



# MDC Resource Science

## *Parelaphostrongylus tenuis*: A Parasitic Nematode of Deer and Elk in Missouri

Science Notes



# *Parelaphostrongylus tenuis*: A Parasitic Nematode of Deer and Elk in Missouri



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## Background

*Parelaphostrongylus tenuis* is a parasitic nematode (roundworm) with a life cycle that involves white-tailed deer and several species of terrestrial snails and slugs in Eastern North America. *P. tenuis* is commonly referred to as “brainworm” or “meningeal worm.” White-tailed deer and other species can become infected by meningeal worm through the ingestion of snails and slugs that carry the parasite. White-tailed deer are the definitive hosts of *P. tenuis*, and the adult worms can live on the surface of a deer’s brain for the lifetime of the deer without ever causing damage or disease. However, *P. tenuis* can be fatal in numerous other species, such as moose, mule deer, elk, llamas, alpacas, horses, sheep or goats.

Elk (*Cervus elaphus*) were introduced into Peck Ranch Conservation Area (PRCA) during the springs of 2011-2013. Illness and mortality attributed to the presence of *P. tenuis* in elk was first documented in 2011. The majority of disease caused by the meningeal worm is seen in calves and yearlings; adults are less commonly affected. Infected elk tend to become isolated from the herd. They can become less wary and their vision may seem impaired. In advanced cases, infected animals often walk in circles, and may carry their heads in a tilted position. The disease is generally progressive and terminates in death, although there may be short periods of remission when the animals appear quite normal.

## Research

To date, 14 free-ranging elk have been confirmed to be infected with *P. tenuis* with 6 others suspected (Table 1).

Table 1. The number of confirmed/suspected *P. tenuis* infections in Missouri’s free-ranging elk herd by year.

Year	<i>P. tenuis</i> mortalities confirmed/suspected
2011	1/0
2012	4/3
2013	3/1
2014*	6/2

\*At time of print

Research shows the severity of clinical signs in elk increases with the number of worms, suggesting that elk may be able to survive low-level infections. The densities of

deer and snail populations in and around PRCA may therefore play a role in the amount of *P. tenuis* exposure to the vulnerable elk population. Research was conducted in PRCA and surrounding areas to determine the prevalence of *P. tenuis* within the white-tailed deer populations from 2011-2013. The average prevalence of *P. tenuis* infection in white-tailed deer was 42%, as sampled at game processors in the Missouri Ozarks from 2011-2013 (Table 2).

Table 2. Infection prevalence of white-tailed deer collected from game processors in the Missouri Ozarks.

Year	Fawns	Yearlings	Adults	Total
2011 sampled	45	63	147	255
2011 infected	9 (20%)	16 (25%)	62 (42%)	87 (34%)
2012 sampled	97	88	151	336
2012 infected	20 (21%)	39 (44%)	80 (53%)	139 (41%)
2013 sampled	65	36	94	195
2013 infected	33 (51%)	16 (44%)	56 (60%)	105 (54%)
Total sampled	207	187	392	786
Total infected	62 (30%)	71 (38%)	198 (51%)	331 (42%)

## Management Implications

Even among domestic animals, *P. tenuis* can be extremely challenging to manage. Treatment options for this parasite are limited and experimental, and most dewormers are either ineffective or must be administered within 24 hours of exposure to the parasite. Preventative use of dewormers may be effective for a short while, but the necessity of redosing and the undesired use of chemicals in wildlife makes this application infeasible in free-ranging animals.

*P. tenuis* is a parasite that should be considered an accepted part of the ecosystem in Missouri. Infected deer are considered safe to consume; *P. tenuis* is not considered infective to humans. While the nematode has no apparent impact on white-tailed deer populations, its presence can be detrimental to other cervid species, such as elk. Research suggests that maternal antibody transfer, as well as evidence of infection-induced antibody development, may confer increased resistance of the herd to future infections over time. This parasite is a normal part of annual mortality in many elk populations in Eastern North America, including the Kentucky population that served as a source for our reintroduction, but generally does not result in population extinction.

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