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Parelaphostrongyliasis in White-tailed Deer in Missouri

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ABSTRACT: The heads of 137 white-tailed deer (*Odocoileus virginianus*) were collected on the opening day of the 1996 Missouri (USA) firearms deer season and surveyed for the presence of meningeal worm (*Parelaphostrongylus tenuis*). Eighteen percent of the deer examined were infected. Mean intensity of infection was 2.0 (range 1–7). There were no significant differences of infection or mean intensity when deer were classified and compared according to sex or age class.

Key words: Meningeal worm, *Parelaphostrongylus tenuis*, survey, white-tailed deer.

The meningeal worm, *Parelaphostrongylus tenuis*, is a rather harmless and common parasite of white-tailed deer (*Odocoileus virginianus*), the normal definitive host. However, infections of this parasite in other cervids (Anderson, 1972) and exotic ungulates (Anderson and Prestwood, 1981) can have detrimental effects. The distribution of this parasite has been documented for much of the eastern region of the United States (Comer et al., 1991; Dew, 1988). *Parelaphostrongylus tenuis* is of veterinary importance due to the increase of private game farms and agri-industry where accidental infections of aberrant hosts are possible (Samuel and Demarais, 1993). This also may be the case in northwestern Missouri (USA). Aside from an abstract of an oral presentation (Garrison et al., 1986), no literature exists documenting the meningeal worm's presence in Missouri. This study was initiated to determine the present prevalence of *P. tenuis* in northwestern Missouri white-tailed deer populations and to examine relationships of infection as they pertain to deer age and sex. The undamaged heads (no gunshot wound or skullcap removal) of 137 deer were collected from deer check-in stations and meat lockers on 16 November 1996, the opening day of the Missouri firearms deer season. Collection points were located in Andrew, Buchanan, Caldwell, and Clinton countries (39°30′ to 47°07′N, 93°45′ to 95°00′W). In the state of Missouri, a harvested deer must be checked-in at the county of harvest or at a bordering county. Because of this law, we assumed that all deer sampled in this study were harvested in northwestern Missouri. Northwestern Missouri landscape is comprised mainly of agricultural cropland and some deciduous woodland tracts.

Heads were maintained at −15 C until dissections could be performed as outlined by Dew (1988). Data collected at the time of necropsy included the presence or absence of worms, the number of worms when applicable, and the age and the sex of each deer. In most instances, nematodes were successfully removed intact. In situations where nematodes were severed, a posterior and an anterior end were identified and collectively counted as one worm. A single female worm was deposited in the U.S. National Parasite Collection (Animal Parasitology Institute, Beltsville, Maryland, USA; accession number USNPC 088653.00). Deer were aged according to tooth wear and replacement criteria set forth by Severinghaus (1949) and were classified as fawns (0.5-yr-old), yearlings (1.5-yr-old), or adults (>2.5-yr-old). The sex of each deer was determined by the presence or absence of antlers or pedicels.

Statistical procedures were performed using Statistical Analysis System (SAS Institute, 1989) software. A chi-square goodness of fit test was used to determine if significant differences existed among the proportion of individuals infected when grouped according to year of study, age class, and sex. One-way analysis of variance

(ANOVA) was used when comparing differences in mean intensities among age classes, and where differences were significant, a Tukey test was used to determine where the variation occurred (Zar, 1996). A two-sample *t*-test was used when comparing mean intensities between sexes. All statistical tests were considered significant at the 5% level ($\alpha = 0.05$).

Twenty-five (18%) of 137 deer heads examined were infected with adult *P. tenuis*. Our findings were slightly greater than the 15% prevalence encountered by Garrison's et al. (1986) study conducted in northwestern Missouri 10 yr earlier. The prevalence of infection in northwestern Missouri was generally lower than other central United States locations. Jarvinen and Hedberg (1993) reported 45% of central Iowa deer were infected, Dew (1988) found 58% of deer in Wisconsin were infected, and Kocan et al. (1982) reported 39% of deer in Oklahoma were infected. However, prevalence in Missouri was higher than in Nebraska which only had a prevalence of 7% (Oates et al., 1999). It is not clear why there were differences in prevalence among midwestern states, although, we suspect sampling biases were the primary cause.

Thirty-six percent of the deer examined were fawns ($n = 49$), 36% were yearlings ($n = 49$), and 28% were adults ($n = 39$). Females ($n = 69$) and males ($n = 68$) were nearly equal in representation. There were no significant differences in the proportion of infected animals when grouped by age ($P = 0.14$) or by sex ($P = 0.53$) (Table 1). Intensity of infection ranged from one to seven nematodes. The latter infection occurred exclusively in a 0.5-yr-old doe. Most (56%) of the heads examined contained only a single nematode. Several (20%) of the heads examined harbored only two nematodes. Mean intensity did not differ significantly among age class ($P = 0.14$) or between sexes ($P = 0.91$) (Table 1). Spinal cords were not examined for *P. tenuis*; therefore, the results of this survey and others like it should be considered conservative at best.

TABLE 1. Prevalence and mean intensity of *Parelaphostronglus tenuis* in white-tailed deer from northwestern Missouri arranged by age class and sex.

Classification	Number infected/number examined (%)	Mean intensity ± SD (range)
Age class		
Fawn	6/49 (12)	3.2 ± 1.0 (1–7)
Yearling	8/49 (16)	1.6 ± 0.4 (1–4)
Adult	11/39 (28)	1.7 ± 0.3 (1–4)
Sex		
Male	11/68 (16)	2.0 ± 1.5 (1–5)
Female	14/69 (20)	2.1 ± 1.7 (1–7)
Overall	25/137 (18)	2.0 ± 0.3 (1–7)

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