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PARASITIC FAUNA OF GASTROINTESTINAL TRACT OF HORSES AND EVALUATION OF DEWORMING EFFECTIVENESS

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Abstract. The aim of the study was to determine the composition of parasitic fauna of the gastrointestinal tract of horses and to assess the efficacy of ivermectin. Incidence and intensity of infection was determined based on faecal analyses using Willis–Schlaf and McMaster methods. Anthelmintic resistance was determined using a faecal egg count reduction test (FECRT). Preparation ivermectin (paste) was administered once to all horses individually, in a dose of 120 mg · 600 kg^{-1} (0.2 mg · kg^{-1}). The study found an average infection incidence of horses with gastrointestinal parasites at the level of 92.86%. Incidence of infection with large strongyles (*Strongylinae*) prior to deworming of horses was 67.86%, while with small strongyles (*Cyathostominae*) it was 89.29%. This treatment did not result in the removal of *Cyathostominae* and *Strongylinae* parasites in all hosts, but significantly reduced infection intensity. The efficacy of ivermectin on day 14 after the treatment was 90.62%.

Key words: horse, Strongylidae, *Strongylinae*, *Cyathostominae*, drug resistance, ivermectin

INTRODUCTION

Profitability of horse breeding and raising depends primarily on their health condition. Diseases caused by parasites have frequently subclinical course, and

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for this reason they often remain unnoticed by breeders as well as veterinarians [Prokulewicz et al. 2014]. Gastrointestinal parasites cause great losses in horses resulting mainly from a decrease in fitness and immunity. Digestive system disorders also occur, such as weakness, colic, diarrhea, anemia and even death [Love et al. 1999, Kaplan et al. 2004, Gawor et al. 2006]. Even horses in best condition are exposed to invasive forms of parasites. Keeping animals in the group as well as common pastures and paddocks, where horses come into contact with invasive forms (mainly larvae of strongyles), are conducive to this situation [Prokulewicz et al. 2014].

Nematodes and cestodes are internal parasites, which represent a potential threat to the health of horses. Strongylidae, of the many species of parasites found in horses, occupy a special place because of their wide distribution.

Prevention based on an early and accurate diagnosis and effective treatment that includes anthelmintic resistance is a primary effective way to prevent the spread of parasitic infections in horses [Lyons et al. 2009]. The problem of anthelmintic cyathostomin resistance in horses is widely reported in the literature from Europe and overseas [Lyons et al. 2009, Traversa 2010]. Low awareness of breeders favors the occurrence of anthelmintic resistance in horses. Control of parasitic infections in most farms is based on two deworming treatments of animals (before and after the grazing season).

Preparations for deworming of horses, which are available on the Polish market are benzimidazole compounds (fenbendazole, mebendazole, oxfendazole), derivatives of tetrahydropyrimidins (pyrantel pamoate) and a group of macrocyclic lactones (ivermectin, abamectin and moxidectin) [Gawor and Kita 2003].

One of the side effects of prolonged and intensive use of chemotherapeutic agents in horses is the emergence of drug resistance among parasites. Another factor that may lead to the development of anthelmintic resistance is the alternating use of drugs belonging to the same group of chemical compounds [Lyons et al. 2009, Travers 2010]. The European Medicines Agency indicated the occurrence of drug resistance against macrocyclic lactones (ivermectin, abamectin, moxidectin) [EMEA/CVMP/EWP/170208/2005-CONSULTA].

The aim of the study was to determine the species composition of parasitic fauna of the gastrointestinal tract of horses and to assess the efficacy of ivermectin.

MATERIAL AND METHODS

Faecal analysis was conducted in 28 horses kept in one of the farms in Western Pomerania. In total, 56 faecal samples were tested. The horses were kept in boxes with shallow bedding. Horses on the farm were dewormed twice a year (spring and autumn). Our study includes deworming of horses during the autumn with

ivermectin (paste). Preparation ivermectin (paste) was administered once to all horses individually, in a dose of 120 mg $\cdot$ 600 kg^{-1} (0.2 mg $\cdot$ kg^{-1}). Stable and its all equipment was cleaned and disinfected after deworming of horses.

The study material consisted of faecal samples collected from each horse prior to drug administration and 14 days after deworming. Drug resistance test was determined using a faecal egg count reduction test (FECRT). The method is recommended by the World Association of Veterinary Parasitology. It involves comparing the average number of eggs per 1 g of faeces in horses before dosing and at a determined time point after the treatment [Betlejewska 2000].

Incidence and intensity of infection was determined based on faecal analyses using Willis–Schlaf and McMaster methods [Ziomko and Cencek 1995]. Eggs were identified based on their morphology (shape, shell structure, the number and size of the blastomeres) and biometrics [Thienpont et al. 1986, Foreyt 2001].

RESULTS AND DISCUSSION

The current study found an average infection incidence of horses with gastrointestinal parasites to be 92.86%; the results are comparable with values obtained by other authors [Betlejewska 2000, Pilarczyk et al. 2010, Geringer de Oedenberg et al. 2010, Prokulewicz et al. 2014]. Romaniuk et al. [2007] also demonstrated the incidence of infection at the level of 100% in Polish horses kept in a forest, while 86.3% in horses kept in the indoor/pasture system.

In the tested horses, an average of 1.066 eggs per 1 g of faeces was found before deworming, while after dewarming it was 100 eggs in 1 g of faeces (Fig. 1). The presence was shown of nematodes of the family Strongylidae and *Cyathostominae*. Incidence of horse infections with *Strongylinae* was 67.86%, while 89.29% with *Cyathostominae*. Similar results were reported by other authors. Pilarczyk et al. [2010] showed in Polish horses imported from Holland an average incidence of infection with *Cyathostominae* to be 94.74%, whereas for *Strongylinae* it was 89.47%. Sasimowski et al. [1994] found significantly larger invasion of *Cyathostominae* than *Strongylinae* in primitive breeds of horses from nature reserves.

Infection incidence of the horses studied after ivermectin deworming was 28.57%. Average infection incidence of horses with *Cyathostominae* was 21.43%, while 10.71% with *Strongylinae*.

Similar results were obtained by Romaniuk et al. [2007], who reported a decrease in infection incidence from 100% to 19% one month after deworming.

This treatment did not result in the removal of *Cyathostominae* and *Strongylinae* parasites in all hosts, but significantly reduced infection intensity of the horses studied. On day 14 after the treatment of horses with ivermectin, isolated nema-

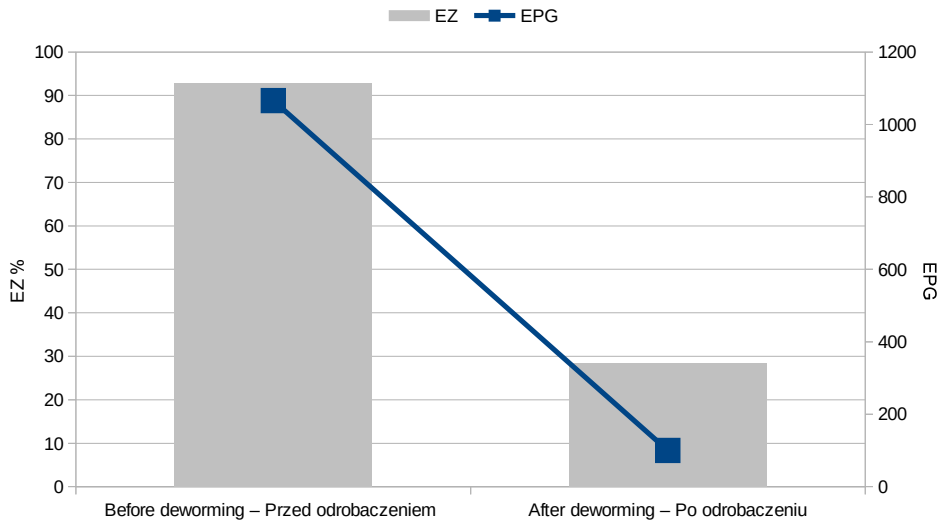

Fig. 1. Extensiveness and intensity of infestation

Rys.1. Ekstensywność i intensywność zarażenia

tode eggs were found in 8 horses from the study group. At that time, the efficacy of the preparation was 90.62% (Fig. 1). World Association for the Advancement of Veterinary Parasitology (WAAVP) reports that anthelmintic resistance occurs at FECRT values over 90%. This does not mean that there are no drug-resistant parasites in the population [Watson 2008].

Prokulewicz et al. [2014], after the treatment of horses with Dectomax (active substance – doramectin), did not detect the presence of *Strongylinae*. Similarly as in our study, deworming did not result in the removal of *Cyathostominae* in all hosts, but the intensity of infection was significantly reduced. Kornaś et al. [2001, 2004] also dewormed horses with Panacur and ivermectin formulation and did not obtain satisfactory results. The authors believe that the intensity of infection of horses with helminths is dependent not only on the external environment, but also the type of pasture, horses age, and most of all the type of drug applied. In our study, lower effectiveness of drug was found against small strongyles (*Cyathostominae*). Similar results were obtained by Romaniuk et al. [2002, 2007] in Polish horses as well as by Betlejewska [2000b] in mares in the Western Pomerania region. According to Gawor and Kita [2006], ivermectin and its derivatives should be used at least every 10 weeks in horses kept in the pasture (in a herd).

The use of the same active substance can lead to drug resistance. According to Gawor [1995], the efficacy of ivermectin against *Strongylinae*, assessed on

the basis of a critical test, was 94–100%. The author reported the inhibition of *Strongylinae* egg excretion for no longer than 6 weeks.

CONCLUSIONS

In the horses studied, an average infection incidence with gastrointestinal parasites was found to be at the level of 92.86%. The presence of small strongyles (*Cyathostominae*) and large strongyles (*Strongylinae*) was demonstrated in the infected horses. Infection incidence of the horses studied was 28.57% on day 14 after ivermectin deworming. At that time, the efficacy of the preparation was 90.62% (Fig. 1). Deworming treatment in horses should always be preceded by a mandatory faecal analysis.

REFERENCES

Betlejewska, K. (2000). Banminth, Eqvalan, Panacur Paste oraz Rintal Plus w zwalczaniu słupkowców małych u koni [Strain of small strongyles (*Cyathostominae*) resistant to Banminth, Eqvalan, Panacur Paste and Rintal Plus in horses]. Med. Weter., 56, 395––397 [in Polish].

Betlejewska, K. (2000b). Dynamika inwazji słupkowców małych (*Cyathostominae*) u koni w cyklu rocznym [The dynamics of small strongyles (*Cyathostominae*) invasion in horses during an annual cycle]. Med. Weter., 56, 36–38 [in Polish].

Committee for Veterinary Medicinal Products (CVMP), 2006. Guideline on the SPC for Anthelmintics. European Medicines Agency Veterinary Medicines and inspections. EMEA/CVMP/EWP/170208/2005–CONSULTATION.

Foreyt, W.J. (2001). Veterinary parasitology: Reference manual. Blackwell Publishing, Oxford, pp. 1–235.

Gawor, J. (1995). The prevalence and abundance of internal parasites in working horses autopsied in Poland. Vet. Parasit., 58, 99–108.

Gawor, J., Kita, J. (2006). Uwagi praktyczne na temat odrobaczania koni [Practical notes on horse deworming]. Życie Weter., 81(11), 753–756 [in Polish].

Gawor, J., Kornaś, S., Charcenko, V., Nowosad, B., Skalska, M. (2006). Pasożyty jelitowe zagrożeniem zdrowia koni w różnych warunkach chowu [Intestinal parasites and health problems in horses in different breeding systems]. Med. Weter., 62, 331–334 [in Polish].

Kaplan, R.M., Klei, T.R., Lyons, E.T., Lester, G., Courtney, C.H., French, D.D., Tolliver, S.C., Vidyashankar, A.N., Zhao, Y. (2004). Prevalence of anthelmintic resistant cyathostomes on horse farms. J. Am. Vet. Med. Assoc., 225, 903–910.

Kornaś, S., Kulisa, M., Nowosad, B. (2001). Robaczyce u koni pełnej krwi angielskiej w różnym wieku [Helminthiasis of English thoroughbred horses of different ages]. Prz. Hod., 6, 23–25 [in Polish].

Kornaś, S., Nowosad, B., Skalska, M. (2004). Występowanie glisty *Parascaris equorum* u koni w różnych systemach chowu [Prevalence of roundworms (*Parascaris equorum*)

in horses housed in different management systems]. Med. Weter. 60, 412–414 [in Polish].

Love, S., Murphy, D., Mellor, D. (1999). Pathogenicity of cyathostome infection. Vet. Parasitol., 85, 113–122.

Lyons, E.T., Tolliver, S.C., Collins, S.S. (2009). Probable reason why small strongyle EPG counts are returning "early" after ivermectin treatment of horses on a farm in Central Kentucky. Parasitology Res., 204, 569–574.

Pilarczyk, B., Smugała, M., Binerowska, B., Tomza-Marciniak, A., Bąkowska, M., Tylkowska, A. (2010). Prevalence of intestinal parasites of Polish Konik horse- comparison between domestic horses and imported from the Netherlands, Bull. Vet. Inst. Pulawy, 54, 171–174.

Prokulewicz, A., Pilarczyk, B., Tomza-Marciniak, A. (2014). Evaluation of the Efficacy of Dectomax in the Control of Strongyle (Strongylidae, *Cyathostominae*) Infestation in Horses. Israel J. Vet. Med., 69 (2), 82–86

Romaniuk, K., Jaworski, Z., Golonka, M. (2002). Ocena inwazji pasożytów wewnętrznych u koników polskich w chowie alkierzowo-pastwiskowym. Mag. Weter., 11, 25––28 [in Polish].

Romaniuk, K., Jaworski, Z., Golonka, M. (2007). Dynamika inwazji pasożytów wewnętrznych w tabunie koników polskich z chowu leśnego [Course of internal parasite invasion in the Polish Konik horse herd from woodland breeding]. Med. Weter., 63, 87–89 [in Polish].

Sasimowski, E., Pietrzak, S., Gundłach, J.L., Sadzikowski, A.B. (1994). Zarobaczenie kuców felińskich, arabo-koników i koników polskich w różnych środowiskach i porach roku [Worm infestation in Felinski ponies, Arabokonik, and Konik in different environments and seasons]. Med. Weter., 50, 555–557 [in Polish].

Thienpoint, D., Rochette, F., Vanparijs, O.F.J. (1986). Diagnosing helminthiasis by coprological examination. Jannsen Research Foundation, Beerse.

Traversa, D. (2010). Anthelmintic resistance in horse cyathostomins in Europe: current status and future perspectives. Sci. Parasitol., 11(1), 1–6.

Watson, J. (2008). Drug resistance in equine parasites: a cautionary tale. J. Equine Vet. Sci., 28, 54–55.

Ziomko, I., Cencek, T. (1995). Outline of parasitology diagnostic in breeding animals. Ed. National Veterinary Research Institute, Pulawy.

PARAZYTOFAUNA PRZEWODU POKARMOWEGO KONI ORAZ OCENA SKUTECZNOŚCI ICH ODROBACZANIA

Streszczenie. Celem pracy było określenie składu gatunkowego parazytofauny przewodu pokarmowego koni oraz ocena skuteczności preparatu iwermektyna. Ekstensywność i intensywność zarażenia ustalono na podstawie badań koproskopowych stosując metodę Willis–Schlafa oraz McMastera. Lekooporność ustalono testem redukcji wydalanych z kałem jaj (FECRT). Preparat iwermektyna (pasta) został podany wszystkim koniom indywidualnie, jednorazowo w dawce 120 mg $\cdot$ 600 kg^{-1} (0,2 mg $\cdot$ kg^{-1}). W wyniku przeprowadzonych badań stwierdzono średnią ekstensywność zarażenia koni pasożytami przewodu pokarmowego na poziomie 92,86%. Ekstensywność zarażenia koni przed odrobaczaniem słupkowcami dużymi (*Strongylinae*) wyniosła 67,86%, natomiast słupkowcami małymi (*Cyatostominacae*) – 89,29%. Odrobaczanie nie spowodowało usunięcia pasożytów *Cyatostominacae* i *Strongylinae* u wszystkich żywicieli, jednak znacznie ograniczyło intensywność zarażenia badanych koni. W 14. dniu po leczeniu koni iwermaktyną skuteczność preparatu wyniosła 90,62%.

Słowa kluczowe: konie, Strongylidae, *Cyathostominae*, lekooporność, iwermektyna

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