ACTA SCIENTIARUM POLONORUM

Acta Sci. Pol. Zootechnica 18(4) 2019, 47–50

www.asp.zut.edu.pl pISSN 1644-0714 eISSN 2300-6145 DOI:10.21005/asp.2019.18.4.06

ORIGINAL PAPER

Received: 28.11.2019
Accepted: 13.12.2019

EXTENSITY AND INTENSITY OF INTESTINAL PARASITE INFECTIONS IN PIGS IN DIFFERENT TYPES OF FARM ORGANIZATION

Aleksandra Balicka-Ramisz[1], Jacek Wiśniewski[1], Olha Stadnytska[2]

[1]Department of Biotechnology of Animal Reproduction and Environmental Hygiene, West Pomeranian University of Technology in Szczecin, Poland
[2]Institute of Agriculture of the Carpathian Region, 5 Hrushevskoho Street, Obroshyno, Pustomyty District, Lviv Region, 81115, Ukraine

ABSTRACT

The aim of the study was to compare the intestinal parasite fauna of pigs kept in different production systems. Eggs of four nematode species: *Ascaris suum*, *Oesophagostomum* spp. *Strongyloides* spp. and *Trichuris suis* as well as *Eimeria* protozoans were found in fecal samples of the examined pigs. In the farms performing an open production cycle, the percentage of infestation was lower (1.07 to 1.36%) than in the farms with a closed production cycle (13.30 to 20%). Differences were found in the scope of infection intensity with particular intestinal parasites depending on the farming system. The *Oesphagostomum* spp. was found in the largest number of farms (68.6%). *Eimeria* was located at the second place (42.9%), followed by *Ascaris suum* (28.6%), *Trichuris suis* (21.4%) and *Strongyloides* spp. (11.4%). Interviews with pig breeders showed that in closed-cycle farms, the deworming procedure was being performed sporadically or only after clear clinical symptoms of a parasitic invasion. Our research has confirmed that the problem of intestinal parasites in pigs is still relevant. In pigs, a preventive program should be introduced, in which a parasitological diagnostics will be an important part.

Key words: pigs, intestinal parasites, production system

INTRODUCTION

There are two organizational forms in the farming of pigs: closed and open cycle. In the closed cycle, a complete production cycle is performed (from breeding to fattening). Such farms maintain all the technological groups of animals, and the pig farming process is limited by e.g. the negative effect that parasites cause on the production cycle. Swine parasites cause significant economic losses, deteriorate animal welfare and cause risks in the production of safe food as well [Martinez-Hernandez et al. 2009, Mildred et al. 2017]. About 80 species of endoparasites found in domestic pigs and wild boars have been described in the global references [Hobbs et al. 2002].

The presence of gastrointestinal parasites can cause abnormal intestinal absorption, impaired fertility, and susceptibility to infection [Kochanowski et al. 2017]. It has been estimated that a parasitic infection reduces feed intake in pigs by about 50 g, which leads to a delay in achieving the target slaughter weight by 10–15 days [Smets et al. 1999].

Currently in Poland, as in the most of European countries, pig farming is carried out on large industrial farms. In such conditions, the extensity and intensity of swine parasite infection is generally low due to keeping the good zoohygienic conditions. However, it is difficult to completely eliminate parasitic invasions. On the other hand, organic farms are currently gaining popularity. According to the data, pigs kept in organic farm conditions are more exposed to parasite infection due to their inability to maintain adequate hygiene conditions, in comparison to conventional farms [Kochanowski et al. 2017].

The most common mistakes in fighting parasite invasions include a lack of fecal testing for the presence of

aleksandra.balicka-ramisz@zut.edu.pl

parasites and improper date of administration or low dose of deworming drug, ineffective disinfection or the wrong choice of disinfectant agent.

The aim of the study was to compare the intestinal parasite fauna of pigs kept in different production systems.

MATERIAL AND METHODS

Animals

The study was performed on 6 pig farms with different sanitary-hygienic conditions. The farms were divided into two categories: cat. I, with an intensive production in open cycle and with more than 200 pigs (A, B, C), focused on a large scale of production and cat. II that performed a local production in closed cycle, for the local market, with less than 250 pigs (D, E, F). All the farms were located in the West Pomeranian province.

Parasitological analysis

Extensity and intensity of infection with gastrointestinal parasites were evaluated basing on coproscopic tests, using the Willis-Schlaff's and Mc-Master's methods [Ziomko and Cencek 1999]. The prevalence of infection was understood as the number of excreted eggs in 1 g of feces (EPG) measured by the coproscopic examination using the Willis-Schlaf and Mc-Master methods [Eckert et al. 2005]. To identify the taxonomy of eggs of gastrointestinal nematodes, we used the Tienpont and Rochette [1986] classification manual.

RESULTS

The fecal samples of examined animals contained eggs of three nematode species: *Ascaris suum, Oesophagostomum* spp. and *Trichuris suis*, as well as *Eimeria* protozoans (Table 1). The level of infestation was lower in the open cycle farms (1.07 to 1.36%), in comparison to the closed cycle ones (13.30 to 20.0%, Fig. 1).

The intensity of infection with intestinal parasites was higher in the II category of farms. The number of eggs in 1g feces (EPG) was high in the category II farms for *Oesophagostomum* spp. (Table 1). We have observed differences in the intensity of infection with particular parasites depending on the farming system.

The *Oesphagostomum* spp. was found in the largest number of farms (68.6%). *Eimeria* was located at the second place (42.9%), followed by *Ascaris suum* (28.6%), *Trichuris suis* (21.4%) and *Strongyloides* spp. (11.4%).

DISCUSSION

Our studies confirmed that the problem of intestinal parasites in pigs is still valid. A higher degree of infestation of pigs with intestinal parasites results from the low awareness of small-scale farmers (closed cycle) regarding the effect of parasite fauna on animal health and the principles of correct prevention as well. Interviews with pig breeders show that in closed-cycle farms deworming procedure was performed either sporadically or only after noticing the clear clinical signs of parasitic invasion.

The analyses show that the biosecurity strategies based on the HACCP standard in closed cycle farms (category I) have contributed to reduce the extensity and intensity of pig infestation with intestinal parasites. However, it should be emphasized that complete elimination of parasitic infections in pigs is difficult to obtain.

The research on the presence and intensity of pig intestinal infections and the assessment of an impact of environmental factors on their progress are carried out in many research centers around the world, including in Poland.

Research undertaken in Europe showed that pigs are infected with different species of parasites and with a different extensity of infection. It is estimated that in our country the occurrence of endoparasites is common. The infection intensity reaches respectively: 40–60% for *Oesophagostomum* spp., 50–70% for *Ascaris suum* and 20% for *Strongyloides ransomi* [Nosal and Eckert 2005, Balicka-Ramisz and Wieczorek-Dąbrowska 2007].

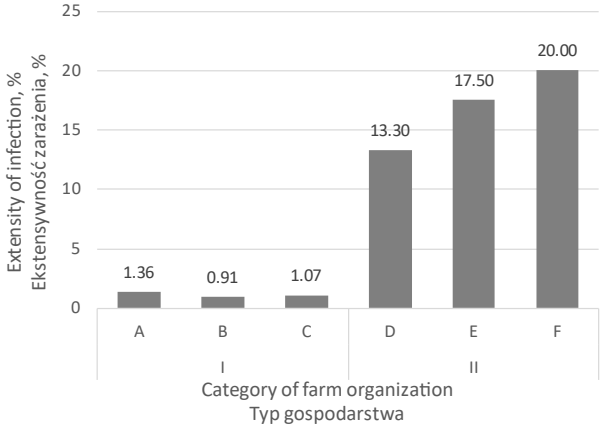

Fig. 1. Extensity of pig infestation in the particular farms

Rys. 1. Ekstensywność zarażenia świń w poszczególnych gospodarstwach

In our studies we have observed a different distribution of occurrence and severity of intestinal parasitic infections in pigs depending on the applied type of production cycle. According to Knecht et al. [2009] and Kochanowski et al. [2017] the level of infestation with *Ascarissuum*in pigs variesfrom 12% to 28.6%. In case of *Oesophagostomum* spp. the levels range from

Table 1. Prevalence of pig parasite infection in the particular technological groups

Tabela 1. Prewalencja zarażenia pasożytami świń w poszczególnych grupach technologicznych

Species Gatunek	Extensity of infection, % Ekstensywność zarażenia, %		Intensity of infection, EPG ($\bar{x}$) Intensywność zarażenia, EPG ($\bar{x}$)	
	I	II	I	II
Oesophagostomum spp.	10.8	35.8	0–1580 (160)	0–2100 (430)
Ascaris suum	4.36	17.5	0–220 (13)	0–330 (28)
Trichuris suis	1.2	1.8	0–11 (2)	0–16 (3)
Strongyloides spp.	0	1.5	0	0–10 (1)
Eimerias spp.	26.1	47.8	0–180 (15)	0–2350 (281)

$\bar{x}$ – mean.
$\bar{x}$ – średnia.

20 to 68.6%, in *Trichurissuis* from 1.3 to 21.4% and in *Strongyloides* spp. from 0 to 11.4%. On the other hand, *Eimeria* protozoans were at the level of 42.9%.

The presence of *A. suum* varies depending on the country, population, farming type and diet as well as the age of the pigs. The extensity of infection of pigs with the most pathogenic *Ascaris suum* nematode reported in German studies was 10.5%, Danish (33%), French (10%), Swiss (approx. 4%) and Dutch (42.9%) [Joachim et al. 2001, Carstensen et al. 2002, Beloeil et al. 2003, Eijck and Borgsteede 2005, Schubnella et al. 2016].

In contrast, in Poland, the extensity of *A. suum* infection in pigs ranges from 30–60% [Nosal and Eckert 2005, Knecht et al. 2012]. In our research, the observed extensity of infection with *Ascaris suum* ranged from 4.36 to 17.5%, which is comparable to the results obtained by scientists in Switzerland, Germany and Denmark but still much lower than the results obtained in Denmark and the Netherlands. Eijck and Borgsteede [2005] found *A. suum* in 21.0% of pigs kept in free-range conditions and only in 3.22% of pigs maintained in traditional breeding. Animals kept in an open system (organic farms) are more often exposed to parasitic infections [Roepstorff and Nansen 1994]. In our research, we have also observed a higher extensity of infections in open-cycle farmed pigs.

The most common mistake made by breeders is the lack of any prior diagnosis of the invasive situation in their own herds, as well as the routine use of antiparasitic agents. The diagnosis of parasitic infection should be based on laboratory tests. In Poland, endoparasitic infestation may result from non-compliance with the principles of the biosecurity programs on farms [Knecht et al. 2009, Kochanowski et al. 2017].

CONCLUSION

This study provided an evidence of the presence of intestinal parasites in pigs kept in various technological systems. In pigs, a preventive program should be introduced, of which parasitological diagnostics will be an important part.

ACKNOWLEDGEMENT

This work was supported by West Pomeranian University of Technology in Szczecin.

REFERENCES

Balicka-Ramisz, A., Wieczorek-Dąbrowska, M. (2007). Parasites of the digestive tract in swine [Pasożytnicze nicienie przewodu pokarmowego świń]. Trzoda Chlewna, 8(9), 160–162 [in Polish].

Beloeil, P.A., Chauvin, C., Fablet, C., Jolly, J.P., Eveno, E., Madec, F., Reperant, J.M. (2003). Helminth control practices and infections in growing pigs in France. Livestock Prod. Sci., 81, 99–104. DOI: 10.1016/S0301-6226(02)00192-6.

Carstensen, L., Vaarst, M., Roepstorff, A. (2002). Helminth infections in Danish organic swine herds. Vet. Parasitol., 106, 253–264. DOI: 10.1016/S0304-4017(02)00080-8.

Eckert, J., Friedhoff, K.T., Zahner, H., Deplazes, P. (2005). Lehrbuch der Parasitologiefürdie Tiermedizin. Enke Verlag Suuttgart.

Eijck, I.A.J.M., Borgsteede, F.H.M. (2005). A survey of gastrointestinal pig parasites on free-range, organic and conventional pig farms in The Netherlands. Vet. Res. Commun. 29(5), 407–414. DOI: 10.1007/s11259-005-1201-z.

Hobbs, R.P., Thompson, R.C.A., Lymery, A.J. (2002). Parasitology. Mundoch University, Western Australia.

Joachim, A., Dülmer, N., Daugschies, A., Roepstorff, A. (2001). Occurrence of helminths in pig fattening units with different management systems in Northern Germany. Vet. Parasitol., 96, 135–146. DOI: 10.1016/S0304-4017(00)00431-3.

Knecht, D., Jankowska, A., Zaleśny, G. (2012). The impact of gastrointestinal parasites infection on slaughter efficiency in pigs, Vet. Parasitol., 184, 291–297. DOI: 10.1016/j.vetpar.2011.09.006.

Knecht, D., Popiołek, M., Jankowska, A. (2009). The infection level of endoparasites of pigs in a small-scale production farm. [Poziom zarażenia pasożytami wewnętrznymi świń w gospodarstwie drobnotowarowym]. Zeszyty Naukowe UP we Wrocławiu, seria BiHZ, LIX, 575, 149–156 [in Polish].

Kochanowski, M., Karamon, J., Dąbrowska, J., Dors, A., Czyżewska-Dors, E., Cencek, T. (2017). Occurrence of intestinal parasites in pigs in Poland – the influence of factors related to the production system. J. Vet. Res., 61, 459–466. DOI: 10.1515/jvetres-2017-0053.

Martinez-Hernandez, F., Jimenez-Gonzalez, D.E., Chenillo, P., Alonso-Fernandez, C., Maravilla, P., Flisser, A. (2009). Geographical widespread of twolineages of Taeniasoliumdue to human migrations: can population genetic analysis strengthen this hypothesis? Infect. Genet. Evol., 9, 1108–1114. DOI: 10.1016/j.meegid.2009.09.005.

Mildred, A., Padilla, R.J., Ducusin, T. (2017). Prevalence of Internal Parasite Infection in Pigs and Analysis of Risk Factors in Small holder Pig Farms in Cavite and Batangas, Philippines. Philipp. J. Vet. Med., 54(1), 27–35.

Nosal, R., Eckert, R. (2005). Gastrointestinal parasites of swine in relation to the age group and management system. Med. Weter., 61, 435–437. DOI: 10.1016/S0016-5107(04)027361.

Roepstorff, A., Nansen, P. (1994). Epidemiology and control of helminth infections in pigs under intensive and non-intensive production systems. Vet. Parasitol., 54(1-3), 69–85. DOI: 10.1016/0304-4017(94)90084-1.

Schubnella, F., von Aha, S., Graageb, R., Sydlerc, T., Sidlerb, K., Hadornd, D., Bassoa, W. (2016). Occurrence, clinical involvement and zoonotic potential of endoparasites infecting Swiss pigs. Parasitol. International, 65, 618–624. DOI: 10.1016/j.parint.2016.09.005.

Smets, K., Neirynck, W., Vercruysse, J. (1999). Eradication of sarcoptic mange from a Belgian pig breeding farm with a combination of injectable and in-feed ivermectin. Vet. Rec., 145, 721–724. DOI: 10.1136/vr.145.25.721.

Tienpont, D., Rochette, F. (1986). Diagnosting helminthiasis by coprological examination. Janssen Research Foundation, Beerse, Belgium.

Ziomko, I., Cencek, T. (1999). Parasitic invasions in farm animals, selected diagnostic methods [Inwazje pasożytnicze zwierząt gospodarskich, wybrane metody diagnostyczne]. Drukarnia Piotra Włodkowica, Warszawa [in Polish].

EKSTENSYWNOŚĆ I INTENSYWNOŚĆ WYSTĘPOWANIA PASOŻYTÓW JELITOWYCH U ŚWIŃ W GOSPODARSTWACH O RÓŻNYCH FORMACH ORGANIZACJI

STRESZCZENIE

Celem badań było porównanie parazytofauny jelitowej świń utrzymywanych w różnych systemach produkcji. W kale badanych świń stwierdzono obecność jaj trzech gatunków nicieni: *Ascaris suum, Oesophagostomum* spp. oraz *Trichuris suis* jak i również pierwotniaków z rodzaju *Eimeria*. W grupie gospodarstw o cyklu otwartym (1,07 do 1,36%) stopień zarobaczenia był niższy niż w gospodarstwach o cyklu zamkniętym (13,30 do 20%). Stwierdzono różnice w zakresie intensywności zarażenia poszczególnymi pasożytami jelitowymi w zależności od systemu chowu. Nicień *Oesphagostomum* spp. był stwierdzany w największej liczbie gospodarstw (68,6%). Na drugim miejscu były pierwotniaki z rodzaju *Eimeria* (42,9%), następnie *Ascaris suum* (28,6%), *Trichuris suis* (21,4%) oraz *Strongyloides* spp. (11,4%). Z przeprowadzonych wywiadów z hodowcami świń wynika, że w gospodarstwach o cyklu zamkniętym zabiegi odrobaczania odbywały się sporadycznie lub po wystąpieniu objawów klinicznych inwazji pasożytniczych. Badania własne potwierdziły, że problem występowania pasożytów jelitowych u świń jest nadal aktualny. U świń należy wprowadzić program profilaktyczny, którego istotną częścią będzie diagnostyka parazytologiczna.

Słowa kluczowe: trzoda chlewna, parazytofauna jelitowa, systemy produkcji

Aleksandra Balicka-Ramisz https://orcid.org/0000-0002-3111-8648
Olha Stadnytska https://orcid.org/0000-0001-6574-4068