Prevalence of Trichinellosis in the North-Central United States

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ABSTRACT: Diaphragms from 3,245 pigs slaughtered in the north-central states (Minnesota, Wisconsin, Iowa, South Dakota, North Dakota) were digested and examined for the larvae of *Trichinella spiralis* from 1983 to 1985. The animals examined originated from small family farms that raised pigs for home consumption as well as from large commercial operations. None of the animals sampled were positive for trichinae. During the same period of time, diaphragm samples were obtained from 413 bears, 222 bobcats, 21 coyotes, 749 fishers, 1 gray fox, 2 red fox, 23 martens, 260 otters, and 2 wolves. All samples were from Minnesota and were examined for larvae of *T. spiralis*. Two wild animals were positive for *Trichinella*, a bear with 1.4 larvae per gram of muscle (LPG) and a fox with 2.4 LPG. These data demonstrate a low prevalence of trichinellosis in both swine and wild animals in this region of the country.

KEY WORDS: *Trichinella spiralis*, swine, bear, fox, *Ursus sp.*, *Vulpes vulpes*.

There has been no recent information pertaining to the prevalence of *Trichinella spiralis* in either swine or wildlife in the north-central U.S. (Minnesota, Wisconsin, Iowa, South Dakota, North Dakota). Zimmerman and Zinter (1971) reported the prevalence in pigs to be 0.15% over the period 1966–1970 for their east and west north-central regions of the country. Recent studies from other areas of the country have reported prevalences of 0.58% in the mid-Atlantic region (Schad et al., 1985a), 0.73% in New England (Schad et al., 1985b), and 0.08% in Louisiana (Hugh-Jones et al., 1985). The prevalence of trichinellosis in fur-bearing animals was 3.2% in Pennsylvania (Schad et al., 1984). With larvae of *T. spiralis* present in several food sources, including pork and wild game, and the incidence in the human population still of general concern (Campbell, 1983; Schantz, 1983), this study was undertaken to determine if the prevalence of trichinellosis in pigs had changed since 1971 in this region. This study also determined the prevalence of *T. spiralis* in wildlife in Minnesota.

Materials and Methods

We arranged with several commercial abattoirs to collect muscle samples (<10) from the pillars of the diaphragms shortly after slaughter. Some samples (<10) were obtained from small farms where the pigs were slaughtered for home consumption. Most animals sampled were slaughter hogs, however, some were older sows. Samples were transported back to the laboratory in an ice cooler and kept under refrigeration until digested. Diaphragm samples from bears were sent to the Minnesota Department of Natural Resources (DNR) by the hunters when they registered the bears they had shot. Other wildlife samples from bobcats, coyotes, fishers, foxes (red and gray), martens, otters, and wolves were collected by the DNR from cooperating trappers. All samples were kept under refrigeration (the coyote and fox samples were frozen) until transported to our laboratory. Some muscle samples were collected from animals submitted to the College of Veterinary Medicine for necropsy. All samples were maintained under refrigeration in our laboratory prior to digestion.

The pooled digestion technique was used to digest the muscle, freeing the larvae for identification as described by Schad et al. (1985a). Sample pools, composed of either 10–10 g samples (most hogs) or 20 5-g samples, were minced with a scissors or laboratory blender and digested in artificial gastric juice (1% pepsin–HCl) in a Stomacher 3500 Lab-Blender® (Tekmar Co., Cincinnati, Ohio) for 10 min. Digestion was completed by agitating the pools on a shaker for 4 hr at 37°C. Each sample pool was then sedimented in an Imhoff cone for 30 min. Fifty ml of sediment was then drawn off, washed several times by sedimentation with tap water, and the sediment examined under 30× magnification.

When a pooled sample was positive (i.e., contained larvae), a 10-g sample (from each sample in a pool) was digested individually using a smaller blender (Stomacher 400®). This procedure was also followed for samples too small to pool (i.e., remaining sample less than 5 g). All larval counts are reported as larvae per gram of muscle (LPG).

Results

No larvae of *T. spiralis* were recovered from the 3,245 pigs sampled. Samples were obtained from 413 bear (*Ursus spp.*), 222 bobcats (*Lynx rufus*), 21 coyotes (*Canis latrans*), 749 fishers (*Martes pennanti*), 1 gray fox (*Urocyon cinereoargenteus*), 2 red fox (*Vulpes vulpes*), 23 martens (*Martes americana americana*), 260 otters (*Lutra spp.*), and 2 wolves (*Canis lupus*). One bear had 1.4 LPG and 1 red fox had 2.4 LPG of *T. spiralis*. All the other animals were negative for larvae of *Trichinella*. © 2011, The Helminthological Society of Washington
Discussion

This study demonstrated the very low prevalence of trichinellosis in the north-central U.S. None of the swine samples were positive, which may be an artificially low number because of the small number of samples evaluated. Schad et al. (1985a, b) reported that the most frequent sources of infected hogs were small commercial slaughterhouses that killed 1,000 hogs per day or less. No infected hogs were found in medium to large slaughterhouses nor were any associated with the small custom packer, who killed 3,000 or more per day or 150 per week, respectively. Most of the samples in this study were obtained from medium to large abattoirs, which may also bias these results. However, pigs were purchased both directly from the supplier and via brokers at the abattoirs we sampled. A larger sampling would perhaps be the only way to verify the low prevalence in the north-central region.

Because 13.9% of human infections in the U.S. have been considered to be the result of the ingestion of meat of wild animals (Schantz, 1983), we examined several species of furbearing animals. We found only 1 bear (0.2%) and 1 of 2 red foxes infected with *T. spiralis*. Small numbers of larvae of *T. spiralis* may have gone undetected in the frozen samples (coyote and fox) using the digestion–sedimentation technique. However, 1 of the 2 positive wildlife samples had been frozen, the red fox. Minnesota has not reported any human cases of trichinellosis since 1976, indicating that either the infection pressure was low or all potential sources of infection were processed adequately to kill the parasite in infected meat.

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Literature Cited


