

Serological monitoring of *Toxoplasma gondii* and *Neospora caninum* in sheep, goats and fallow deer farmed together on the same area

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Toxoplasma gondii and *Neospora caninum* are closely-related obligate tissue-dwelling Coccidian parasites with a worldwide distribution. Both parasite species can infect a wide range of wild and farmed warm-blooded intermediate hosts. Both species are important causes of reproductive failure and production losses in farm livestock worldwide. *T. gondii* is an important zoonosis. Humans can be infected after consumption of undercooked venison. *N. caninum* does not infect humans, but some evidence of positive serology has been documented. Little is known about the prevalence of both parasites in European *Cervidae*. The aim of the study was to determine the seroprevalence of *T. gondii* and *N. caninum* infection in sheep, goats and fallow deer farmed in a mixed flock. Such mixed flocks, in which the three species live under the same conditions, are excellent models for identifying any differences in the rate of infection with the two parasites between the animal species. Samples of 167 captive fallow deer, 64 sheep and 39 goats were obtained from 2014 to 2015 in the breeding station in Kosewo Górne, in the Mazurian Lake District, north-east Poland. Anti-*Toxoplasma* antibodies were confirmed in 40.6% of examined sheep, 12.8% of goats and 8.4% of fallow deer. Anti-*Neospora* seropositivity was found in 6.25% sheep, 12.8% goats and 10.8% of fallow deer. Coinfection of both parasites was detected in 6.25% sheep, 7.7% goats and 1.8% fallow deer. Western blot analysis of *T. gondii* revealed complex recognition pattern for sera taken from all three animal species and of *N. caninum* revealed similar protein recognition patterns for sheep and goats. Immunodominant protein bands were located in the 55-250 kDa range. However, sera from fallow deer demonstrated seroreactivity against immunodominant *N. caninum* antigens at 25 and 130 kDa. Although the variations in sensitivity and specificity to *T. gondii* and *N. caninum* infections demonstrated by the examined animals may account for the observed differences in seropositivity, they are also influenced by the feeding habits of the animal species. These results are extremely important from an epidemiological point of view due to the fact that the undercooked meat of sheep, goats and game corvids are the most common source of human toxoplasmosis.

The research was partially conducted in the Polish-Slovak Joint Research Project for the years 2013–2015 “Observation of serious protozooses (neosporosis and toxoplasmosis) in domestic and sylvatic cycle”.