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Detection and surveillance for animal trichinellosis in GB

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Abstract

The zoonotic disease trichinellosis is considered one of the re-emerging diseases with surveillance and control methods constantly gaining more importance worldwide. Recent change in European Union (EU) legislation introduces *Trichinella*-free production, and the possibility of risk-based monitoring for *Trichinella* in pigs. This has increased the role of wildlife surveillance programmes and their impact on protecting human health as well as highlighted the need for harmonised surveillance protocols and test methods for these infections.

A modified digest method, based on the EU reference method for *Trichinella* testing of pig meat, was used to screen foxes present in Great Britain (England, Scotland and Wales) for trichinellosis. The method was validated using batched pools of 10 g foreleg muscle from up to 20 foxes (maximum amount 200 g). The method gave an average trichinae recovery rate of 71% for spiked samples. Assuming this recovery rate applies to all contaminated samples, then the test sensitivity would be 70% for all tissue samples with 0.1 trichinae per 10 g of foreleg muscle, 99.9% for samples with 1 trichinae per 10 g, and 100% for samples with 2 or more trichinae per 10 g.

In two separate studies, conducted between 1999 to 2001 (Smith et al., 2003) and 2003 to 2007, over 3500 wild foxes have been screened for *Trichinella* with negative results. In the second study reported here, foxes were collected from locations throughout Great Britain using a stratified sampling method based on fox population densities. All work was conducted in compliance with appropriate quality assurance systems, latterly under ISO 9001. Results to date indicate the national prevalence of trichinellosis in foxes is <0.001 based on a 10 g individual sample size, an infection level of 1 larva per gram (lpg) and 95% confidence interval. This, together with no reports of trichinellosis in domesticated pigs, suggests that Britain can be considered a region of negligible risk of trichinellosis.

Keywords: Trichinellosis; Surveillance; Foxes; Muscle digest method; Validation; Quality assurance (QA); Great Britain (GB)

1. Introduction

Trichinellosis is a zoonosis, caused in humans by the ingestion of raw or undercooked meat containing larvae of the nematode genus, *Trichinella*. Species of *Trichinella* can be found worldwide in a variety of hosts, ranging from mammals to birds and reptiles. The genus *Trichinella* is divided into an encapsulated and non-encapsulated clade, referring to the collagen capsule that surrounds the larvae of some species in the host muscle. Presently there are 8 recognised *Trichinella* species and three genotypes. While historically the

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domestic cycle and human disease were always closely associated with *Trichinella spiralis*, which is believed to have now established an independent sylvatic cycle, there are now four species recognised to exist within Europe: *T. spiralis*, *T. pseudospiralis*, *T. nativa* and *T. britovi*. Symptoms of trichinellosis are usually only reported in humans, infected animals generally do not display clinical signs. A complete and comprehensive overview of the systematics of *Trichinella* has been published by Pozio and Murrell (2006).

Human trichinellosis is not notifiable in every country and data are submitted to the World Organisation for Animal Health (OIE) on a voluntary basis. Individual human cases reported to the OIE in the years 1999–2003 fluctuate between approximately 1600 and over 2500 worldwide. A survey on human trichinellosis, carried out by the International Commission on Trichinellosis (ICT) in 2004 revealed a notable disparity in the numbers of cases reported to the OIE for that year and the results of the ICT survey, and it can be assumed that the actual number of affected humans worldwide is probably higher. Globally, human trichinellosis is estimated to affect at least 11 million people (Kapel, 2005).

Within the EU member states the annual number of reported cases of trichinellosis in humans has varied between 48 and 97 cases during the period 1999–2003. This number includes imported cases, either through humans travelling abroad, or through imported meats. In 2004 this number increased to 270, with over 80% of these cases reported in 4 of the 10 new EU member states (EFSA, 2006a,b).

Worldwide, the most important cause for trichinellosis in humans is meat from infected pigs or wildlife. In Europe, France and Italy, horses were also involved in large outbreaks in the 1990s (Boireau et al., 2000). Infections in pigs are detected on a regular basis in Europe, though at a very low level (<0.001%) and most reported infections are found in wild boar and other wildlife (EFSA, 2006a,b). Infected pigs generally come from 'high-risk' production systems, such as backyard, free-ranging, organic or small family production. Animals, including wildlife, slaughtered for own private consumption are exempt from official *Trichinella* testing, and pose an additional risk to human health.

In the United Kingdom (Britain and Northern Ireland), the last recorded case in pigs was 1979 in a pig from Northern Ireland (information held by the VLA). No human cases demonstrably originating in the UK (i.e. acquired from meat produced in the UK) have been reported since the last outbreak in Liverpool, England, in 1953 following the consumption of an infected domestic pig (Semple et al., 1954). It is assumed that the products causing the 1969 outbreak of trichinellosis in a group of soldiers stationed in Aldershot originated in south Wales, but the actual source could not be traced (Bradford et al., 1971). An outbreak in the UK in 2000, involving eight cases was caused by the consumption of pork salami imported from northern Serbia, Federal Republic of Yugoslavia (Milne et al., 2001). Regular screening of pigs for Trichinellosis in abattoirs have given negative results and for the last 30 years, Great Britain has been considered free of the disease.

Wildlife acts as a natural reservoir for *Trichinella*. Links between the sylvatic and domestic cycle are well reported and, depending on human cultural food practices, the causative agent may enter the human food chain resulting in infection (Pozio and Murrell, 2006). In Europe, *T. spiralis*, *T. britovi*, *T. nativa* and *T. pseudospiralis* are transmitted in nature among wildlife. The red fox (*Vulpes vulpes*) is considered the main wildlife reservoir host for *Trichinella* infections (Pozio, 1998) and its role as an indicator animal is well established (Anon, 1996). In Europe, the species strongest associated with red foxes is *T. britovi*, though depending on the area and altitude a higher prevalence of *T. spiralis* in foxes has been observed (Pozio et al., 2007). The reported occurrence of *Trichinella* in foxes varies dramatically: from 0.1% in Denmark (Enemark et al., 2000), 0.9% in the Republic of Ireland (Rafter et al., 2005), 3% in Spain (Pérez-Martin et al., 2000), 4.8% in Norway (Davidson et al., 2006), up to 41% in Estonia (Järvis et al., 2004) to 80% in certain regions in Finland (Oivanen, 2005).

It has been widely accepted that it is almost impossible to achieve absolute freedom of the disease in wildlife. New food hygiene legislation applied throughout the EU under Commission Regulation (EC) No 2075/2005 lays down specific rules on official controls for *Trichinella* in domestic pig meat, and addresses the risk of infection from wildlife to domestic pigs. Derogation from the required sampling and examination of carcases and meat of domestic pigs (kept solely for fattening and slaughter) in slaughterhouses is permitted in regions of the EU, where the risk of *Trichinella* in domestic pigs is officially recognised as negligible. To apply for official recognition as a region of negligible risk from *Trichinella* infection, EU Member States must provide supporting evidence based on the results of monitoring programmes covering domestic pigs, horses and other susceptible species. A wildlife-monitoring programme is mandatory, especially in regions where no *Trichinella* has been detected