

Trichinella and Australian wildlife

Fact Sheet

February 2022

Introductory statement

Trichinella is a genus of intracellular helminth parasites of mammals, birds and reptiles. Trichinellosis (disease caused by infection with *Trichinella* spp.) primarily refers to infection with *T. spiralis*, a significant public health risk ^[1]. *Trichinella spiralis* has never been diagnosed in animals in Australia ^[2]. *Trichinella pseudospiralis*, a related species, has been reported in wildlife in Tasmania ^[3] and *T. papuae* has been detected in two wild boar from the Torres Strait ^[4,5]. *Trichinella* have not been detected on mainland Australia.

Aetiology

Trichinella spp. are nematodes belong to the family *Trichurata*. There are 12 genotypes identified, nine of which are distinct species ^[6]. Most human cases of trichinellosis are due to *T. spiralis* and *T. murrelli* ^[1].

Natural hosts

Trichinella infections in general occur in an extremely wide host range including mammals and birds. Infection is most common in rodents and carnivores but it is likely that all mammalian species can serve as suitable hosts ^[7]. The domestic pig is the main reservoir host for *T. spiralis*.

Trichinella pseudospiralis infections are found in a wide range of mammals and birds ^[8]. In Tasmania, *T. pseudospiralis* has been reported in four marsupial species; spotted-tailed quolls (*Dasyurus maculatus*), eastern quolls (*D. viverrinus*), Tasmanian devils (*Sarcophilus harrisii*), brushtail possums (*Trichosurus vulpecula*) and two predatory bird species, masked owls (*Tyto novaehollandiae*), and swamp harriers (*Circus approximans*). It has not been found in macropods, feral rats or cats ^[3, 9, 10].

World distribution and occurrence in Australia

Trichinella spp. have been detected worldwide in domestic and wild animals ^[11]. *Trichinella pseudospiralis* is widespread globally ^[8].

Trichinella pseudospiralis infection has been detected in marsupials and birds in Tasmania ^[3], and in a human from Tasmania ^[12]. *Trichinella papuae* has been detected in wild boar from a Torres St island and has been described in pigs in New Guinea ^[4]. There are no cases of *Trichinella* reported from mainland Australia.

Trichinella spiralis has never been diagnosed in animals in Australia and Australia's domestic pig population is free from *T. pseudospiralis* and other *Trichinella* species [2, 3].

Epidemiology

Hosts are infected by ingesting encysted larvae in muscle tissue. Most wildlife acquire the parasite as a result of scavenging. Pigs can become infected following ingestion of uncooked garbage, faeces or infected rat carcasses. The matured larvae penetrate the small intestine and distribute throughout the body and burrow into individual muscle cells. This results in formation of a cyst to protect the larvae [6]. Globally, wildlife may be an important reservoir for infection of domestic animals and humans [1].

The epidemiology of *T. pseudospiralis* is not fully understood. The parasite is widespread globally, suggesting a possible role for birds in spread, although the parasite is genetically distinct across different continents, which suggests a degree of genetic isolation [13]. In Tasmania, the lifecycle of the parasite probably moves between wildlife predators and prey [3]. Tasmanian devils and other wildlife species are probably infected through predation, carrion feeding and cannibalism [14].

Laboratory rodents, pigs and chickens were successfully infected after experimental ingestion of infected meat from Tasmanian devils and quolls, although it was considered that *T. pseudospiralis* was only poorly infective for these hosts [3]. Subsequently, cats, brushtail possums, swamp harrier and brown falcon (*Falco berigora*) were experimentally infected with *T. pseudospiralis* [9].

Although *T. pseudospiralis* forms a domestic cycle (humans and domestic pigs) in Eastern Europe, the role of domestic animals in the natural cycle of *T. pseudospiralis* seems to be negligible [8].

Clinical signs

Infection in wildlife and domestic animal hosts does not commonly cause clinical disease. Lethargy, fever, inappetence, reduced growth, decreased reproductive activity and increased risk of predation may be seen [1]. Gastrointestinal and respiratory symptoms, fever, muscle pains and weakness are seen in humans.

Diagnosis

Diagnosis is by microscopic examination of muscle biopsy (trichinoscopy) or antibody detection, using ELISA. ELISA testing for *Trichinella* is known to have high false positive rates in wildlife [5]. Samples for trichinoscopy include tissues of tongue, jaw, diaphragm and skeletal muscle. Polymerase chain reaction (PCR) has simplified the identification of *Trichinella* isolates from different host species and geographical regions [1]. *Trichinella pseudospiralis* is almost impossible to detect by trichinoscopy, but can be detected using the digestion test [8]. ELISA testing may be used as a screening test, followed by a more specific test such as Western blot or PCR to confirm suspect cases [5].

Pathology

There may be elevated muscle enzymes in blood serum. There are few gross lesions observed with infection. Lesions may include sloughing of gut epithelium and local haemorrhage of the small intestines. Larval cysts may be visible in the muscles of the jaw, tongue and diaphragm. Affected muscles and lymph node may be grossly swollen and soft in texture.

Treatment, prevention and control

There is no treatment for trichinellosis in animals ^[6]. In wildlife, treatment is unlikely to be necessary as infection rarely causes disease. Likewise, prevention and control in free-living wildlife is not considered necessary. For domestic animals, the most practical form of control is preventing ingestion of contaminated animal products ^[1]. Human infection can be avoided by ensuring meat is cooked appropriately. Prevention of domestic trichinellosis in endemic areas involves farm level controls, meat inspection regulations, food processing methods and public education ^[6].

Statistics

A survey of Tasmanian wildlife and feral species in 1988 detected positive cases in 70% of Tasmanian devils, 30% of spotted-tailed quolls and 36% of eastern quolls. Only one of 22 brush-tailed possum (*Trichosurus vulpecula*) was infected in the first survey and no other infected possums (n = 145) were found in across other areas of Tasmania ^[3].

Tasmanian devils were subsequently trapped in several locations across Tasmania. The prevalence of infection varied but *Trichinella* was shown to be geographically widespread across the state, with an overall prevalence of 30% in this species.

Examination of museum specimens (Tasmanian devils, spotted-tailed quolls, eastern quolls and thylacine (*Thylacinus cynocephalus*) found evidence of *Trichinella* infection in devils from the 1970s ^[3].

No infections were detected from limited sampling of Bennett's wallabies (*Macropus rufogriseus*), Tasmanian pademelons (*Thylogale billardierii*), feral rodents (*Rattus rattus* and *Mus musculus*) and feral cats (*Felis catus*) across Tasmania ^[3]. The findings of these surveys suggest *T. pseudospiralis* is endemic or had been established in Tasmania for some time ^[3].

Sera from 321 wild boar from south-western WA (considered a low-risk area for possible *Trichinella* incursion) and 352 wild boar from regions of northern Australia (considered to be high-risk for the introduction of *Trichinella*) were tested by ELISA, with positive samples then tested by Western blot and PCR. All samples were PCR negative for *Trichinella*, although ELISA showed a low level of positive results, which could be attributed to cross-reactivity or other causes of low specificity ^[5].

Surveillance and management

In Australia, domestic surveillance for *Trichinella* includes abattoir monitoring. A study of wild pigs and other feral carnivores found no evidence of *Trichinella* infection in the far north of mainland Qld and south-west WA, with two positive cases of *T. papuae* in wild boar from a Torres St island ^[4].

^{5]}. Surveillance in Australian wildlife includes game meat export certification results and limited other surveys in wildlife ^[4, 15].

Wildlife Health Australia administers Australia's general wildlife health surveillance system, in partnership with government and non-government agencies. Wildlife health data is collected into a national database, the electronic Wildlife Health Information System (eWHIS). Information is reported by a variety of sources including government agencies, zoo based wildlife hospitals, sentinel veterinary clinics, universities, wildlife rehabilitators, and a range of other organisations and individuals. Targeted surveillance data is also collected by WHA. See the WHA website for more information <https://wildlifehealthaustralia.com.au/Our-Work/Surveillance> and <https://wildlifehealthaustralia.com.au/Our-Work/Surveillance/eWHIS-Wildlife-Health-Information-System>.

There are reports of *T. pseudospiralis* infection in Tasmanian devils and a quoll (*Dasyurus* sp.) from Tasmania, and *T. papuae* in a boar from Torres St in the National Wildlife Health Information System.

Human health implications

Trichinella infection is a significant public health risk to humans. Consumption of raw or undercooked meat represents the main risk for human infection ^[11]. A risk assessment for the introduction of *T. pseudospiralis* and *T. papuae* in mainland Australia via wildlife found a very low level of risk of introduction, but possible significant consequences for human health recreational hunters, consumers of game meats and government authorities responsible for food security and trade ^[15]. *Trichinella pseudospiralis* is also considered a zoonosis ^[8] although only one case in humans have been reported in Tasmania ^[12].

Conclusions

Trichinellosis is a significant zoonosis in many countries worldwide. *Trichinella* spp. are not present in mainland Australia and incursion would have considerable public health, trade and animal health implications. Ongoing surveillance, research and prevention strategies are important to ensure the parasite is not introduced to Australia in meat products or wildlife.

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Wildlife Health Australia recognises the Traditional Custodians of Country throughout Australia. We respectfully acknowledge Aboriginal and Torres Strait Islander peoples' continuing connection to land, sea, wildlife and community. We pay our respects to them and their cultures, and to their Elders past and present.

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