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Prevalence of gastro-intestinal helminths of slaughtered pigs at Bodija abattoir, Ibadan, Oyo State, Nigeria

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Abstract

A 3-week study was carried out to determine the prevalence of gastro-intestinal helminths in slaughtered pigs at Bodija Abattoir, Ibadan. Five faecal samples per day were collected for 21 days (105 samples) from the rectum of slaughtered pigs, stored in sterile container, labeled appropriately and then transported in a flask with ice pack to the parasitology laboratory of the department of veterinary parasitology and microbiology, University of Ibadan, Ibadan, where they were preserved in 10 % formalin before processing for laboratory analysis. Formalin-ether sedimentation/floatation method was used for identification of the gastrointestinal parasites. The results showed overall prevalence of 62.85 % with the presence of four nematodes (*Ascaris suum*, *Oesophagostomum spp*, *Metastrongyloides spp* and *Strongyloides spp*) and one protozoan (*Isospora spp*). *Ascaris suum* (25.71 %) was the most prevalent, followed by *Oesophagostomum spp* and *Isospora spp* (14.29 % each), *Metastrongyloides spp* (5.71 %) whereas the least was *Strongyloides spp* (2.86 %) with mean eggs per gram (EPG) of 640±5.23, 500±1.06, 2190±2.34, 400±1.76 and 670±0.23 respectively. With regards to sex, sows had greater prevalence of 63.83 % as opposed to boars with 62.07 % though not significantly different ($p>0.05$). It can be concluded that there was high prevalence of gastro-intestinal helminthes in the study area. Therefore, strict sanitation and improved management practices as well as quarterly broad spectrum anthelmintics to be administered to the pigs are recommended.

Keywords: Boars, Bodija abattoir, Gastro-intestinal helminthes, Sows

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INTRODUCTION

Domestic pig production can contribute immensely to gross domestic product of a nation since it is a veritable means of generating income for households and as well create employment opportunities to the youths of developing countries where unemployment has been on a steady rise (Huynh *et al.*, 2007; Geresu *et al.*, 2015). Enhanced pig production will also help to improve source of animal-based protein in the diets of humans thereby ameliorating food insecurity that is increasingly becoming a major challenge in developing countries including Nigeria. While curbing poverty, it will go a long way to cut down on youths' rural-urban migration (Oluwafemi, 2008; Geresu *et al.*, 2015) which has constituted a menace of high population density in the metropolises. Many gastro-intestinal parasites that weigh down immunity, compromise nutrient absorption and by extension, cause poor conversion of feed have invariably resulted in low productivity and avoidable economic losses to pigs farmers (Weng *et al.*, 2005), which is evidenced by decreased litter size, poor growth rate, reduced weight gain, organ condemnation at slaughter and death (Nissen *et al.*, 2011; Tomass *et al.*, 2013).

Pigs being one of the most abundant livestock in Nigeria (Olaniyi, 2014) have been associated with hosting an avalanche of pathogenic gastro-intestinal parasites that can be transmitted to and cause diseases in humans (Dadas *et al.*, 2016). Pigs are omnivores and scavengers that eat all sorts of food that predispose them to agents of diseases such as dead insects, plants' bark, rotting carcasses, garbage and even other pigs in the wild (Pam *et al.*, 2013). It has been reported that intensively raised pigs sometime involve in eating their young ones, particularly when under intense stress (Pam *et al.*, 2013). Among livestock mostly raised in Nigeria are the pigs and have been assessed to be laden with much potential for economic development (Sowemimo *et al.*, 2012; Pam *et al.*, 2013). Pig production has been used to increase animal sourced protein and alleviation of protein deficiency in humans and has been acknowledged as a means of fighting poverty in the tropics (Jufare *et al.*, 2015) due to its short generation interval, prolificacy, fecundity, early maturity, and smaller space requirement of production (Khanal and Subedi, 2020).

Gastrointestinal parasitism in pigs has been identified as one of the constraints that impede pig production in most parts of the world including Nigeria (Adenaike, 2020). Gastro-intestinal helminthosis is a disease-complex caused by the invasion and multiplication of multicellular endoparasitic trematodes, cestodes and nematodes within the gastro-intestinal tracts of animals, with parasitic nematodes being of utmost economic importance (Talabi *et al.*, 2003). Southwestern Nigeria, of which Oyo State is part, has the highest concentration of pigs in the country having about 25 % of the pig population in Nigeria (Majiyagbe and Lamorde, 1997). With the growing popularity of pigs as a quick and good source of protein and income, coupled with its dense population at the study area, there is need to understudy the prevalence of gastro-intestinal parasitism in the study location which could help proffer solution to problem of reduced growth rate.

MATERIALS AND METHODS

Study area

The study area was Bodija Abattoir, located in Ibadan North-West Local Government area of Oyo State, Nigeria. Ibadan is the largest city in West Africa and the second largest in Africa, with land size covering an area of 240 km². The city is located on geographic grid reference longitude 3^o 58'E and latitude 7^o 22'N (Filani, 1994). Ibadan has an altitude generally ranging from 185 to 222 m above mean sea level and is drained by three major river basins (Ogunpa, Ona and Ogbere). It is surrounded by secondary rainforest as well as savannah. Spatially, it sprawls over a radius of 12-15 km and experiences a mainly tropical climate with an estimated annual rainfall of about 1250 mm (UNCHS/UNEP, 1997). Bodija Abattoir is located in Ibadan North-West Local Government Area.

Ethical approval

The Animal Ethics Committee of the Federal College of Animal Health and Production Technology, Ibadan, before the commencement of the survey approved the protocol for the study. The experiment number is FCAH&PT 34/2019.

Study population and sample collection

A total of one hundred and five (105) adult pigs (> 1 year) slaughtered at Bodija abattoir, comprising 47 females and 58 males were used for the study. The age was determined by asking the Veterinary Doctors in-charge of inspection at the abattoir and as well using the method described by Okandjeji *et al.* (2021). The study lasted for three weeks. The faecal samples were collected from the rectum of the slaughtered pigs and stored in sterile container, labeled appropriately and then transported in a flask with ice pack to the Department of Veterinary Parasitology and Microbiology, University Of Ibadan, Ibadan, where they were preserved with 10 % formalin before processing for laboratory analysis.

Laboratory procedure

The collected samples were analyzed in the laboratory using the formalin-ether sedimentation/floatation method to identify the gastrointestinal parasites present in the faecal samples of the pigs by method described by Amadi *et al.* (2018). Eggs of parasites were identified by using identification keys based on their morphological features (FAO, 1998).

Statistical analysis

Differences in prevalence of parasite infection between sexes were tested by Chi-squared (χ^2) tests using IBM SPSS Statistics Version 20 for windows (Armonk, NY: IBM Corp). Values of $p < 0.05$ were considered significant. Results were presented using frequency and percentages.

RESULTS

Table 1 shows prevalence of the gastrointestinal helminths found in the faeces of 105 sampled pigs (>1 year old) at the study area. Out of the 105 pigs, 66 of them had single or mixed infections of five gastrointestinal helminthes resulting to the overall prevalence of 62.85 %. Five gastrointestinal parasites screened out were these four nematodes; *Ascaris suis*, *Oesophagostomum spp*, *Metastrongylus spp* and *Strongyloides spp* with prevalence of 25.71, 14.29, 5.71 and 2.86 % and a protozoan; *Isospora suis* (14.29 %) and average EPG (egg/gram of faeces) of 640 ± 5.23 , 500 ± 1.06 , 400 ± 1.76 , 670 ± 0.23 and 2190 ± 2.34 respectively. Table 2 reveals the gastrointestinal helminthes

and their prevalence in the 58 sampled boars. Further analysis showed *Ascaris suis* been the most prevalent followed by *Oesophagostomum spp*, *Isospora suis* and *Metastrongylus spp* with prevalence of 27.59, 15.52, 13.79 and 5.17 % respectively whereas there was no *Strongyloides spp* detected. In the same vein, Table 3 shows the different gastrointestinal helminths found in the faecal samples from the 47 sows studied to include *Ascaris suis*, *Isospora suis*, *Oesophagostomum spp*, *Strongyloides spp* and *Metastrongylus spp* with respective prevalence rates of 23.40, 14.89, 12.77, 6.38 and 6.38 %.

DISCUSSION

The overall prevalence of 62.85 % obtained in the present study is higher than 35.8% obtained from pigs at Ibadan by Sowemimo *et al.* (2012), 24.10 % by Wosu (2015) in confined pigs in Nsukka, 42.7 % by Amadi *et al.* (2018) in Umuahia North Local government area of Abia State, 28.4 % by Sharma *et al.* (2020) and 36.36 % by Adenaike (2020) in Ibadan but lower than 100 % reported by Eyo *et al.* (2014) in pigs slaughtered for meat in Nsukka, Nigeria, 100 % by Sarker *et al.* (2016) in Chittagong, Bangladesh, 79.20 % by Nwafor *et al.* (2019) and 88.57 % by Khanal and Subedi (2020). Higher infection rate in this study could be attributed to possible lack of deworming of the pigs and poor sanitation. It could also be because of failure in adhering to deworming regimen or even resistance to commonly used chemotherapeutics due to quackery among pig farmers. Similarly, infection rates between 13.2 to 96.4 % have been widely reported across the globe (Okorator *et al.*, 2014; Alynne *et al.*, 2015; Roesel *et al.*, 2017; Kouam *et al.*, 2018). The *Ascaris suum* was the most prevalent which conforms to 24.50 % obtained by Lekko *et al.* (2017) in Billiri Local Government Area, Gombe State, among domesticated pigs, 24 % by Amadi *et al.* (2018) who got the result from Umuahia North Local government area of Abia State, 44.5 % by Nwafor *et al.* (2019) at the central Free State, South Africa, 38.09% by Khanal and Subedi (2020) at Chandragiri Municipality, Kathmandu, Nepal, 12.24 % by Adenaike (2020) in Ibadan, Nigeria and 11.1 % by Sharma *et al.* (2020). The highest prevalence recorded against *Ascaris suum* in this study could be as a result of high fertility associated with the female *A. suum* that leads to massive production of eggs on daily basis thereby increasing contamination of environment where pigs are raised.

Table 1: Prevalence of the gastrointestinal helminths found in the faeces of 105 sampled pigs (>1 year old)

| Parasite | Number infected | Prevalence (%) | EPG (Mean±SE) |
|----------------------------|-----------------|----------------|---------------|
| <i>Ascaris suum</i> | 27 | 25.71 | 640±5.23 |
| <i>Oesophagostomum spp</i> | 15 | 14.29 | 500±1.06 |
| <i>Isospora suis</i> | 15 | 14.29 | 2190±2.34 |
| <i>Metastrongylus spp</i> | 6 | 5.71 | 400±1.76 |
| <i>Strongyloides spp</i> | 3 | 2.86 | 670±0.23 |
| Total | 66 | 62.85 | - |

Table 2: Prevalence of the gastrointestinal helminths found in the faeces of sampled 58 boars (>1 year old)

| Parasite | Number infected | Prevalence (%) |
|----------------------------|-----------------|----------------|
| <i>Ascaris suum</i> | 16 | 27.59 |
| <i>Oesophagostomum spp</i> | 9 | 15.52 |
| <i>Isospora suis</i> | 8 | 13.79 |
| <i>Strongyloides spp</i> | 0 | 0.00 |
| <i>Metastrongylus spp</i> | 3 | 5.17 |
| Total | 36 | 62.07 |

Table 3: Prevalence of the gastrointestinal helminths found in the faeces of sampled 47 sows (>1 year old)

| Parasite | Number infected | Prevalence (%) |
|----------------------------|-----------------|----------------|
| <i>Ascaris suum</i> | 11 | 23.40 |
| <i>Isospora suis</i> | 7 | 14.89 |
| <i>Oesophagostomum spp</i> | 6 | 12.77 |
| <i>Strongyloides spp</i> | 3 | 6.38 |
| <i>Metastrongylus spp</i> | 3 | 6.38 |
| Total | 30 | 63.83 |

More so, the ability of their eggs to withstand most harsh environmental conditions also enhanced their survivability for many years. Contrary to the present result of *A. suum* been the most prevalent, Eyo *et al.* (2014) reported *Eimeria* spp (51.70 %), *Schistosoma ransomi* (41.10 %) and *Ascaris suum* (31.10 %) as the most prevalent in Nsukka, Enugu State, Nigeria. The present study also showed sows (63.83 %) having greater overall prevalence than the boars (62.07 %) although not significant when subjected to Chi squared analysis which is in consonance with the report of Dey *et al.* (2014) who 100 % and 93.90 % in sows and boars respectively but disagrees with the findings of Sowemimo *et al.* (2012) and Dadas *et al.* (2016) who reported 18 and 28.15 % for boars and 7 and

22.96 % for sows respectively. The higher prevalence among the sows in this study could be attributed to lactation stress and possible increased circulation of progesterone due to pregnancy which Lloyd (1983) attributed to increased proneness to infections. The higher rate of gastrointestinal infestation could have arisen from the longer period in which breeding sows are allowed to stay in the farm as against the boars that are fattened, culled, and replaced periodically to avoid reduced heterosis seen in inbreeding (Sowemimo *et al.*, 2012; Akanni *et al.*, 2017). In the present study, the prevalence of *Isospora suis* (Coccidium) is higher than 6.30 and 7.61 % reported by Asaolu *et al.* (2012) in Ibadan and Khanal and Subedi (2020) at Chandragiri Municipality, Kathmandu, Nepal respectively.

Unlike the present result, coccidium was the most recovered parasite (72.7%) by Nwafor *et al.* (2019) at the central Free State, South Africa and 65.50 % by Dey *et al.* (2014) at Mymensingh, Bangladesh. The prevalent rate here is lower than 34.80 % in Homabay District, Kenya but higher than 12% in Bishoftu, Ethiopia and 5.6% in Holeta, Ethiopia as reported by Obonyo *et al.* (2012), Jufare *et al.* (2015) and Abdu and Gashaw (2010) respectively. The prevalence of *Oesophagostomum spp* in the present study is similar to 12.70 % reported by Dey *et al.* (2014) at Mymensingh, Bangladesh, higher than 2.6 % obtained by Nwafor *et al.* (2019) at the central Free State, South Africa but lower than 37 % by Kagira *et al.* (2012) in Busia District, Kenya whereas the *Strongyloides sp.* (14.28 %) as reported by Khanal and Subedi (2020) was far higher than in the present study. These variations in prevalence rates could have occurred due to different management practices in the various study areas, season of sample collection, breed, age, health status, sample size of the sampled pigs among other factors.

CONCLUSION

The results of this study showed that the common nematode parasites affecting pigs in the study area include *Ascaris suum*, *Oesophagostomum spp*, *Metastrongyloides spp*, and *Strongyloides spp* with *Ascaris suum* the most prevalent whereas *Isospora spp* was a singular protozoan detected. Sows were affected more than the boars. Therefore, strict sanitation and improved management practices should be undertaken. Routine broad spectrum anthelmintics should be administered quarterly to pigs. Dearth of standard equipment had its toll on the result, no wonder some of the parasites were not identified to species level. The need to study the prevalence rates both in the young and adults is worthwhile. The estimation of age in pigs is a daunting challenge that needs more research into, to avoid over/under-estimation of age. There is need for the Federal government of Nigeria to beam torchlight on pig health and production to bring about sufficiency in animal food security in the country.

Conflict of interest

Authors have no conflict of interest to declare.

Author contributions

UCR conceived the study and wrote the manuscript. ELU, LU and UCS participated in going to the abattoir for collection of data and performed the analysis. All authors performed the experiments and approved the final manuscript.

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