

The prevalence and intensity of the intestinal parasite incidence in pigs kept in farm with the prevention program

Justyna Bartosik¹, Paweł Górski², Martyna Batorska¹,
Grażyna Tokarska¹, Maciej Klockiewicz²

¹Warsaw University of Life Sciences SGGW, Faculty of Animal Sciences,
Department of Animal Breeding and Production,

²Warsaw University of Life Sciences, Faculty of Veterinary Medicine,
Department of Preclinical Sciences,
ul. Ciszewskiego 8, 02-786 Warszawa

The aim of the study was to compare the intestinal parasites in different groups of pigs (sows, weaners, fatteners) before and after the application of a deworming programme. The experiment was carried out twice, in February and in June 2011 on a farm keeping pigs in a deep litter system. Samples of faeces for analyses were collected twice from 15 sows, 7 weaners and 18 fatteners. In total, 80 samples of faeces were examined using flotation and the McMaster technique. Three parasitic species belonging to the phylum Nematoda (*Strongyloides ransomi*, *Ascaris suum*, *Oesophagostomum dentatum*) and one protozoan species from the phylum Apicomplexa (*Eimeria* sp.) were detected. The highest prevalence of parasite infection was recorded in sows in the period before deworming (86.7%). Differences in the intensity and prevalence of intestinal parasite invasion were observed before and after the prevention program was applied. The intensity of *Ascaris suum* infestation in sows before and after deworming differed significantly ($P \leq 0.05$). The highest intensity of parasitic invasion was observed after deworming in the group of fatteners (26 800 oocysts of *Coccidia* per 1 gram of faeces). Multi-species invasions were also observed in some infected pigs. These results indicate the necessity to implement parasitological screening protocols in pig herds to control and implement prevention and/or control programmes.

KEY WORDS: pigs / intestinal parasites / prevention program

Studies on parasite invasions in pigs are being conducted in various countries in terms of the health status, productivity and economic aspects [1, 2, 3, 9, 10, 11, 17, 18]. Experiments, screening tests and monitoring programmes have been conducted for many years e.g. on gastro-intestinal helminth infestation in various Suidae species [4, 14, 19, 20]. Identification of the problem and its scale, as well as the implementation of prevention programmes and treatment protocols make it possible to limit the incidence of parasitoses,

which in turn has an advantageous effect on the yield and quality of products obtained from farm animals [21]. Health status of the numerous pig population providing animals for slaughter and supplying pork, thus being a source of valuable animal origin protein, is of particular importance for consumers living in areas, where this species is farmed.

The aim of this study was to compare the intestinal parasite species composition in pigs of various technological groups (sows, weaners, fatteners) before and after the administration of a deworming drug as well as assess the prevalence of detected parasites.

Materials and Methods

The farm, on which faeces samples were collected from pigs reared pigs in the closed cycle. The average number of sows in the foundation stock was 30 head. A total of 80 faeces samples were collected from randomly selected animals, i.e. 15 sows in various production phases, 7 weaners and 18 fatteners kept in different pens. The number of samples collected for analyses was representative for each production group and the number of animals within the group.

On that farms all animals were kept in a deep litter system in pens with solid floors. In pens for non-pregnant and pregnant sows manure was removed once every two weeks and straw litter was supplemented at every 2-3 days. In farrowing pens, in the nursery house and the fattening house manure was removed once a week, while litter was supplemented daily in pens for sows and weaners and at every 2 days in pens for fatteners. After manure was cleared the floors in pens were disinfected using Dezosan Wigor. Once a year the piggery walls were whitewashed. Once every 2-3 years the pens were washed using a pressure washer and water with a disinfectant. The prevention programme implemented in the pig herd included protection of animals against ecto- and endoparasites; Dectomax was applied at 1 cm³ per 33 kg body mass. Comprehensive disinfection of the piggery and deworming of pigs were performed in April 2011.

Samples of faeces were collected twice: in February – prior to deworming, and in June – after deworming. Faeces samples were tested using the modified Fulleborn method [23]. The McMaster technique was applied in order to assess the prevalence of parasite invasion [7].

Parasite eggs and oocysts detected in the coproscopic tests were photographed using a Panasonic GP-KR 222 camera with the NIS Elements programme, and next they were identified.

The significance of differences in parasite invasion intensity before and after the application of a deworming drug in individual groups was verified by the Kruskal-Wallis test. Calculations were performed with the IBM SPSS Statistics 20 statistical software.

Results and Discussion

Overall 3 parasitic species belonging to Nematoda (photos 1-3) and 1 protozoan species identified as a representative of the genus *Eimeria* (photo 4) were identified. Figures 1-3 present prevalence (extent) of invasion of individual parasite species in sows, weaners and fatteners in the period before and after deworming.



Photo. 1. Egg of *Strongyloides ransomi* (10×40) (Bartosik, 2011)



Photo. 2. Egg of *Ascaris suum* (10×40) (Bartosik, 2011)



Photo. 3. Eggs of *Oesophagotonum dentatum* (10×40) (Bartosik, 2011)



Photo. 4. Oocyst of *Eimeria* sp. (10×40) (Bartosik, 2011)

Overall prevalence of intestinal parasites in sows in the period before and after deworming was relatively high and amounted to 86.7% and 60.0%, respectively. In comparison to sows it was lower in weaners, amounting to 28.5% both before and after deworming, while in fatteners compared to weaners it was higher. In the latter group prevalence of parasite infestation was 66.7% before and 72.3% after deworming, respectively. In some affected animals multi-species infestations were observed. This phenomenon was more common before rather than after the introduction of the deworming programme, particularly in fatteners.

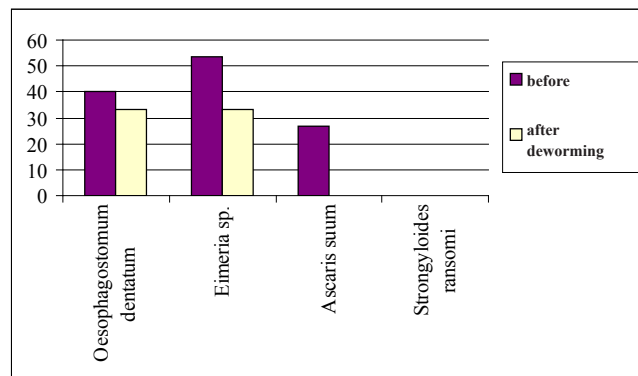


Fig. 1. The prevalence of parasite invasion in sows before and after deworming

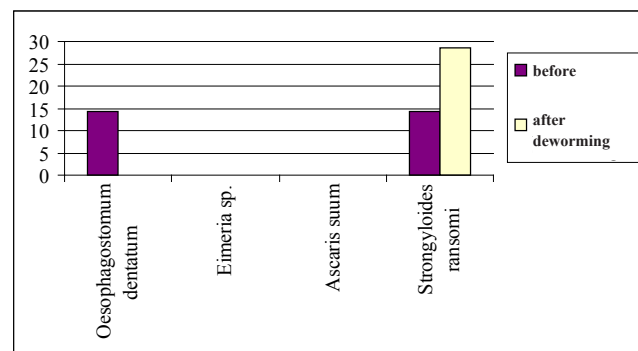


Fig. 2. The prevalence of parasite invasion in weaners before and after deworming

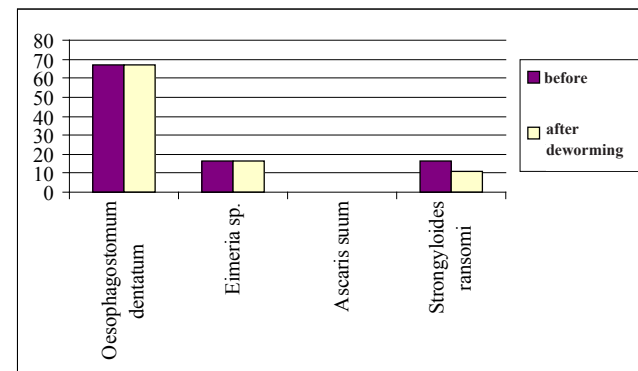


Fig. 3. The prevalence of parasite invasion in fatteners before and after deworming

The table presents the intensity of parasitic invasion (the mean number of eggs per 1 g faeces – EPG) in various production groups of pigs before and after deworming. Differences were found in the intensity of intestinal parasite invasion before and after the introduction of the prevention programme; most often being lower after deworming. The invasion intensity in the case of the large roundworm and coccidia in sows was much greater before deworming (for *Ascaris suum* at $P \leq 0.05$), while that of *Oesophagostomum dentatum* in that group was greater after deworming. In the group of fatteners the invasion of *Strongyloides ransomi* and coccidia was greater after deworming in comparison to the period preceding that procedure. In turn, the intensity of *Oesophagostomum dentatum* invasion, similarly as in weaners, was greater before rather than after deworming.

Investigations conducted by the authors of this study confirmed that the incidence of intestinal parasites in pigs continues to be problem in animal production farms. Literature sources on the subject include descriptions of experiments, in which animals were kept in the litter system on solid floors, but it was in shallow litter, deep litter or in floor management systems [8, 11, 22]. Results found in analysed piggeries concerning pigs from different production groups varied. The prevalence of parasitic infestation was even as high as 100% in pigs kept in litter piggeries in extensive systems [2], while in animals kept in piggeries with slatted floors it was much lower and amounted to as little as 20% [12, 15, 22].

Parasitoses are a considerable problem in the case of production groups kept in piggeries for extended periods of time (sows, fatteners) [6, 13]. In this study in the groups of sows and weaners a greater prevalence was recorded for parasitic infestations in comparison to the group of weaners. In the latter group of animals analyses of faeces samples showed no oocytes of coccidia or eggs of *Ascaris suum*, while only the presence of eggs of *Oesophagostomum dentatum* and *Strongyloides ransomi* was detected.

Popiołek et al. [16] showed that irrespective of the rearing system differences are found in parasitic infestation of pigs between the autumn and spring. In the spring season when compared to the autumn the prevalence of *Trichuris suis* decreased from 7.92% to 4.76%. Invasion of *Oesophagostomum dentatum* and *Strongyloides ransomi* was detected only in the autumn, while the prevalence of *Ascaris suum* was comparable in the analysed seasons. In this study the results concerning the prevalence of invasions by the four parasites indicate variation between the winter and summer. The differences in the prevalence of parasitic invasions in those seasons probably resulted from the deworming treatment performed in April. More advantageous results were obtained after the implementation of a prevention programme in the pig herd; an exception to this rule was observed for the prevalence of *Oesophagostomum dentatum* (fatteners – comparable results) and *Coccidia* (comparable results). In turn, Nosal and Petryszak [13] in a study conducted on sows in a 1-year period found a constant and very high, reaching 100%, prevalence of parasitic infestation in the period from January to December. They recorded the greatest invasion intensity with nematodes from the genus *Oesophagostomum* (2 species identified) in the summer (August) and winter seasons (from December to February). A major effect on the results in this study may have been exerted, apart from the spring deworming, by thorough disinfection of farming facilities. The greatest deworming efficacy was recorded in the group of sows –

Table
Average (from the smallest and to the biggest) intensity of parasite infection in pigs. Number of eggs or oocysts in 1 g of faeces

Animal groups	Numbers of faecal samples		<i>Oesophagostomum dentatum</i>		<i>Eimeria sp.</i>		<i>Ascaris suum</i>		<i>Strongyloides ransomi</i>	
	before	after	before	after	before	after	before	after	before	after
Sows	15	15	100-700 (6)	100-1300 (5)	200-7600 (8)	200-3800 (5)	200-2100 ^a (4)	0 ^a (0)	0 (0)	0 (0)
Weaners	7	7	200-400 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	200 (1)	200-400 (2)
Fatteners	18	18	100-1000 (12)	100-500 (3)	200-1000 (12)	100-26800 (3)	0 (0)	0 (0)	100-200 (3)	100-300 (2)

a, a – P≤0.05

In brackets – the number of samples in which the parasites infection was detected

overall prevalence after the procedure decreased by 26.7%. Ceylan et al. [5] reported that earlier experiments using the same antiparasitic drug showed its greater efficacy, reaching even 100%.

Results recorded in this study indicate a relatively high infestation rate of the animals. A biosecurity programme was implemented in the piggery, comprising e.g. quarantine and acclimatisation, monitoring of health status, sanitary measures including vaccinations and deworming, cleaning and disinfection, as well as a health protection programme, including control of endo- and ectoparasites. The level of overall prevalence amounting to 70% in the case of fatteners, even after the application of deworming drugs and disinfectants, suggests errors in the execution of the above-mentioned programme. It also indicates the need to perform screening tests on faeces of pigs in similar herds using cheap testing and diagnostic methods in order to control and supervise prevention and/or therapeutic programmes.

REFERENCES

1. ARIZONO N., YOSHIMURA Y., TOHZAKA N., YAMADA M., TEGOSHI T., ONISHI K., UCHIKAWA R., 2010 – Ascariasis in Japan: is pig-derived *Ascaris* infecting humans? *Japanese Journal of Infectious Diseases* 63, 6, 447-448.
2. BARTOSIK J., 2012 – Choroby pasożytnicze przyczyną spadku produktywności świń. *Farmer* 1, 100-101.
3. BORGSTEEDE F.H.M., GAASENBEEK C.P.H., VAN KRIMPEN M.M., MAURER V., MEJER H., SPOOLDER H.A.M., THAMSBORG S.M., VERMEER H.M., 2011 – Studies on preventive strategies and alternative treatments against roundworm in organic pig production systems. *Wageningen Journal of Life Science – NJAS* 58, 3-4, 173-176.
4. CABAJ W., 2006 – Wild and domestic animals as permanent *Trichinella* reservoir in Poland. *Wiadomości Parazytologiczne* 52, 3, 175-179.
5. CEYLAN E., RAGBETLI C., TANRITANIR P., 2010 – Evaluating the Effect of the Treatment of Doramectin on Some Biochemical Parameters in Goats Naturally Infected with Gastrointestinal Nematodes. *Asian Journal of Animal and Veterinary Advances* 5, 162-168.
6. EIJCK I., BORGSTEEDE F.H.M., 2005 – A survey of gastrointestinal pig parasites on free-range, organic and conventional pig farms in the Netherlands. *Veterinary Research Communication* 29, 407-414.
7. GUNDŁACH J.L., SADZIKOWSKIA B., 1998 – Diagnostyka i zwalczanie inwazji pasożytów u zwierząt. Wyd. 3, Wydawnictwo Akademii Rolniczej w Lublinie.
8. JANKOWSKA-MAKOSA A., KNECHT D., ŚRODOŃ S., 2012 – Pasożyty wewnętrzne u tuczników w zależności od systemu utrzymania i sezonu. V Szkoła Zimowa, Materiały Konferencyjne. Wisła 14-17 lutego, 103-105.

9. LAI M., ZHOU R.Q., HUANG H.C., HU S.J., 2011 – Prevalence and risk factors associated with intestinal parasites in pigs in Chongqing, China. *Research in Veterinary Science* 91, 3, 121-124.
10. NISSEN S., POULSEN I.H., NEJSUM P., OLSEN A., ROEPSTORFF A., RUBAIRE-AKIIKI C., THAMSBORG S.M., 2011 – Prevalence of gastrointestinal nematodes in growing pigs in Kabale District in Uganda. *Trop Animals Health Production* 43, 3, 567-572.
11. NOSAL P., 2001 – The influence of intestinal nematode infection on the productivity of gilts at pig testing stations. *Wiadomości Parazytologiczne* 47, 4, 675-680.
12. NOSAL P., ECKERT R., 2005 – Pasożyty przewodu pokarmowego świń w zależności od wieku i warunków produkcyjnych. *Medycyna Weterynaryjna* 61, 4, 435-437.
13. NOSAL P., PETRYSZAK A., 2007 – Poziom zarażenia *Oesofagostomum* spp. u loch z gospodarstwa drobnotowarowego. *Wiadomości Parazytologiczne* 53 (suplement: Sesja I. Różnorodność biologiczna i systematyka pasożytów), 24.
14. PILARCZYK B., BALICKA-RAMISZ A., CISEK A., SZALEWSKA K., LACHOWSKA S., 2004 – Występowanie kokcydii i nicieni przewodu pokarmowego u dzików na terenie Pomorza Zachodniego. *Wiadomości Parazytologiczne* 50, 3, 637-640.
15. POŁOZOWSKI A., ZIELIŃSKI J., ZIELIŃSKA E., 2005 – Influence of breed conditions of present internal parasites in swine in small-scale management. *Electronic Journal of Polish Agricultural Universities* 8, 1.
16. POPIOŁEK M., KNECHT D., BORUTA O., KOT M., 2009 – Effect of breeding conditions, phynology and age on the occurrence of helminthes in pig. A preliminary study. *Bulletin of the Veterinary Institute in Pulawy* 53, 213-220.
17. RAMISZ A., 1999 – Economic consequences of parasitic diseases in farm animals. *Wiadomości Parazytologiczne* 45, 2, 161-162.
18. RAMISZ A., BALICKA-RAMISZ A., PILARCZYK B., MAŁECKI J., CISEK A., 2000 – Wpływ inwazji pasożytniczych na przyrosty masy ciała u zwierząt gospodarskich. *Folia Universitatis Agriculturae Stetinensis* 210, Zootechnica 39, 143-148.
19. RAMISZ A., SZYMBORSKI J., BALICKA-RAMISZ A., 2001 – Epidemiological studies on Trichinellosis among swine, wild boars and humans in Poland. *Journal de la Societe Francaise de Parasitologie* 8, 590-591.
20. RAMISZ A., SZYMBORSKI J., BALICKA-RAMISZ A., 2001 – Trichinellosis in swine and wild boars in Poland from 1993 to 1998. *Wiadomości Parazytologiczne* 47, 2, 233-235.
21. ROMANIUK K., WAJDA S., SZELIGIEWICZ M., 1992 – Wpływ późnego odrobaczania świń na przebieg tuczu, wydajność rzeźną i cechy jakościowe mięsa. *Medycyna Weterynaryjna* 48, 7, 324-326.

22. WENG Y.B., HU Y.J., LI Y., LI B.S., LIN R.Q., XIE D.H., GASSER R.B., ZHU X.Q., 2005 – Survey of intestinal parasites in pigs from intensive farms in Guangdong Province, People's Republic of China. *Veterinary Parasitology* 127, 333-336.
23. ZIOMKO I., CENEK T., 1999 – Inwazje pasożytnicze zwierząt gospodarskich. Wybrane metody diagnostyczne. Drukarnia Piotra Włodarskiego, Warszawa.

