Research Note

Trichinella nativa in sylvatic wild boars

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Abstract

Of 17 *Trichinella* isolates from domestic pigs and wild boars (*Sus scrofa*) in regions where *Trichinella nativa* is widespread among sylvatic animals, two wild boars from Estonia were found to be naturally infected with this *Trichinella* species. The other 15 animals were infected with *Trichinella spiralis*. *Trichinella nativa* is tolerant to freezing when in the muscles of carnivores. The biological characteristics and temperature tolerance of this species in swine need to be further investigated if pork is certified for consumption following freezing.

Since 1916, extensive studies have been conducted on the effect of freezing pork on the viability of *Trichinella* sp. larvae in muscles (Ransom, 1916; Rust & Zimmerman, 1972; Smith, 1975), and a regulation has been established to certify pork *Trichinella*-free by freezing (Murrell, 1985). The existence of freezing-resistant isolates of *Trichinella* has became apparent in the Arctic since 1950 (Brandly & Rausch, 1950). Studies on mice have shown that a high resistance to freezing is a biological characteristic of parasites identified as *Trichinella nativa* and *Trichinella* T6, and that the degree of resistance is lower for parasites belonging to *Trichinella britovi* (Pozio *et al.*, 1992a, 1994).

Even though the results from rodent studies are not directly applicable for swine, the existence of freezing-resistant *Trichinella* larvae has concerned veterinarians working on the control of foodborne diseases, and the dangers of the introduction of these parasites in the domestic habitat, i.e. in pig farms.

Since 1986, the *Trichinella* Reference Center (TRC) (Pozio *et al.*, 1989) has studied 17 *Trichinella* isolates from domestic and sylvatic swine originating from regions where *T. nativa* is widespread among sylvatic animals; two (11.8%) of them belong to *T. nativa*, whereas the other 15 (12 from domestic pigs and three from wild boars) have been identified as *Trichinella spiralis* by biochemical and/or molecular analyses. Muscle larvae (ML) of *T. nativa* have been collected from two naturally infected wild boars (*Sus scrofa*) killed by hunters in Estonia (58°04′N, 26°56′E; 59°01′N, 26°54′E). The wild boars harboured 7.4 and 12.0 ML/g in the masseter muscle after artificial digestion according to standard procedures (Pozio, 1987). In spite of the limited number of isolates examined at the TRC, the high prevalence of *T. nativa* (11.8%) indicates that this species may play a significant epidemiological role in endemic areas. In the Tianjin region (China) (39°N; 117°E), *T. nativa* has been detected in a domestic pig (Gasser *et al.*, 1998). In the Primorsk Region (Russia), where *T. nativa* is widespread among sylvatic animals, this *Trichinella* species has been detected in two of 133 examined wild boars, one of which harboured a mixed infection with *T. spiralis* (Britov, 1995). In the same geographical area, *T. spiralis* was the only species found in 42 of the 746,747 domestic pigs examined (Britov, 1995). In spite of the above observations in nature, experimental inoculations with *T. nativa* ML have shown domestic pigs are rarely, or not at all, a susceptible host to this *Trichinella* species. Britov (1982), who infected pigs with 20 ML of *T. nativa* per 1 g of body weight, observed an intensity of infection ranging from 0.03 to 0.3 ML/g, 30

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https://doi.org/10.1017/S0022149X00700253 Published online by Cambridge University Press

days post infection (d.p.i.), but he did not recover any larvae 120 d.p.i. Murrell *et al.* (1985) showed a reproductive capacity index (RCI; larvae recovered/ larvae given per os) of *T. nativa* in experimentally infected pigs ranging from 0.003 to 0.09. No ML of *T. nativa* were recovered from pigs infected with 10,000 ML (0.5 ML/g body weight), 70 d.p.i. (Kapel *et al.*, 1998). Only Bessonov *et al.* (1975) showed an RCI of *T. nativa* in pigs that was similar to or higher than that reported for *T. spiralis* in the same host species. However, we can speculate that the isolate of *T. nativa* used in that study was contaminated with larvae of *T. spiralis*, since at that time, there were no biochemical or molecular methods to identify the parasite at the species level.

The discrepancy between the results obtained in laboratory conditions and those from nature might be explained by the following: (i) the genetic variability of *T. nativa* isolates (La Rosa *et al.*, 1992); (ii) the genetic variability of domestic and sylvatic swine; and/or (iii) the occurrence in nature of stress, starvation, or concomitant infections capable of inducing immunosuppression in swine.

The presence of *T. nativa* in swine in nature suggests that freezing pork can no longer be considered a method for making meat safe, if pigs are bred or hunted in areas where *T. nativa* is prevalent among sylvatic animals. Moreover, the importation of live animals or meat from carnivores (i.e. bears, wild boars) from cold to temperate regions could also represent a potential source of *T. nativa* infection in swine living in temperate regions. As an example, *T. nativa* has been found in a polar bear after more than 20 years in captivity (Kumar *et al.*, 1990). Thus, the carcasses of imported animals could represent a source of infection if they are not appropriately destroyed.

The minimal establishment of *T. nativa* muscle larvae in experimentally infected domestic pigs has been an obstacle to study the survival of this parasite in frozen muscles of swine. Experimental data have shown that the time of survival of ML in frozen muscles is related to the host species, and that *T. nativa*, *T. britovi* and *Trichinella* T6, can survive longer in frozen muscles of carnivores than in laboratory mice (Pozio *et al.*, 1994). Consequently, when in pig muscle tissue, the freezing resistance of *T. nativa* is likely to be shorter than that observed in carnivores, where larvae can survive for years (Dies, 1980). For example, infective ML of *T. britovi* were collected from fox muscles after 12 months and from wolf muscles after 6 months of freezing at –20 C (E. Pozio, unpublished data; Pozio *et al.*, 1994), whereas *T. britovi* larvae survived only 3 weeks in wild boar muscles kept at –20 C (Pozio *et al.*, 1992b).

Further studies are needed to establish: (i) the infectivity of freezing tolerant *Trichinella* species to different breeds of domestic pigs and wild boars; (ii) the freezing tolerance of the *Trichinella* species able to persist in muscles of domestic pigs and wild boars at different temperatures and length of exposure; and (iii) the prevalence of freezing tolerant *Trichinella* species in domestic pigs and wild boars from the Holarctic region.

Knowledge from such research will have great value in implementing conventional intensive and alternative free ranging pig production, and the management of the hunt on wild boars.

Acknowledgments

We are grateful to M. Amati and F. Mancini Barbieri for their technical assistance. This study received partial financial support from the Danish National Research Foundation and from the USDA Agricultural Research Service, Beltsville, Maryland, USA.

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(Accepted 27 May 1998)

Communicable Disease Epidemiology and Control

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