

Original papers

Giardia prevalence in wild cervids in Poland¹

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ABSTRACT. A total of 181 faecal samples were collected from wild cervids in two regions of Poland. Specimens were taken from 65 fallow deer (*Dama dama*), 61 red deer (*Cervus elaphus*), 50 roe deer (*Capreolus capreolus*), and five moose (*Alces alces*). *Giardia* cysts were detected in one faecal specimen from the red deer and in two samples from the roe deer. Although this study has demonstrated that *Giardia* infection is remarkably rare in wild cervids, it should be emphasized that there are large populations of these animals in Poland.

Key words: *Giardia*, Cervidae, prevalence, Poland

Introduction

Giardia duodenalis (syns. *G. intestinalis*, *G. lamblia*) is a cosmopolitan flagellated parasite of humans and many species of animals, and is considered as the most common cause of protozoan diarrhea worldwide [1–3]. For many years, the zoonotic potential of *G. duodenalis* has been a controversial problem in *Giardia* research. This species is genetically heterogeneous, and eight major assemblages of genotypes (A–H) have been recognized. *G. duodenalis* isolates belonging to assemblages A and B are found in both humans and animals, whereas the rest of the assemblages (C–H) seem to be more host-adapted [1,4]. Such considerable genetic variability among *G. duodenalis* isolates obtained from different hosts and from various geographic regions complicates the determination of the role of animals as a source of human *Giardia* infection.

While the role of pets and livestock in *Giardia* transmission has been studied intensively, the role of wild animals, particularly artiodactyls, has recently been taken into consideration [5–9]. Wild cervids might play a significant role in contami-

nation of the environment with *Giardia* cysts because large populations occur worldwide. They excrete a relatively large volume of faeces, and their feeding ranges usually overlap with cattle pastures. Thus, they might be potential reservoirs of *Giardia* infection both for humans and livestock, and they might represent a public and veterinary health interest. *Giardia* cysts have so far been detected in the faeces of red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), white-tailed deer (*Odocoileus virginianus*), fallow deer (*Dama dama*), tule elk (*Cervus elaphus nannodes*), moose (*Alces alces*) and reindeer (*Rangifer tarandus*) [5–7,9–15]. However, data on the prevalence of *Giardia* in cervid species in Poland is still sparse.

The aim of this study was to obtain information about the prevalence of *Giardia* infection in wild cervids living in west-central and north-eastern regions of Poland.

Materials and Methods

In the present study, a total of 181 faecal samples were collected from wild cervids in west-central and north-eastern regions of Poland between the years

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2008 and 2010. Specimens were taken from 65 fallow deer (*Dama dama*), 61 red deer (*Cervus elaphus*), 50 roe deer (*Capreolus capreolus*), and five moose (*Alces alces*). Most of the faecal samples (n=174) were taken from the rectum of animals killed by hunters during selective shootings, whereas only seven specimens were picked up immediately after excretion next to feeding sites during animal observation.

From each faecal specimen two thin smears were made. One of them was examined as a wet mount, and the second as a permanent trichrome-stained smear. To demonstrate *Giardia* cysts, the faecal smears were microscopically screened using 1000× magnification with a light microscope (Axioskop, Zeiss). In addition, part of each faecal sample was concentrated using the 0.85 M sucrose gradient centrifugation technique, and the final sediment was examined using a microscope.

Results

In this study the overall prevalence of *Giardia* in wild cervids was low; *Giardia* cysts were detected only in three faecal samples out of 181 examined (1.7%). The cysts were detected in one faecal specimen collected from red deer (2%) and in two samples obtained from roe deer (4%), originating from west-central and north-eastern regions of Poland, respectively. The same faecal samples were found to be *Giardia* positive both by direct smears and concentration gradient technique.

Discussion

In this study *Giardia* cysts were detected only in red deer and roe deer. The infection rate in red deer was low (prevalence 2%). Similarly, low *Giardia* infection rates in red deer were described in other studies carried out in other region of Poland and in Norway (1.7%) [13,14] as well as in Croatia (1.1%) [9]. However, higher prevalence of *Giardia* infection in red deer was found in the USA (7.5%) [10] and in Canada (15.8%) [12]. In the present study the infection rate of *Giardia* in roe deer was also low (4%). Similarly, low prevalence of *Giardia* was earlier described in roe deer from another part of Poland (4.5%) [14] and from Spain (5.3%) [16]. However, the infection rates in roe deer were higher in other countries: 15.5% in Norway [13], and 24% in Croatia [9]. Moreover, a higher infection rate (13.8%) was found in wild deer in Australia, but the

species of deer was not identified [17].

In the present study, no *Giardia* cysts were detected in five faecal specimens from moose and 65 samples obtained from fallow deer, whereas in other part of the world *Giardia* infection rates in these animals ranged from 11.5 to 12.5% [6,7,13]. The above-mentioned data indicates that the *Giardia* prevalence in wild cervids differs between individual geographic regions. Nevertheless, it should be noted that the various prevalence data of *Giardia* infection in wild cervids may be related to the fact that it was only possible to examine a faecal sample from an individual animal once.

Although this study has demonstrated that *Giardia* infection is remarkably rare in wild cervids, it should be emphasized that there are large populations of these animals in Poland. According to the Central Statistical Office in Poland (http://www.stat.gov.pl/cps/rde/xbcr/gus/rl_lesnictwo_2011.pdf), in 2011 the number of roe deer reached 822,000 and of red deer, 180,000. Thus, it would be reasonable to assume that the environmental contamination with *Giardia* cysts is probably high. Moreover, our earlier multilocus genotyping and phylogenetic analysis data based on the *Giardia* isolates derived from the red deer and the two roe deer demonstrated that the *G. duodenalis* isolate from red deer clustered within the cervid-specific sub-assembly AIII, whereas isolates from roe deer are clustered within zoonotic sub-assembly AI [18]. Therefore, environmental contamination with *Giardia* cysts by roe deer may be associated with zoonotic hazard.

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