 2016 (a 15% decrease compared to 2015). Of these, 25 were serologically positive and another 8 were inconclusive. The majority of positive cases originated from the north west of NSW and had reported either contact with feral pigs or were fed raw feral pig meat. NSW DPI assists private veterinarians in assessing and managing the risks posed by *Brucella suis* infection in dogs, providing advice on infection control to prevent transmission to humans and other animals.

Equine Chlamydiosis – was investigated in 196 instances of foetal death or perinatal illness in horses in NSW during 2016. The *Chlamydia psittaci* organism was detected in 21 cases, all from the Hunter region. All infections were reported to the local public health unit for assessment. No human cases of psittacosis resulting from exposure to these horses were reported.

Hendra virus infection – Of 252 reports of sick or dead horses where samples were submitted for Hendra virus testing in NSW during 2016, Hendra virus infection was confirmed on one property involving a single adult horse. The event occurred

in Richmond Valley LGA in December 2016. The horse was not vaccinated against Hendra virus. The dead horse was buried and the property was placed into quarantine. As there had been minimal human contact with the affected animal no public health intervention was required for any humans (Table 4).

Table 4: Human assessment and treatment following exposure to horses infected with Hendra virus, NSW, 2016[a]

Date	Council Area	Number of Horses	Number of Human contacts			Human Risk Assessment
			High Risk	Moderate Risk	Low/Neg Risk	
Dec-2016	Richmond Valley	1	0	0	1	Horse owner: minimal contact with sick horse during infectious period. Assessed as 'low risk'.
Total		1	0	0	1	

[a] *Only lists humans deemed 'exposed'. The table does not include people who wore appropriate personal protective equipment (PPE).*

Appendices

Appendix 1: Methods

Human disease notifications: Under authority of the *NSW Public Health Act 2010*, NSW Health receives notifications of communicable diseases from laboratories, doctors, and hospitals. Cases are recorded on the NSW Notifiable Conditions Information Management System (NCIMS) – a confidential, internet based system used by NSW public health units – and categorised based on the agreed national cases definitions.[2]

This report reflects notifications of anthrax, avian and other animal influenza virus infections, brucellosis, Hendra virus infections, leptospirosis, psittacosis, Q fever, and rabies and other lyssaviruses (including ABLV), recorded in NCIMS on or shortly after 27 April 2017. Unless specified otherwise, cases were categorised by calendar year based on calculated onset date (i.e. the date of symptoms onset, or whichever occurred first between dates of specimen collection and notification).

Incidence rates were calculated using mid-year estimated resident population (ERP) projections published by the Secure Analytics for Population Health Research and Intelligence (SAPHaRI) group, NSW Ministry of Health. This includes LGA based ERPs derived from estimates published by the NSW Department of Planning and Environment (prior to 2015)[3] with projections from 2015 produced by using cubic spline interpolation, and Aboriginal/non-Aboriginal ERPs derived from estimates published by the Australian Bureau of Statistics.[4]

The degree to which notification data reflect the true incidence of disease varies between conditions, as many people with infectious disease will not be diagnosed with the disease or notified. For some conditions (e.g. Q fever), where infections maybe asymptomatic or are not diagnosed, notifications likely underestimate the true incidence of disease. Notification data are also subject to retrospective changes – data are only accurate at the time of extraction.

Animal disease notifications: Members of the public, veterinarians or animal owners or managers are legally obligated to notify certain suspected animal diseases under legislation. This report reflects selected conditions prone to infect humans, notified to the DPI during 2016, and conveyed to public health authorities. This information is not intended to reflect overall incidence of disease in the animal population, but rather an indication of the scope of diseases upon which the DPI and NSW Health collaborate to prevent transmission to the public.

Rabies post-exposure treatment: Doctors contact public health units for advice on the management of potential exposures to lyssaviruses. Where indicated, public health units arrange for the ordering, urgent delivery and administration of rabies vaccine and HRIG to prevent infection – a service provided free of charge to NSW residents. These events are routinely captured in NCIMS, and records of rabies vaccine and HRIG distribution are maintained by the Immunisation Unit.

Costs estimates provided in this report were based on the total number and costs of treatments distributed and courier distribution costs. This does not take into account any salaries, consumables, consultation costs, other incidental costs borne by NSW Health or costs associated with testing bats.

Appendix 2: Zoonoses notifiable to NSW human and/or animal health authorities

Disease	Status in NSW	Human health notification	Animal health notification
Anaplasmosis	sporadic		✓
Anthrax	sporadic	✓	✓
Arboviral infections	varies by virus	✓	some
Babesiosis	sporadic		✓
Borna disease	exotic		✓
Brucellosis - *Brucella suis*	sporadic	✓	✓
Brucellosis - NEC	exotic	✓	✓
Camelpox	exotic		✓
Campylobacteriosis	endemic	*	
Crimean-Congo haemorrhagic fever	exotic	✓	✓
Cryptosporidiosis	endemic	✓	
Cysticercosis – porcine, bovine	exotic/sporadic		✓
Encephalitides (tick-borne)	exotic		✓
Escherichia coli - STEC and HUS	endemic	✓	
Getah virus infection	exotic		✓
Giardiasis	endemic	✓	
Glanders	exotic		✓
Hendra virus infection except in pteropid bats	sporadic	✓	✓
Hepatitis E	sporadic	✓	
Influenza - highly pathogenic avian influenza	exotic	✓	✓
Influenza - swine/equine influenza	exotic	✓	✓
Leishmaniasis	exotic		✓
Leptospirosis	endemic	✓	✓
Listeriosis	endemic	✓	
Louping ill	exotic		✓
Lyssavirus - ABLV	endemic	✓	✓
Lyssavirus - Rabies	exotic	✓	✓
Menangle virus infection	sporadic		✓
Nairobi sheep disease	exotic		✓
Newcastle disease	exotic		✓
Nipah virus infection	exotic	✓	✓
Pigeon paramyxovirus	sporadic		✓
Plague	exotic	✓	
Psittacosis (Ornithosis) / Chlamydiosis in birds	endemic	✓	✓
Q Fever	endemic	✓	
Rift Valley fever	exotic	✓	✓
Salmonellosis - NEC	endemic	✓	
Salmonellosis - *Salmonella* Enteritidis	sporadic	✓	✓
SARS CoV	exotic	✓	
Transmissible spongiform encephalopathy	exotic	✓	✓
Trichinellosis	exotic		✓
Trypanosomiasis / Chagas' disease	exotic		✓
Tuberculosis - Bovine (*Mycobacterium bovis*)	exotic		✓
Tuberculosis - other mammal or avian	sporadic		✓
Tularaemia	Exotic/sporadic	✓	✓
Turkey rhinotracheitis (avian metapneumovirus)	exotic		✓
Vesicular stomatitis virus	exotic		✓
Viral haemorrhagic fever, human – NEC	exotic	✓	
Warble-fly myiasis	exotic		✓
Wesselsbron disease	exotic		✓

*NEC: Not elsewhere classified. * Campylobacter notifications commenced in NSW on 7 April 2017*
Table correct as at 31 December 2016

Appendix 3: Additional sources of information

See NSW Health's Infectious Diseases website for further information for the general public and health professionals on all human health conditions presented in this report, as well as other notifiable conditions. This includes NSW-specific data and information, factsheets and control guidelines on:

- Anthrax
- Avian influenza
- Brucellosis
- Hendra virus
- Leptospirosis
- Psittacosis
- Q fever
- Rabies and ABLV
- Tularemia.

See the DPI's Animal health and diseases and Animal Biosecurity Zoonoses websites for further information for general public, veterinarians and animal health authorities about zoonoses in animals.

Appendix 4: List of acronyms

AAHL	Australian Animal Health Laboratory
ABLV	Australian Bat Lyssavirus
ACT	Australian Capital Territory
CDNA	Communicable Diseases Network Australia
DPI	Department of Primary Industries
EMAI	Elizabeth Macarthur Agriculture Institute
ERP	Estimated resident population
HRIG	Human rabies immunoglobulin
LGA	Local Government Area
LHD	Local Health District
LLS	Local Land Services
NCIMS	Notifiable Conditions Information Management System
NEC	Not elsewhere classified
NSW	New South Wales
NQFMP	National Q Fever Management Program
PPE	Personal protective equipment
SAPHaRI	Secure Analytics for Population Health Research and Intelligence
Yr	Year

Contributors and acknowledgements

This report was developed by staff of the Enteric and Zoonotic Diseases Unit and the Immunisation Unit, Communicable Diseases Branch, Health Protection NSW in collaboration with the NSW Department of Primary Industries.

Protecting the health of the community is a collaborative effort, involving public health units, clinicians, laboratory scientists, affected communities, and other government and community-based organisations. We sincerely thank all those involved for the role they played in NSW in 2016.

References

1 World Health Origanization. Health Topics: Zoonoses. [updated: 2016; cited: 28 Apr 2016]. Available from: http://www.who.int/zoonoses/control_neglected_zoonoses/en/

2 Communicable Diseases Network Australia (CDNA). Australian national notifiable diseases and case definitions. [updated: 15 Apr 2016; cited: 5 May 2016]. Available from: http://www.health.gov.au/casedefinitions

3 NSW Planning and Environment. NSW population, household and dwelling projections. [updated: 3 July 2017 cited: 17 July 2017]. Available from: http://www.planning.nsw.gov.au/Research-and-Demography/Demography/Population-Projections

4 Australian Bureau of Statistics. 3238.0 - Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026 [updated: 17 Dec 2015; cited: 5 May 2016]. Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3238.0Main+Features12001%20to%202026?OpenDocument