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Original papers

Zatorska goose – a subject of parasitological research[1]

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ABSTRACT. The aim of the study was to determine the level of gastrointestinal parasites in a native breed of geese – Zatorska goose – based on coproscopic testing. Faecal samples were collected from 90 young geese in three age groups (5, 7 and 9 weeks old) in 2014. The geese were kept indoors on deep litter and pastured from spring to autumn. The area of the pastures around the buildings where the geese grazed was about 1 hectare, divided into quarters for different age groups. Before grazing, the birds were dewormed with fenbendazole (Fenbenat powder 4%, Naturan). As additional treatment for coccidiosis, coccidiostats were added to the feed. The study was conducted using the McMaster quantitative method with centrifugation (flotation liquid: NaCl and glucose). The birds were shown to be infected with coccidia and nematodes. The prevalence of *Eimeria* sp. infection (mean 40%) and the number of oocysts per gram of faeces (reaching 5,300 OPG) were highest in the youngest age group of geese. The level of *Amidostomum anseris* infection was similar in the three age groups, with prevalence from 40% to 50% (nematode egg output ranged from 50 to 350 eggs per gram of faeces, EPG). *Capillaria anatis* was observed only in 5- and 7-week-old geese.

Key words: parasites, geese, faecal examination, Poland

Introduction

A programme entitled "Protection and management of national genetic resources of farm animals" is carried out in Poland by The National Research Institute of Animal Production in Balice near Krakow (southern Poland) and protects many breeds, varieties and genotypes of animals, mainly birds and mammals. Among poultry, the number of protected breeds is highest in geese. The following 14 breeds of geese are protected: Biłgorajska (Bi), Zatorska (ZD-1), Garbonosa (Ga), Kartuska (Ka), Kielecka (Ki), Lubelska (Lu), Podkarpacka (Pd), Pomorska (Po), Rypińska (Ry), Suwalska (Su), Słowacka (Sł), Romańska (Ro), Kubańska (Ku) and Landes (LsD-01). Most of the Zatorska goose population is kept at the Experimental Station in Rząska, belonging to the University of Agriculture in Krakow. Geese of this breed are characterized by high value of dietetic meat (low fat) and good quality of feathers [1].

Endoparasites in birds, especially from the order Anseriformes, are highly diverse and include species of protozoa, flukes and tapeworms, as well as nematodes. In Poland, many parasitological studies on wild Anseriformes have been done [2–9], while information about parasite infection in native breeds of goose is currently rare [10–13]. This is also true in European countries [14–16]. In view of the relatively small population of Zatorska geese, parasitological research was done to determine the level of gastrointestinal parasite infections.

Material and Methods

The results presented in this paper were obtained on the basis of a coproscopic study of young geese. Material for the study included samples of fresh faeces collected from 90 geese in three age groups (5, 7 and 9 weeks old) in 2014. The study was conducted in July, since our previous investigation had shown that the level of parasite infection

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Table 1. The results of coproscopical study of examined geese

	No. examined	Protista *Eimeria* sp.		Nematoda *Amidostomum anseris*		Nematoda *Capillaria anatis*	
		P (%)	I (range in OPG)	P (%)	I (range in EPG)	P (%)	I (range in EPG)
5-weeks old	30	40	662.5 (50-5300)	45	94.5 (50-200)	25	60 (50-100)
7-weeks old	30	20	150 (100-250)	50	160 (50-350)	0.5	50
9-weeks old	30	15	133 (100-200)	40	50 (50-100)	0	0
Total	90	25	420 (50-5300)	38.3	106.9 (50-350)	10	58.3 (50-100)

constitutes a threat to geese in this month of the year [17,18].

The geese were kept indoors on deep litter and pastured from spring to autumn. The area of the pasture around the buildings was about 1 hectare, divided into quarters for different age groups. The birds were dewormed with fenbendazole (Fenbenat powder 4%, Naturan). As additional treatment for coccidiosis, coccidiostats were added to the birds' diet.

The study was conducted using centrifugation by McMaster's method with saturated NaCl and glucose solution as the flotation liquid, and the decantation method [19]. The results determined the prevalence (%) (P) and intensity (I) of infection, given as the output of protozoa oocysts (OPG) or nematode eggs (EPG) in one gram of host faeces.

Results

The results obtained are shown in Table 1. The geese were infected with coccidia and nematodes. The prevalence of infection and the number of *Eimeria* oocysts was highest in the youngest group of geese, reaching 5,300 OPG. The level of infection with *Amidostomum anseris* was similar in all age groups, ranging from 40% to 50% of the tested flock (50 to 350 eggs per gram of faeces, EPG). *Capillaria anatis* was observed only in 5- and 7-week-old geese.

Discussion

First, our own research on parasite infection in Zatorska geese was carried out over the period 2002–2004 due to deaths in these birds, particularly young birds [17,18]. The study included over two hundred birds in each of two annual cycles. The rate of coccidia infection was found to be about 40% in the geese, and the nematodes *Amidostomum anseris*, *Heterakis gallinarum*, and *Capillaria* sp. were noted. The rate of infection with *Capillaria anatis* was highest [17,18] (Table 2).

Due to the high value of the meat of Zatorska geese, as well as the small number of individuals in the herd under genetic protection, we performed another faecal examination. The present study confirmed the presence of coccidia and two species of nematodes, *Amidostomum anseris* and *Capillaria anatis*. The third nematode species, *Heterakis*

Table 2. The results of coproscopical study of "Zatorska goose" conducted in 2002–2004

Year of study (annual cycles)	No. examined	Protista *Eimeria* sp.		Nematoda *Amidostomum anseris*		Nematoda *Capillaria anatis*		Nematoda *Heterakis gallinarum*	
		P (%)	I (OPG)	P (%)	I (EPG)	P (%)	I (EPG)	P (%)	I (EPG)
2002-2003	286	45.2* / 28.1+	1420* /188+	23.8	68	37.1	136	12.9	56
2003-2004	263	38.9* / 39.1+	53* /50+	24.0	37	33.5	38	11.0	29

* goslings; + adults geese

gallinarum, was not observed in goslings as in the previous investigation. The mean level of coccidia infection was lower than in the earlier study, but *Amidostomum anseris* was still frequently recorded (38.3% of the herd) (Table 1).

This study demonstrates that the level of *Eimeria* infection decreased with the age of the host, which is typical in the case of infection with coccidia parasites. The prevalence of *Amidostomum anseris* in all age groups of birds was similar, but higher than in the previous study (2002–2004, see Table 2). It is difficult to explain why the nematode *Capillaria anatis* in this study was noted most often only in the younger birds.

Coccidiosis can occur in geese of different ages, but in general younger birds are much more susceptible than adults. The most common species are *Eimeria truncata* and *Eimeria anseris*, which live in the kidney and small intestine, respectively. The use of coccidiostats limits protozoan infections, but in extreme cases, especially in weak individuals, symptoms such as severe diarrhoea, anorexia or death may occur. In the present study, infection of individual geese reached up to 5,300 OPG with no symptoms of disease. It seems therefore that coccidiosis in geese is not as severe a problem as on broiler or hen farms, although infection with renal *Eimeria truncata* may, in extreme cases, cause high mortality.

We did not find flukes or tapeworms on the basis of the coproscopic examination. The goose pasture on the farm is used intensively (small paddocks), which does not create good conditions for intermediate hosts for Platyhelminthes, such as slugs or snails. The geese also lack access to natural waterways – habitats of aquatic intermediate hosts of this group of parasites.

The most common nematode species found was *Amidostomum anseris.* In our study it occurred in around 40% of examined birds (see Table 1). Cencek et al. [20] found an even higher (60–86%) level of infection with this parasite in eight reproductive herds of geese in Poland. The dynamics of infection by this parasite demonstrated by the authors cited indicate that the level of infection increases from the late autumn to spring (October –March), which suggests poor management conditions in the buildings, favouring transmission of the nematode.

Transmission of different species of nematodes is easy due to their direct life cycle. Some species, however, require an intermediate or paratenic host (e.g., earthworms), such as *Capillaria contorta* or *Capillaria caudinflata.* The common intestinal nematodes of the goose located in the mouth, oesophagus, crop, small intestine and caecum are *Echinura uncinata*, *Epomidiostomum uncinatum*, *Ascaridia galli*, six species of the genus *Capillaria* (*C. anatis*, *C. bursata*, *C. annulata*, *C. anseris*, *C. caundinflata* and *C. obsignata*), *Heterakis dispar*, *Heterakis gallinarum*, *Strongyloides avium* and *Trichostronglus tenuis*. The nematode *Syngamus trachea* living in the respiratory tract has been also found in geese.

The present study confirmed that the most significant problem in Zatorska geese is the nematode *Amidostomum anseris*. *Ascaridia galli*, *Heterakis* spp., and other nematodes are generally not an issue. On the other hand, various species of the *Capillaria* genus can also be dangerous in the flock.

Nematodes localize in different parts of the gastrointestinal tract, causing weakness and lethargy, and in extreme cases leading to death. Especially dangerous are infections with *Amidostomum anseris*, which is lethal for young birds because of hematophagic feeding and mucosal damage in gizzard and sometimes the proventriculus [11–13].

The study showed the presence of parasites despite regular use of antihelmintics. The most important factors in reducing the level of invasion and improving the birds' welfare seem to be washing and disinfection of buildings with insecticide after each generation of geese and increasing the pasture area, with appropriate rotation (3–4 times a year) to break the cycle of flatworms (intermediate host) or nematodes (infective larvae). The area of the pasture on the farm investigated in this study is too small for a flock of more than 300 individuals. It is important not to mix young geese, which are more susceptible to parasite infections, with older ones. Regular parasitological monitoring could be beneficial as well. Therefore the research will be continued, including especially protozoan diversity such as the zoonotic species *Toxoplasma gondii*, *Giardia duodenalis* or *Cryptosporium* sp. [21–23].

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