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Prevalence of gastrointestinal parasites of red deer from Protected Landscape Area Štiavnické vrchy

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Abstract

Count of red deer in some areas of Slovak republic exceeds standard count. To these areas belongs as well Protected Landscape Area Štiavnické vrchy (N48°24'42" E18°52'21"). High count of is a risk for spread of viral, bacterial as well as parasitic diseases. The aim of this study was to determined and evaluated prevalence of gastrointestinal parasites of red deer (*Cervus elaphus*) from Protected Landscape Area Štiavnické vrchy in year 2016. Monitoring was realized through cooperation between Department of Veterinary Sciences at Slovak University of Agriculture in Nitra and District Veterinary and Food Administration in Zvolen as well as with Hunting Associations acting in area of Štiavnické vrchy. Total 120 faecal samples (10 from each month of the year 2016) was analysed using flotation method and eggs and oocysts were identified. Highest prevalence was detected by *Trichostrongylus axei*, *Eimeria* spp. and *Spiculopteragia boehmi*. Prevalence of endoparasites is affected by age structure of red deer and then by using antiparasitics, climatic condition. Result of these was, that prevalence of total gastrointestinal parasites was lowest during months January to March, when Hunting Associations realised regular worming. The highest prevalence of total gastrointestinal parasites was in months July to December, when the relative humidity is higher and to red deer population belongs as well new offspring, which has high predisposition to gastrointestinal parasites.

Keywords: endoparasite, intestine, prevalence, red deer

Introduction

The red deer (*Cervus elaphus*) has 20 different geographical subspecies. Two from these subspecies are common in area of Slovak republic, Central European red deer (*Cervus elaphus hippelaphus*) and Carpathian red deer (*Cervus elaphus montanus*) (Bališ, 1980). Area monitored in this research was Protected Landscape Area Štiavnické vrchy. This area has 78,000 hectares where live both above mentioned species as well as their crossbreed. Red deer has in Protected Landscape Area Štiavnické vrchy good living conditions, that results in increase of standardized deer

spring count. Together with this, the rearing management, hunt and prevention of game damages is more intensive (Ciberej and Krajniak, 2013). More intensive hunt place emphasis on the quality and health clean of game meat, because some parasites have zoonotic potential and represent a risk for public health (Kashid et al., 2003; Roman et al., 2017). Good health state of present fundamental prerequisite of resultful game rearing (Richter, 2003). Most frequently changes of health state are causes by parasitosis. Impact of endoparasites on the host depends mainly on resistance of the animal and its health and condition status. Most of endoparasites excrete harmful substances like products of its metabolisms. Invasion of endoparasites is connected with expression of acute or chronic action. Clinical symptoms of endoparasitosis differ case by case, however manifestation is major by the young animals (Kanka et al., 2017), which fall in growth and development. The most significant is delay of hair replacement. Some acute case ends with death. Cause of endoparasitosis is not explicit, it is combination of different stress factors. It is important to know the causes of disease origination and ways to prevention. Conventional game praxis used as a prevention application of antihelmintics once yearly, mostly in January or February, when are the conditions best (Ciberej et al., 1992). Aim of this study was to monitor and evaluated the prevalence of endoparasitosis of red deer intestine in Protected Landscape Area Štiavnické vrchy during hunting season in year 2016.

Materials and methods

Monitoring of parasite prevalence in red deer intestine was realized on 120 faeces samples. Monitoring was realised in Protected Landscape Area Štiavnické vrchy during year 2016. Faecal samples collection in the year 2016 was realized in four time intervals: first was January, February and March; second was April, May and June; third was July, August and September, and fourth was October, November and December. Abundance of gastrointestinal parasites of game is also affected by regular worming, which was realised in months January to March. Every month was collected 10 samples of faeces. Hunted red deer was from hunting areas resident in district of cities Zvolen, Krupina, Banská Štiavnica and Levice (Slovakia). These districts appurtenant to mountain chain Štiavnické vrchy. Faeces samples were collected from red deer excrements found in areas with high appearance of red deer, or during hunting season faeces samples were collected directly from rectum of hunted red deer. Faeces were collected in amount of 5 gram and stored in plastic tube at 5 °C. Faeces samples were analysed by method of Faust et al. (1938). Flotation method introduced by Faust et al. (1938) for concentrating eggs and cysts in fresh samples is still in regular use in many laboratories. After flotation of faeces samples, three drops were taken from the surface of each faeces sample. Each drop was examined using microscope Olympus Provis AX, magnification 100x and eggs and cysts were identified. Results were statistically processed using SAS Enterprise Guide 5.1. Prevalence was expressed as a percentage of positive samples from all analysed samples in that time interval. Additionally, to prevalence the 95%-exact confidence intervals were calculated. Effect of sampling time on prevalence of gastrointestinal parasite was determined using One-Sample Chi-Square Test.

Results and discussion

Results of prevalence of parasites in gastrointestinal tract of red deer in Protected Landscape Area Štiavnické vrchy during hunting season in year 2016 are shown in Table 1.

Table 1. Prevalence of gastrointestinal parasites in faeces of red deer in Protected Landscape Area Štiavnické vrchy

Months of the year 2016	Endoparasite	Prevalence (%)	95%-exact confidence interval
I.–III. n = 30	*Oesophagostomum venulosum*	26.7	12.3 – 45.9
	Trichostrongylus axei	16.7	5.64 – 34.7
IV.–VI. n = 30	*Nematodirus filicollis*	6.7	0.82 – 22.1
	Trichocephalus globulosa	6.7	0.82 – 22.1
	Ostertagia ostertagi	20	7.71 – 38.6
	Eimeria isospora	13.3	3.76 – 30.7
VII.–IX. n = 30	*Eimeria elaphi*	30	14.7 – 49.4
	Trichostrongylus axei	36.7	19.9 – 56.1
	Eimeria isospora	20	7.71 – 38.6
X.–XII. n = 30	*Ostertagia ostertagi*	10	2.11 – 26.5
	Spiculopteragia boehmi	33.3	17.3 – 52.8
	Eimeria isospora	26.7	12.3 – 45.9
	Trichocephalus globulosa	23.3	9.93 – 42.3

The prevalence of parasites in intestine of red deer from Protected Landscape Area Štiavnické vrchy was low (Table 1). This statement confirms also the information from Chroust (2001), that red deer is relative resistant. In hunting year 2016, the highest abundance was detected by *Trichostrongylus axei* (36.7%). *Trichostrongylus* spp. are more frequently in young red deer and generally causes inflammation of abomasum (Eysker and Kooyman, 1993). Second highest abundance had *Spiculopteragia*

boehmi (33.3%). *Spiculopteragia boehmi* are small worms 5 to 12 millimetres parasitic in abomasum and small intestine (Ferte et al., 2000). Abundance of *Eimeria* spp. was from 13.3 to 30%. Detected were two species *Eimeria isospora* and *Eimeria elaphi.* Highest abundance of *Eimeria isospora* was in month November. Most common way of entering oocyst of *Eimeria* spp. is via ingesting of feed or water (Špeník, 1977).

According to Bowman (2013) the source of infections are mostly areas with high humidity and near to feeding places. *Eimeria* spp. prevalence of 10% by red deer published Kotrlá et al. (1984). Prevalence of *Eimeria* spp. detected in this study is higher than published Kotrlá et al. (1984), this difference can be as a result of higher concentration of in that area. Next detected species of endoparasites were *Oesophagostomum venulosum* (8 samples). This endoparasite has 15 to 20 millimetres. *Oesophagostomum* is detected often in colon and larvae penetrate the intestine wall, where encysted (Chroust, 1998). Jurášek (1987) detected larvae also in liver and kidney. Other detected endoparasites revealed prevalence from 2 to 10% (Table 1).

Season development of total parasites in intestine of red deer from Protected Landscape Area Štiavnické vrchy is shown in Figure 1. Gradual increase from January to December 2016 was detected. This was probably cause by higher average annual temperature and higher humidity mainly in autumn months. Besides climatic condition from July to December affects the higher prevalence of gastrointestinal parasite also natural increase young categories of (Kanka et al., 2017). Lover prevalence of endoparasites from January to June is due to regular worming realised in January to March. Effect of time of faeces sampling on prevalence of gastrointestinal parasite was significant P=0.028.

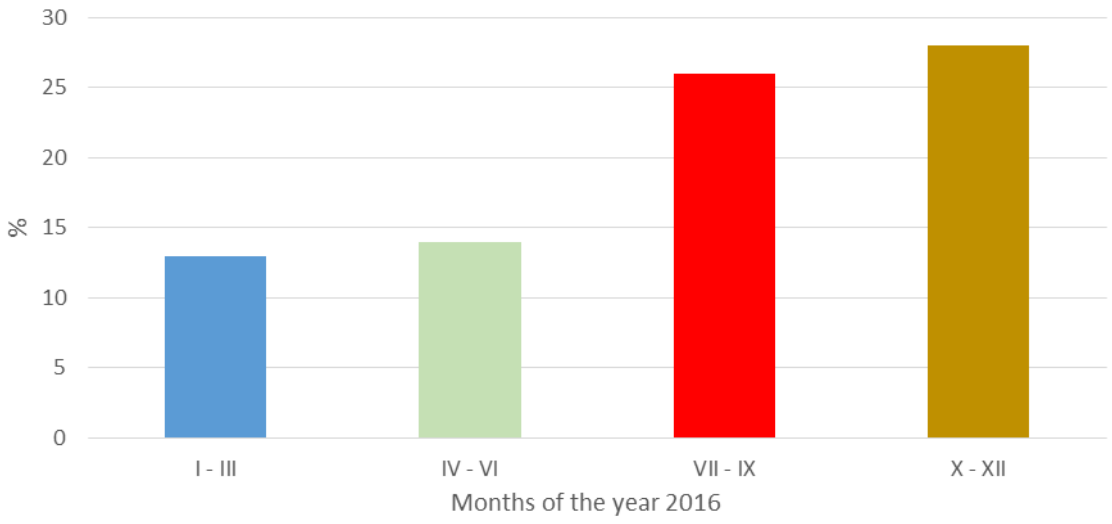

Figure 1. Development of gastrointestinal parasites count of red deer according to months of the year 2016

Conclusions

Aim of this study was detection of parasite species in intestine of red deer, calculation of endoparasite prevalence and description of season changes in parasitocenosis of red deer from Protected Landscape Area Štiavnické vrchy. During year 2016 a 120 faeces samples were analysed, ten per each month. Eight species of gastrointestinal parasites were detected. Most frequently was *Eimeria* spp. (*Eimeria isospora* and *Eimeria elaphi*). The highest prevalence had *Trichostrongylus axei* 36.7% and *Spiculopteragia boehmi* 33.3%. From detected gastrointestinal parasites the lowest prevalence 6.7% had *Nematodirus filicollis* and *Trichocephalus globulosa*. During months July to December was prevalence of total gastrointestinal parasites in red deer double high compared to months January to June. From parasitological point of view was health status of red deer in monitored area good. This state is influenced by regular worming in months January to March. To decrease of prevalence of parasites in intestine of red deer contribute also decrease of count, which is in this hunting area essential.

References

Bališ, M. (1980) Jelenia zver. Bratislava: Príroda.

Bowman, D. (2013) Georgis' parasitology for veterinarians. Amsterdam: Elsevier.

Chroust, K., Lukešová, D. (1998) Veterinární protozoologie. Brno: VFU Brno.

Chroust, F. (2001) Parazitární choroby spárkaté zvěře. Myslivecké listy, S1.

Ciberej, J., Lazar, P., Halász, J. (1992) Chov a choroby zveri. Košice: Magnus.

Ciberej, J., Krajniak, D. (2013) Lov zveri a poľovnícke plánovanie IV. 2. vyd. Zvolen: Technická univerzita.

Eysker, M., Kooyman, F. N. J. (1993) Notes on necropsy and herbage processing techniques for gastrointestinal nematodes of ruminants. Veterinary Parasitology, 46 (1-4), 205-213. DOI: https://dx.doi.org/10.1016/0304-4017(93)90059-V

Faust, E. C., D'Antoni, J. S., Odom, V., Miller, M. J., Peres, Ch., Sawitz, W., Thomen, L. F., Tobie, J., Walker, J. H. (1938) A critical study of clinical laboratory technics for the diagnosis of protozoan cysts and helminth eggs in feces. American Journal of Tropical Medicine, 18 (2), 169-183.

Ferte, H., Cleva, D., Depaquit, J., Gobert, S., Leger, N. (2000) Status and origin of Haemonchinae (Nematoda: Trichostrongylidae) in deer: a survey conducted in France from 1985 to 1998. Parasitology Research, 86 (7), 582-587.

Jurášek, V., Dubinský, P., Bírová, V., Borošková, Z. (1993) Veterinárna parazitológia. Bratislava: Príroda.

Kanka, T., Rolinec, M., Kasarda, R., Imrich, I., Bučko, O. (2017) Endoparasites prevalence of wild boar (*Sus scrofa*) in CHKO Štiavnické vrchy. Research in Pig Breeding, 11 (1), 18-21.

Kashid, K. P., Shrikhade, G. B., Bojne, G. R. (2003) Incidence of gastro-intestinal helmints captive wild animals at different locations. Zoos Print Journal, 18 (3), 1053-1054. DOI: https://dx.doi.org/10.11609/JoTT.ZPJ.18.3.1053-4

Kotrlá, B., Černý, V., Kotrlý, A., Minář, J., Ryšavý, B., Šebek, Z. (1984) Parasites of Wild Animals. Prague: Academia.

Richter, V. (2003) Jelenia zver. Bratislava: PaPress.

Roman, C., Ciucă, L., Mardare, R., Ivănescu, L. M., Acatrinei, D. M., Miron, L. D. (2017) Research regarding endoparasitosis in some wild mammals living in zoological parks. Lucrari Stiintifice – Univesitatea de Stiinte Agricole a Banatului Timisoara. Medicina veterinara, 50 (2), 220-224.

Špeník, M. (1977) Choroby poľovnej zveri. Bratislava: Príroda.