

COPROLOGICAL PREVALENCE AND INTENSITY OF GASTROINTESTINAL PARASITES IN HORSES IN SOME ROMANIAN STUDS: PRELIMINARY DATA

Mariana IONIȚĂ, Marius Cătălin BUZATU, Violeta ENACHESCU, Ioan Liviu MITREA

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Veterinary
Medicine, 105 Splaiul Independenței, 050097, Romania

Corresponding author email: ionitamary@yahoo.com

Abstract

*Gastrointestinal parasites are a significant threat to health of horses and can cause irreparable internal damage as fifty percent of the deaths in horses may be related to internal parasites. In Romania, despite of the importance of horses in various activities (agriculture, sport, or as companion animal), knowledge and research studies on equines are sparse and fragmentary. Therefore, the present study aimed to provide an insight into the internal parasite burdens in Romanian horses, using coprological examination. A total of 158 horses from the breeds Shagya Arabian (n= 90) and Lipizzan (n= 68) residing at two studs, one in the northeastern and the second one in the center Romania were included in the study. Fresh fecal samples collected in September - November 2012, were analyzed for presence of gastrointestinal parasites using sodium chloride flotation technique, and additionally, for a subset of 56 samples, fecal worm eggs counts (FWECs), described as the number of eggs per gramme (epg) of feces, were determined using McMaster method. The overall prevalence of intestinal parasites eggs and oocyst in the positive horses were: strongyles 87.97 % (139/158) *Parascaris equorum* 13.9 % (22/158), *Strongyloides westeri* 5.06% (8/158), and *Eimeria leuckarti* 1.90 % (3/158). One hundred eleven positive horses (79.85%) were infected with a single parasite type, 27 (19.42%) and 1 (0.72%) of horses had multiple infections with two and three parasites, respectively. The highest prevalence and intensity rate belonged to strongyles, with the EPG counts varying from 25 to 3800, while for ascarids the EPG values varied from 75 to 1200. These findings emphasize high rate of infection with gastrointestinal parasites in Romanian horses, particular with strongyles, and will be the basis for further in-depth studies on the epidemiology and control of the equine parasites in Romanian horses.*

Key words: coprology, gastrointestinal parasites, horses, prevalence.

INTRODUCTION

The main internal parasites traditionally considered to be important in horses are ascarids, large and small strongyles, bots, and pinworms. Other species, such as tapeworms, stomach worms, and intestinal threadworms also can be of clinical importance (Mitrea, 2011).

Internal parasites are a significant threat to the health of horses and can cause irreparable internal damage. Fifty percent of the deaths in horses may be related to internal parasites (Bussieras and Chermette, 1995).

Equids can harbor over 100 species of internal parasites. About one-half of these species are in the strongyle group (Lichtenfels et al, 2008). Predominant research elsewhere has been, and continues to be, on strongyles and ascarids which are the most potentially pathogenic

endoparasites of horses. Strongyle infections in horses are widely spread, with a prevalence of 70 - 90% (Euzeby, 1975).

The great dilemma in controlling internal parasites in horses and other domestic animals is that, historically, after a period of usage of antiparasitic drugs, resistance of some species occurred (Kaplan, 2002).

Ideally, nonchemical measures would be a better method of controlling the parasites, and research efforts are now in the preliminary stage of being directed toward this endeavor. In the meantime, chemicals still will have to be used as the main source to remove these organisms in hosts.

Therefore, two main avenues of study are important: monitoring the effectiveness of drug treatment of animals in various ways, including pre- and post treatment examination for parasite eggs, and molecular mapping of the

species to identify and pinpoint the genes responsible for drug-resistance (Kaplan, 2004). In Romania, despite of the importance of the horse in various activities (in agriculture, sport, or as companion animal), knowledge and research interests in equine parasites is sparse and fragmentary. In the last years, it is well accepted that the assessment of helminth distribution patterns in managed equine populations will yield useful information for developing improved control methods that are less reliant on chemical compounds (Relf et al., 2012). Therefore, the present study aimed to provide preliminary data on insight into the internal parasite burdens in Romanian horses using coprological examination. The study was carried out in two different regions of Romania where horses are breeding in studs.

MATERIALS AND METHODS

A total of 158 horses from the breeds Shagya Arabian (n = 90) and Lipizzan (n = 68) residing

at two studs, one in the northeastern and the second one in the center Romania, were included in the study. The animals were assigned in age and gender groups, as follows: foals (up to 1 year, n = 20), yearlings (1 – 3 years, n = 49), adults (3 – 5 years, n = 30), stallions (n = 33), and mares (n = 26) (Table 1). Fresh fecal samples were collected in September - November 2012 and were analyzed for the presence of gastrointestinal parasites using sodium chloride flotation technique. Additionally, for a subset of 56 samples, fecal worm eggs counts (FWECs), described as the number of eggs per gramme (epg) of feces were determined using McMaster method.

The statistical analyses were performed using Quantitative Parasitology 3.0 free software. *P*-values by Fisher's exact test and Chi-square test and 95% confidence intervals (CI) were computed. $P \leq 0.05$ was considered as statistically significant.

Table 1. Animals included in the study, stratified by their provenance, age, gender, and reproductive class

Provenance	Age and gender category					Stallions	Mares	Total
	Foals (< 1 year)	1 – 3 years		3 – 5 years				
		males	females	males	females			
Stud A	10	10	10	3	7	17	11	68
Stud B	10	11	18	20	-	16	15	90
Total	20	21	28	23	7	33	26	158

RESULTS AND DISCUSSIONS

Of the 158 fecal samples analyzed, 139 (87.87 %, 95%CI=81.85-92.61) were positive for at least one parasite species. The most prevalent infection was with strongyles (87.97%), followed by *Parascaris equorum* (13.9 %), *Strongyloides westeri* (5.06 %), and *Eimeria leuckarti* (1.90%) (Table 2, Figure 1).

Of the tested animals, all foals, mares, and the yearlings were positive (100%) for strongyles, while the adults aging between 3 – 5 years and stallions had a lower strongyle prevalence, of 63.33%, and 75%, respectively.

The chi-square test for differences of age class in both studs was significant ($P=0.0001$).

With regards of ascarids, of the 22 positive animals, 54.54% were foals, 31.81% were yearlings, and the remainders were stallions (13.63%) aging between 5 and 7 years ($P=0.0001$).

One hundred eleven positive horses (79.85%) were infected with a single parasite type, 27 (19.42%) and 1 (0.72%) of horses had multiple infections with two and three parasites, respectively ($P=0.0001$).

The intensity rate of parasitic infection was assessed by determining the EPG counts, individually for 56 animals from the stud B:

foals (n = 10), yearlings (n = 15), stallions (n = 16), and mares (n = 15). Of them, 89.3% (50/56) were positive for strongyles, including all foals and mares, and 10 of the 16 stallions. Six animals (10.7%) (3 yearlings, 2 foals, and 1 stallion) were positive for ascarids.

The highest intensity rate belonged to strongyles, with the EPG counts varying from

25 to 3800, the highest values being registered in foals. The mean strongyle fecal worm egg count (eggs per gramme, EPG) and its distribution between the age and reproductive class of horses are presented in the Figure 1.

For ascarids, the EPG values varied from 75 to 1200, with the highest intensity registered also in foals (Table 3, Figure 2).

Table 2. Prevalence of gastrointestinal parasites in horses from two studs in Romania, according to the age, gender and reproductive class of animals

Species of parasite	No. of positive animals (percent)							
	Foals (< 1 year)	1 – 3 years		3 – 5 years		Stallions	Mares	Total
		males	females	males	females			
Strongyles								
Stud A n = 68	10/10	10/10	10/10	3/3	7/7	15/17	11/11	66/68 (97.05 %)
Stud B n =90	10/10	11/11	18/18	9/20	0	10/16	15/15	73/90 (81.11 %)
<i>Total</i> N = 158	20/20	21/21	28/28	12/23	7/7	25/33	26/26	139/158 (87.97%)
<i>Prevalence</i>	100%	100%		63.3%		75.8%	100%	
	<i>P = 0.0001</i>							
<i>Parascaris equorum</i>								
Stud A n = 68	8/10	2/10	1/10	0/3	0/7	2/17	0/11	13 (19.12%)
Stud B n =90	4/10	1/11	3/18	0/20	0	1/16	0/15	9 (10.00)
<i>Total</i> N = 158	12/20	3/21	4/28	0/23	0/7	3/33	0/26	22/158 (13.93%)
<i>Prevalence</i>	60%	14.3%		0.00		9.1%	0.00	
	<i>P = 0.0001</i>							
<i>Strongyloides westeri</i>								
Stud A n = 68	2/10	1/10	0/10	0/3	0/7	4/17	0/11	7 (10.3%)
Stud B n =90	0/10	0/11	0/18	0/20	0	0/16	1/15	1 (1.11%)-
<i>Total</i> N = 158	2/20	1/21	0/28	0/23	0/7	4/33	1/26	8/158 (5.06%)
<i>Prevalence</i>	10%	2.04%		0.00		12.12%	3.85%	
	<i>P =0.245</i>							
<i>Eimeria leuckarti</i>								
Stud A n = 68	1/10	0	0	0	0	0	0	1 (1.47%)
Stud B n =90	2/10	0	0	0	0	0	0	2 (2.22%)
<i>Total</i> N = 158	3/20	0	0	0	0	0	0	3/158 (1.90%)
<i>Prevalence</i>	15%	0.00		0.00		0.00	0.00	
	<i>P =0.142</i>							

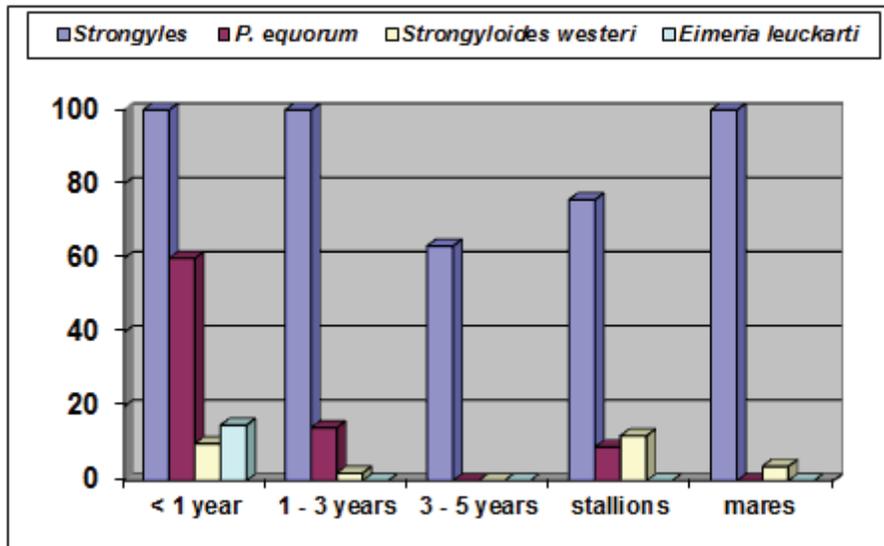


Figure 1. Prevalence (mean %) of eggs of strongyles, *Parascaris equorum*, *Strongyloides westeri*, and oocysts of *Eimeria leuckarti*, according to the age and reproductive class of horses

Table 3. The mean of EPG counts of strongyle and ascarids, determined for selected - positive horses on the stud B, stratified by class of intensity

EPG counts	No of positive horses, according to the age class							
	Positive for strongyles				Positive for ascarids			
	< 1 year	1-3 years	stallions	mares	< 1 year	1-3 years	stallions	mares
< 250	0	1	8	2	0	2	1	0
250 - 1000	0	7	2	3	1	0	0	0
1000 - 2000	4	7	0	8	1	1	0	0
> 2000	6	0	0	4	0	0	0	0

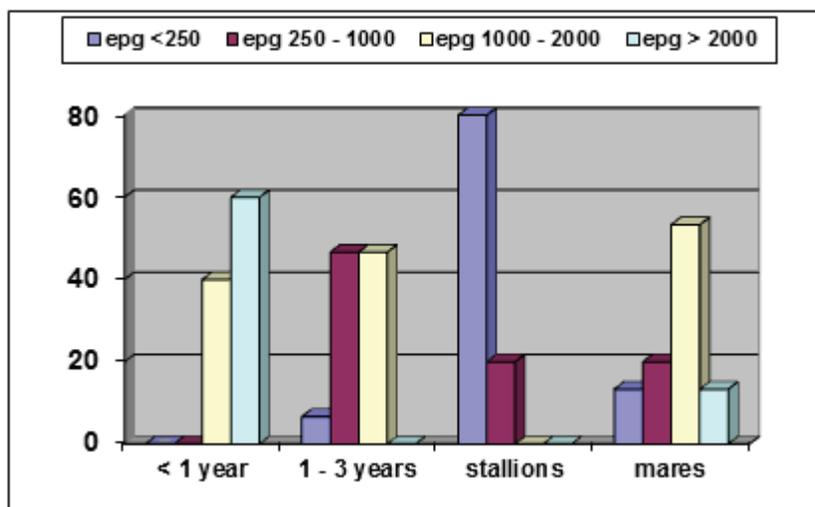


Figure 2. Mean strongyle fecal worm egg count (eggs per gram, EPG) distribution between the age and reproductive class of horses

The mean value of eggs per gram (EPG) differed significantly between species of helminthes and the level of fecal egg production. The *Strongylus* sp. was the most frequently helminthes found.

The presence of strongyle eggs in feces of almost all horses was not unexpected. Since there is widespread drug-resistance of small strongyles to the benzimidazoles and tetrahydropyrimidines, only treatment with ivermectin would have resulted in feces of foals

consistently being negative, in several horses, for small strongyle eggs for a period of time afterwards (Kaplan 2002).

In the present study, the higher prevalence in foals with nurse mares may be due to the fact that it may have been less frequent use of antiparasitic compounds, especially ivermectin, in these mares and possibly their own foals.

The prevalence and intensity of parasite infestations were similar to the reports of previous studies in Romania, but in other regions and other horse populations.

Therefore, epidemiological studies of strongyles in horses performed in the north-west areas of Romania, in three horse populations (n = 920), revealed mean values of strongyle infection extensivity of 80.71% and an intensivity value of 2793 EPG (eggs per gram) (Cernea et al., 2003).

If we refer to other European countries, our findings are also very similar to those. In Branderburg (Germany), the prevalence of equine parasites on horse farm level were reported as 98.4% for cyathostomins, 16.7% for ascarids, 14.3% for tapeworms, 8.7% for pinworms, and 4.0% for strongyloides (Hinney et al., 2011).

As it has been reported in most related literature, the most prevalent parasite infestation in horses is with strongyles, but particularly with small strongyles (cyathostomins). The presence of small strongyle has being reported with prevalences from 48.3%, 62.8%, 67.4% up to 98.4%, in Italy, United Kingdom, and Germany, respectively (Traversa et al., 2009, 2010, Hinney et al., 2011). In Italy cyathostome infections in horses are very common with prevalence rates up to 100% (Traldi et al., 1988; Piergili-Fioretta et al., 2005).

The prevalence of *P. equorum* has been also assessed in various countries (e.g., USA, Germany, Poland, and Sweden). Prevalence is generally high and varies from 22.4% to 80% (Reinemeyer et al., 1984; Rieder et al., 1995; Tavassoli et al., 2010; Lyons and Tolliver, 2004; Lind and Christensson, 2009).

Recently, Laugier et al. (2012) investigated the prevalence of *P. equorum* in foals from 15 large stud farms in France (Normandy) and the values varied from 6.9% to 76.2%, with an

overall prevalence of 30.5%, agreeing with research results within the our study.

The 5.06% prevalence of *S. westeri* indicated somewhat of marked decrease from the infection rate of over 90% several decades ago in foals in some areas (Lyons et al. 1973). The tremendous reduction of infections of this parasite species is related to the high efficacy of ivermectin, which has been on the market for 20 years. This compound is highly efficacious against intestinal infections in foals (Ryan and Best 1985) and has also been reported to have some activity on tissue stages in mares (Ludwig et al. 1983), thus reducing transmammary transmission. Earlier, efficacy of some of the benzimidazoles (cambendazole, fenbendazole, oxbendazole, and thiabendazole) at various dose rates against *S. westeri* probably contributed to the diminishing prevalence of this parasite (Lyons et al. 1993).

The presence of *E. leuckarti* oocysts in feces of foals (prevalence of 15%, comparing with the overall prevalence of 1.90%) is in according with literature in which is stated that foals aging 2 - 3 months are more receptive than adults (Bauer, 1988; Mitrea, 2012). Similar studies performed in Italy, reported coccidian oocysts in six foals, two stallions and one mare (Battelli et al., 1995).

In conclusion, this study emphasizes a high rate of infection with gastrointestinal parasites in horses. Nevertheless, internal parasites in horses are widely spread and an accurate diagnosis of the species distribution is paramount for proper control (Ionita et al, 2010). Unless control measures are practiced, they are likely to increase and could contribute to low performance and life expectancy of horses, and also can cause severe injury or even death of the horse (Klei, 1997).

Knowledge about the helminth prevalence will allow the issuance of specific treatment recommendations. Moreover, the information on risk factors of individual horses will facilitate targeting single animals for selective treatments (Becher and Pfister, 2010). Therefore, further extended studies in different areas of Romania on different horse populations in different grazing systems are necessary towards to emphasize the prevalence of different endoparasite species of horses, and subsequent epidemiological studies for

monitoring the anthelmintic treatments used as a base for applying future efficiently integrated control program.

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