

Original papers

Parasites of captive fallow deer (*Dama dama* L.) from southern Poland with special emphasis on *Ashworthius sidemi*

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ABSTRACT. Fallow deer in Poland is an alien species, with an ambiguous legal status. It is considered both, a game and a farm animal, which introductions in recent years led to a substantial increase of its population. As a representative of cervids, it shares with other free-ranging and domestic ruminants many of gastrointestinal helminths, among them an alien *Ashworthius sidemi*, the nematode of a high pathogenicity. Until now, the parasite was observed in Poland at two foci of the wild (i.e., Bialowieża and Bieszczady forests), but not yet in fallow deer. The present study was intended to recognize the infection level, and helminth species composition, in fallow deer living in captivity. Alimentary tracts of four animals, hunted in enclosure situated in Dulowa Primeval Forest, were dissected. Nematodes belonging to seven species: *Spiculopteragia spiculoptera*, *S. mathevossiani*, *S. asymmetrica*, *Nematodirus filicollis*, *Aonchotheca bovis*, *Oesophagostomum radiatum* and *Ashworthius sidemi* were recovered, with the latest helminth being predominat. In the present study, the origin of *A. sidemi* infection, its impact on the host and abomasum nematode communities, as well as the potential parasite spread on other ruminants, were investigated.

Key words: helminths, *Ashworthius sidemi*, fallow deer, ruminants

Introduction

Fallow deer in Poland is an introduced species, which increases in the number both in captive and natural environment. Because of its farm animal status, it is kept for meat production and antlers – in breeding farms, whereas as a game animal, it is bred in enclosed large fields or makes free-ranging populations, and in these cases it is hunted during hunting season.

Fallow deer can share with other ruminants a number of gastrointestinal helminths [1]. *Ashworthius sidemi* – the alien invasive, highly pathogenic abomasum nematode – was already observed in Poland in Bieszczady Mountains [2], and Białowieża Primeval Forest [3], in such hosts as European bison, roe deer and red deer. Until now, it has not been observed in domestic bovids [4], although such possibility was experimentally proved [5]. Parasitological data related to fallow deer living in Poland are limited to some regions [6–8], and data on *A. sidemi* are lacking. From foreign authors, only Höglund et al. [9] reported *A. sidemi* occurrence in fallow deer in Sweden. The objective of this study was to determine whether parasitic species composition of fallow deer in Poland changed, and whether the cervid might harbour *A. sidemi*, thus constituting a serious source of infection to highly susceptible domestic hosts.

Materials and methods

The herd of approximately 40 fallow deer, living separately from other ungulates on a 120 ha enclosed game farm in Dulowa Primeval Forest, was involved in the study. Dulowa Forestry District, situated in Małopolska province (50°15 latitude and 19°52 longitude, altitude about 300 m above sea

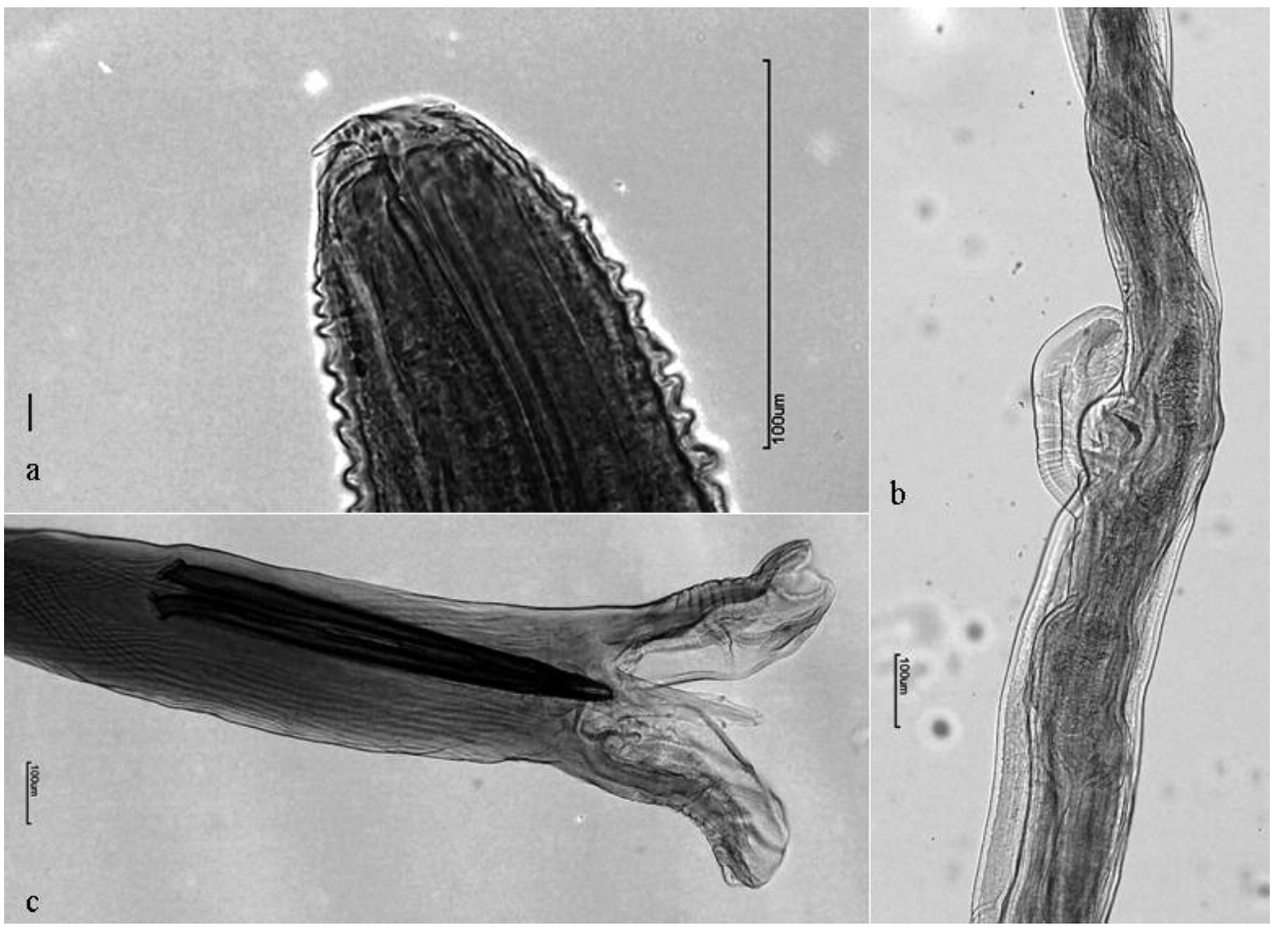

Fig. 1. *Ashworthius sidemi* from fallow deer: a – buccal capsule with characteristic „hook"; b – vulva region of immature female; c – posterior end of male

level), covers the area of 3340 ha with 68.7% forest cover, predominated by pine (60%) and birch (20%), and occupied mostly by wetlands.

The primary herd of captive fallow deer was descended from the nearby Zielonka forestry, and supported later by animals imported from Hungary. The animals were supplementary fed, and dewormed once a year by ivermectin mixed with fodder. In parasitological survey, the entire alimentary tracts of four deer (two hinds and fawns), hunted in January 2011, were processed according to Dróżdż [6], and Hansen and Perry [10]. Collected helminths were preserved in 70% ethanol with 10% of glycerin, and identified to species on the basis of morphological features [2,11].

Results and discussion

A total of 584 specimens from seven nematode species were recovered (Table 1), most of them constituting non-matured stages (L5) of *Ashworthius sidemi* (Fig. 1) settled in abomasum (in one deer in omasum) of animals examined. Other species from the family Trichostrongylidae (i.e., *Spiculopteragia spiculoptera*, *S. mathevossiani* and *S. asymmetrica*) were represented only by a few specimens (50 parasites, total) noted in duodenum. Additionally, *Nematodirus filicollis* and *Aonchotheca bovis* occurred in small intestine, and *Oesophagostomum radiatum* in colon (Table 1).

To our knowledge, *Ashworthius sidemi* has not been reported from fallow deer before in Poland, and it was previously observed in this host only in Sweden [9]. Other nematodes represent common species occurring in fallow deer inhabiting different European countries [6–8,12–16]. Low density and abnormal localization (only in small intestine) of *Spiculopteragia* spp. could be the consequence of antagonistic *A. sidemi* impact. Similar phenomenon (the limitation of other species presence, and their intensity of infection) was observed by Demiaszkiewicz et al. [17] in gastrointestinal nematode communities of European bison in long-term infected population. *Spiculopteragia*

Table 1. The occurrence of helminth species in fallow deer examined

Nematode species	No. of animals infected/examined	Mean intensity of infection (min–max)
Ashworthius sidemi	4/4	119 (2–399)
Spiculopteragia spp.	4/4	14 (1–30)
S. spiculoptera	2/4	18 (3–30)
S. mathevossiani	1/4	3
S. asymmetrica	1/4	14
Nematodirus filicollis	1/4	2
Aonchotheca bovis	1/4	10
Oesophagostomum radiatum	2/4	20 (5–35)

spiculoptera and *S. mathevossiani*, included to one polimorphic species [18], in one animal occurred together, whereas minor morph of *S. asymmetrica*, i.e., *S. quadrispiculata*, was not observed.

A. sidemi was introduced to Europe via sika deer [19]. In the presently studied animals, the source of the parasite constituted probably fallow deer lately translocated from Hungary. However, since the parasitological status of the animals before translocation remains unknown, the introduction of parasite during migration of other free-ranging Cervidae could be considered, as well. Except for fallow deer, living only in enclosure, the studied area is inhabited by such wild ruminants as red deer, roe deer and moose, with estimated species density of 1.9, 3.6, and 0.4 animals. Nevertheless, Höglund et al. [9] also mention the Hungarian origin of *A. sidemi* in Sweden, although, to date – this parasite has not been noted in Hungary.

Harmful effect of *A. sidemi* on fallow deer is unrecognized, but infection with such non-specific, pathogenic parasite probably have health consequences, especially in young animals. Intensity of *A. sidemi* infection, using the scale of Hansen and Perry [10] elaborated for *Haemochus contortus*, the other species of Hemonchinae, was low. Only in one fawn, the intensity of infection was moderate (399 specimens, Table 1). However both, regular deworming by ivermectin which shows high effectiveness against gastrointestinal nematodes in fallow deer [20], and creating of a new host-parasite relationship could have crucial impact on the observed low intensity of infection. *A. sidemi* was noted also in all the examined free-ranging roe and red deer from the same hunting area (own data, unpublished), which makes a new focus of this parasitosis in Poland, and shows that the nematode rather spreads out on the other Cervidae of this area. Regardless of the transmission direction – from captive to free-ranging or the opposite – our results demonstrate that any enclosure could not present a solid barrier for dispersion of intestinal parasites. These conditions constitute the infection hazard for domestic ruminants, and especially fallow deer may be betoken as the potential origin of *A. sidemi* introduction to domestic herds. Further monitoring of the parasite status in free-ranging and domestic ruminants becomes necessary.

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