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THE PREVALENCE OF GASTROINTESTINAL PARASITES IN RED FOXES (*VULPES VULPES*) FROM WESTERN ROMANIA – PRELIMINARY STUDY

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Abstract

In this study, the gastrointestinal parasites and prevalence of infestation in the red fox (Vulpes vulpes), were investigated at the laboratory of Parasitology of Veterinary Medicine Faculty Timisoara. During period December 2011 - January 2012, 20 red foxes from 12 hunting grounds of Arad County were necropsied. Animals were killed by shooting for establishing the effectiveness of rabies vaccination. Faecal samples and gastrointestinal masses were collected and examined for parasites. The presence of endoparasites was detected in 12 of 20 samples, and overall prevalence was 60%. Of the examined samples poliparasitism was observed in 10 (50%), and monoparasitism in 2 (10%). There were no significant differences between sex groups and intensity value. Male and female red foxes were infected with five genera from three classes of parasites: fluke - Alaria alata (40%), tapeworm (55%) - unidentified tapeworm (10%), Taenia taenieformis (10%), Taenia hydatigena (15%), Mesocestoides lineatus (40%), Taenia pisiformis (15%), roundworm (30%) - Ancylostoma spp., (25%), Pterygodermatites affinis (5%).

Keywords*: parasites, gastrointestinal, red fox, Romania*

INTRODUCTION

Red foxes (*Vulpes vulpes*) is a common carnivorous, widely distributed throughout the world, considered also as opportunistic omnivorous (Dybing et al., 2013; Lahmar et al., 2014), with an important role in the transmission of diseases, some with zoonotic importance (Henderson, 2009; Wolfe et al., 2001).

Foxes alimentary habit makes them potential hosts for many species of gastrointestinal parasites that can be harmful to both humans and animals (domestic and wild) (Willingham et al., 1996).

It is well known that parasitic digestive infestations decreases performance in domestic animals and wildlife worldwide. The main effect is often subclinical with the reduction of appetite, reproduction, performance etc. However most studies focused on parasitological investigation of livestock, and recently, there was determined that parasitic infestations are as common and important also in wildlife which may serve as a potential reservoir of parasites.

The aim of this study was to determine the prevalence of infestation with gastrointestinal parasites in foxes from hunting grounds in western Romania.

MATERIALS AND METHODS

1.1. Description of the sampling area

Arad is located at the western Romania, in the high plain of Arad, 30 km from Zarand Mountains, part of the Western Carpathians, with a landscape characterized by the presence of a tiered relief from east to west, a well distributed river network, most of them affluent of two major rivers Mures and White Cris, the presence of a temperate continental climate with oceanic influences and not least the presence of flora and fauna with high value items (www.wikipedia.org).

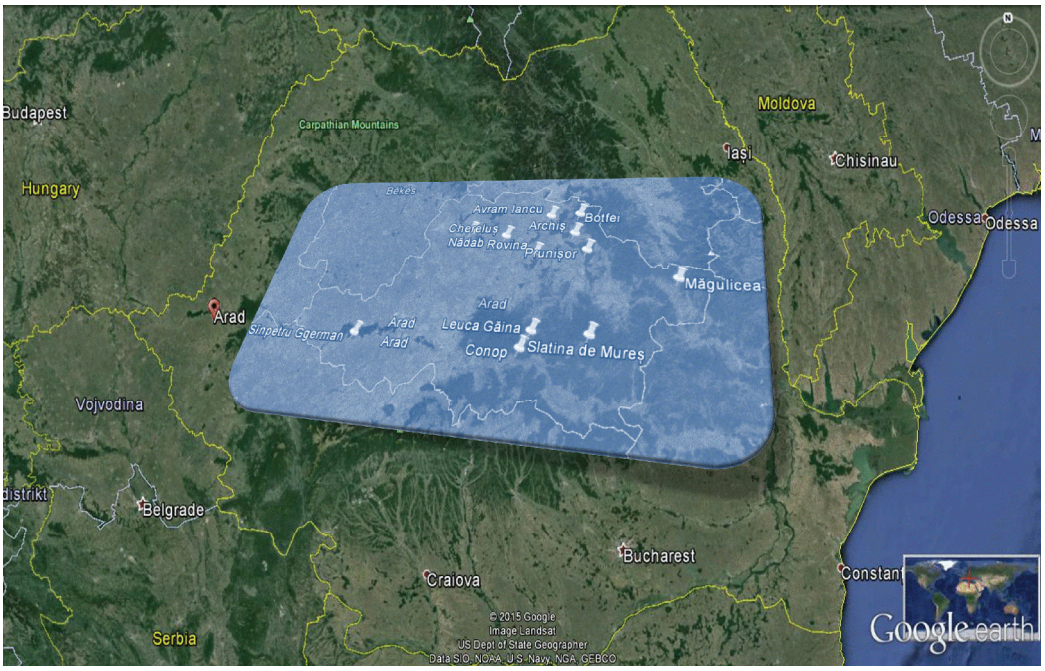

Fig. 1. The area of origin for sampled foxes

1.2. Animals studied, parasitological examination and epidemiological investigation

The presence of gastrointestinal parasitism was investigated in 20 foxes killed by shooting to determine the effectiveness of rabies vaccination in 12 hunting grounds between December 2011 and January 2012.

To identify the species of parasites coproscopic flotation methods and successive washings of faeces collected from gastrointestinal masses were performed.

Faecal samples were collected directly from the gastrointestinal mass of shot animals.

Identification of parasite species or genus was made in accordance with determination keys for trematodes, cestodes and nematodes, from the literature (Anderson, 2000; Dărăbuş et al., 2006, 2013; Dunn, 1978; Euzeby, 1963, 1971; Gibson et al., 2002; Khalil et al., 2004; Skryabin, 1992a, b).

For each animal, data on the origin of hunting, registration number and gender, were recorded thus compiling epidemiological investigation. Data were statistically analyzed using Fisher's test. Differences were considered statistically significant when p values were less than 0.05 ($p \leq 0.05$).

RESULTS AND DISCUSSIONS

Coproparasitological exams revealed parasites divided into three classes and five genera, among which: trematodes (40 %) - *Alara* spp., Tapeworms (55 %) - *Taenia* spp., *Mesocestoides* spp., Nematodes (30 %) - *Ancylostoma* spp., *Pterygodermatites* spp. (table 1**).**

Among the 20 foxes examined, 12 were positive on the parasitological examination and the overall prevalence was 60 %. The results are shown in table 2 and figure 2. Of the samples examined 10 samples (50 %) were found with poliparazitism and 2 (10 %) with monoparasitism. Monoparasitism was found with *Alara alata* (1/20 – 5 %) and *Mesocestoides lineatus* (1/20 – 5 %). Poliparasitism was encountered in 10 animals, being the combination of trematodes, cestodes and nematodes.

The prevalence and intensity were calculated for gender group. The prevalence was not significantly different ($p = 0.7128$) between the

number of positive males (8/11, 67 %) and female foxes (4/9, 23 %). No statistically significant differences were found between gender of animals and intensity value.

Table 1. Synoptic data on foxes studied

Crt. No.	*H.G. AR*	*Registration No.*	*Gender*	*Internal parasites species found*
1	Rovina	164469	F	Negative
2	Năbab	202503	F	Negative
3	Nadăş	180092	F	Negative
4	Archiş	-	M	*Taenia pisiformis* (n=11), *Taenia hydatigena* (n=1), *Alaria alata* (n=54), *Mesocestoides lineatus* (n=1)
5	Archiş	-	M	*Taenia taeniaeformis* (n=1), *Heterakis gallinae* (n=3) (Chicken legs found in the stomach)
6	Leuca Găina	146380	M	*Alaria alata* (n=10), *Mesocestoides lineatus* (n=58), *Ancilostoma* spp. (n=1), *Pterygodermatites affinis* (n=2)
7	Chereluş	37986	M	*Alaria alata* (n=1), *Mesocestoides lineatus* (n=12), *Ancilostoma* spp. (n=5), *Taenia pisiformis* (n=15), *Taenia hydatigena* (n=3)
8	Slatina de Mureş	8	M	*Alaria alata* (n=20), *Mesocestoides lineatus* (n=5), *Ancilostoma* spp. (n=5)
9	Conop	202483	M	*Mesocestoides lineatus* (n=5), Unidentified cestodes, *Heterakis gallinae* (n=3), *Ascaridia galli* (n=1)
10	Conop	202282	M	*Taenia pisiformis* (n=2), *Alaria alata* (n=99)
11	Avram Iancu, Măgulicea	149259	F	Negative
12	Avram Iancu, Măgulicea	149302	M	Negative
13	Avram Iancu, Măgulicea	149209	M	Negative
14	Slatina de Mureş	7	M	Negative
15	Botfei	-	F	*Alaria alata* (n=12)
16	Sînpetru German	81937	F	Negative
17	Sînpetru German	81889	F	*Alaria alata* (n=2), Unidentified cestodes
18	Prunişor	-	F	*Alaria alata* (n=5), *Mesocestoides lineatus* (n=5), *Ancylostoma* spp. (n=3), *Taenia hydatigena* (n=2), *Heterakis gallinae* (n=1)
19	Prunişor	-	F	*Mesocestoides lineatus* (n=18)
20	Prunişor	-	M	*Ancylostoma* spp. (n=3), *Taenia pisiformis* (n=2), *Alaria alata* (n=32)

Legend: H.G. – hunting ground; F – female; M – male.

Table 2. Epidemiological data recorded in foxes in western Romania

		No. of animals	**No. of positive samples**	**P value**	**Prevalence %**
	Monoparasitism	20	2		10
	Poliparasitism	20	10		50
Gender	Male	11	8	0.7128	73
	Female	9	4		44
Total		**20**	**12**		**60**

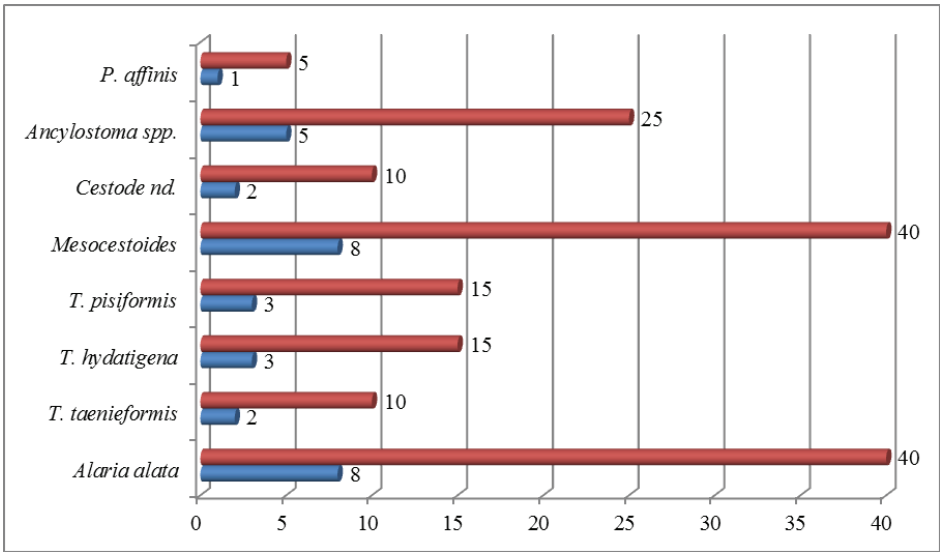

Fig. 2. Prevalence of gastrointestinal parasites in foxes in western Romania

Regarding the prevalence of parasites identified (figure 2) there have been found that *Alaria alata* was identified in eight foxes (40 %), unidentifiable cestodes in two animals (10 %), *Taenia taenieformis* two foxes (10 %), *Taenia hydatigena* in three animals (15 %), *Mesocestoides lineatus* in eight (40 %), *Taenia pisiformis* in three animals (15 %), *Ancylostoma* spp., five animals (25 %), *Pterygodermatites affinis* in one fox (5 %).

In a study conducted in Saudi Arabia, of 58 faecal samples examined there were found oocysts of coccidia (*Eimeria* and *Isospora*) *Tricocephalus* eggs spp., *Ancylostoma* spp., *Trichosomoides* spp. and oncosphera of *Taenia* spp. On the other hand after larva cultures there were revealed the presence of larvae species: *Ancylostoma caninum*, *Pterygodermatites affinis* and *Trichocephalus vulpis.* Of tapeworms there were identified *Joyeuxiella echinorynchoides, Diplopylidium nölleri, Taenia hydatigena,* and of acantocephali *Macracanthorhynchus catalinus (Alagaili et al., 2011).*

Compared to our study there was observed in addition, Eimeria and Isospora, Tricocephalus spp., *Joyeuxiella echinorynchoides, Diplopylidium nölleri and Macracanthorhynchus catalinus.*

Our study is the first to indicate nematode *Pterygodermatites affinis* infestation in Romania.

Prevalence of helminths in red fox was studied in Western Australia, where there were highlighted: Dipylidium caninum (27.7 % of foxes) Uncinaria stenocephala (18.2 %), Toxocara canis (14.9 %), Spirometra erinaceieuropaei (5.4 %), *Toxascaris leonina* (4.7 %), *Taenia serialis* (1.4 %), *Taenia hydatigena* (0.7%), *of* unidentifiable *Taenia species (4.1 %), Brachylaima cribbi* (0.7 %), *Plagiorchis maculosus* (0.7 %) *and an acantocephalus form Centrorhynchidae family (2.1 %)* (Dybing et al., 2013).

A study conducted by Barabasi et al., in 2007-2010, on 561 foxes in 15 counties in Romania revealed nematode parasitism (91.4 %) followed by cestodes (90.7 %) and trematodes (15 %). A total of 17 species of intestinal helminths were found: *Alaria alata, Dipylidium caninum, Echinococcus multilocularis, Mesocestoides lineatus, Taenia polyacantha, T. hydatigena, T. Multiceps, T. pisiformis, T. serialis, T., taeniaeformis T. crassiceps, T. ovis, Ancylostoma caninum, Uncinaria stenocephala, Toxascaris leonina, Toxocara canis* and *Trichuris vulpis* (Barabasi et al., 2010).

CONCLUSIONS

The results of this study underline the importance and spread of gastrointestinal parasites in foxes in Romania, previously confirmed by researchers in other countries.
Foxes in Western Romania are simultaneously parasitized with trematodes, cestodes and nematodes of the genera *Alaria, Taenia, Mesocestoides, Ancylostoma, Pterygodermatites*.
It was reported for the first time in Romania, infestation with nematode *Pterygodermatites affinis* in foxes. However, for a more comprehensive picture of these parasites etiological further studies are still needed to identify species common with domestic animals, and also zoonotic species.

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