Journal of Sustainable Veterinary & Allied Sciences
P-ISSN-2695-2661 e-ISSN: 2811-1346
JoSVAS 2023, Vol 4, Issue 1: 53-58

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Original research

Prevalence of gastrointestinal parasites of pigs inAbakaliki, Ebonyi State, South-Eastern Nigeria

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ABSTRACT

Gastrointestinal parasites are responsible for substantial loss of productivity in swine and other livestock industries, they constitute a major impediment to efficient and profitable livestock production. The objective of the study is to determine the prevalence and evaluate the risks factors associated with gastrointestinal parasites among pigs in the study area. Methodologically, faecal samples were macroscopically examined for the presence of blood and adult parasites. Direct smear method, floatation technique and sedimentation by centrifugation were employed to detect the presence of eggs of parasites. Results identified eight intestinal parasites from a total of 300 fecal samples in pigs from different farms in Abakaliki metropolis, with an overall prevalence of 99.7%. *Ascaris suum* had the highest prevalence of 30.6%, followed by *Metastrongylus spp.* 17.5%, *Cryptosporidium spp.* 17.1%, *Trichuris suis* 10.6%, *Eimeria spp.* 10.2%, *Oesophagostomum spp.* 6.12%, *Isospora suis* 4.0% and *Paragonimus westermanii* 3.6%. In the present study, it can be deduced that gastrointestinal parasitism can occur in any farm irrespective of the type of housing, and management practices. Therefore, improved husbandry system and modern management practices should be embraced to enhance preventive measures against helminthosis.

KeyWords: Gastrointestinal parasites, Pigs, age, sex, breeds and management.

INTRODUCTION

Pigs (*Sus scrofa domesticus*) have been domesticated and lived in the proximity of humans for around 9000 years (Giuffra *et al*., 2000). They are kept in different management systems, from small backyard farms with only few pigs, to large farms with thousands of animals. The pigs are reared in neighborhoods of villages and in semi-urban areas as small-scale enterprises having 1-150 pigs, but a few large-scale farms exist (Ajala *et al*., 2006; Saka *et al*., 2010; Abiola *et al*., 2015). Semi-intensive and extensive pig production systems occur in the Northern, Middle Belt and Niger-Delta regions of Nigeria (Bourne *et al*., 1994). Intensive pig rearing exists mostly in Southern Nigeria (Ajala *et al*., 2006; Saka *et al*., 2010; Nwanta *et al*., 2011) and consists of farms having each 50-200 pigs in concrete pens. Commercial piggeries rear about 3% of the national pig population with usually more than five breeding sows per farm (Bourne *et al*., 1994). Regardless of the production type, gastrointestinal parasites tend to be common.

In modern pig production, the most commonly found parasites are the helminthes, *Ascaris suum*, *Oesophagostomum spp.* and *Trichuris suis* as well as protozoa such as coccidian (Roepstorff *et al*., 1998, Eijck and Borgsteede, 2005, Kochanowski *et al*., 2017, Raue *et al*., 2017). Although gastrointestinal parasites rarely cause clearly clinical disease in infected pigs, their impact on pig health and welfare, as well as on the sustainability and productivity of the farms can be substantial (Kipper *et al*., 2011, Vlaminck *et al*., 2015, Martinez-Perez *et al*., 2017). Gastrointestinal parasites are one of the main problems of effective swine production of all ages (Lin *et al*., 2013, Okorafor *et al*., 2014). They are also responsible for substantial loss of productivity in swine and other livestock industry, they constitute a major impediment to efficient and profitable livestock production (Boes *et al*.,2000; Joachim *et al*., 2001). Gastrointestinal parasitism in pigs affects pig's performance in terms of efficient feed conversion, poor growth rate, reduced weight gain and the condemnation of affected organs after slaughter (Nsoso *et al*., 2000). In

Nigeria, livestock production sector is vital not only because of its economic benefits but because over 80% of the population are involved in one way or the other in agriculture (Otuma and Uchewa, 2009).

Pigs heavily parasitized are more susceptible to disease, the resulting diseases being major causes of zoonosis and economic loss (Olson and Guselle, 2000). Nigeria is one of the African countries with significant pig population density (Robinson *et al*., 2014). In the 1990s, the pig population was 3.5 million consisting of native black hairy pigs and exotic breeds. The latest population estimate was reported by the National Agricultural Sample Survey in 2016 to have increased to 7.1 million pigs, indicating that the population had doubled in about two decades. Sustainable growth of the pig production industry in Nigeria is adversely affected by numerous factors, most importantly disease outbreaks (Ajala and Adesehinwa, 2008; Ironkwe and Amefule, 2008; Saka *et al*., 2010; Anukwu and Ebong, 2011; Abiola *et al*., 2015). The disease burden limits significant profitable pig farming in Nigeria. Adequate knowledge of prevalent gastrointestinal parasites affecting pigs in the country is a prerequisite for the proper planning of effective preventive and control measures to reduce their associated cost burden on the production system and boost profit margin (Igbokwe and Maduka, 2018). Therefore, this study was undertaken to determine the prevalence of gastrointestinal parasites of pigs and to evaluate the associated risk factors in the study area.

MATERIALS AND METHODS

STUDY AREA

This study was carried out in Abakaliki, Southeastern Nigeria. Abakaliki is the capital city of Ebonyi State. It is located between longitude 6^0 and 20^0 N and Latitude 8^0 and 6^0 E. The city is about 64 kilometers southeast of Enugu. The indigenes are predominantly farmers and animal breeders. The 'Abakaliki abattoir' is located in the capity city and provides job opportunity for butchers and market for animal breeders.

SAMPLING TECHNIQUE

Convenience sampling technique was employed were age, sex, breed and management practices were the variable recorded prior to sample collection. Target population was pigs within Abakaliki, Local Government Area. Faecal samples were collected from 300 pigs (categorized as weaners, growers, and adults) from intensive, semi-intensive and scavenging pigs. Faeces were collected by inserting a finger with sterile hand glove into the rectum through the anus and also from freshly voided faeces. About 5g of the sample from each pig was immediately transferred into a well labelled screw cap specimen bottles containing 70% ethanol, and kept for a week at room temperature of 30^oc and were transferred in an ice-pack to the parasitology laboratory of National Veterinary Research Institute, Vom, Plateau State, Nigeria, for analysis and examination. Thirty (30) fecal samples each were collected from 10 different farms in October 2019.

ANALYSIS AND EXAMINATION OF FECAL SAMPLES

LABORATORY EXAMINATION

The faecal samples were macroscopically examined for the presence of blood and adult parasite with naked eyes.

DIRECT SMEAR METHOD:

A drop of normal saline was placed at the center of a clean grease free slide and a small portion of the stool was picked with the help of an applicator stick and smear was made in the drop. It was covered with a cover slip and examined under the microscope using x 10 and x 40 objectives respectively.

For *Cryptosporidium spp* A drop of normal saline was placed at the center of a clean grease free slide and a small portion of the stool was picked with the help of an applicator stick and smear was made and further stained for Ziehl-Neelsen method to detect acid fast organisms as described (Rekha *et al*., 2016).

FLOATATION TECHNIQUE

The method was carried out as demonstrated by Soulsby (1986). Briefly, a wide mouth universal container, few milliliters of saturated salt solution (sodium chloride) was dispensed, and about 3g of feacal samples was emulsified using an applicator stick, it was sieved into another container and filled the solution to the brim with saturated salt solution until a convex meniscus was formed. Each tube was then covered with a glass cover slip and allowed to stand for 10 minutes. Each cover slip was then gently lifted from each tube and placed on a clean grease-free glass slide and examined under the x10 and x40 objectives of the microscope for the presence of eggs of parasites.

SEDIMENTATION BY CENTRIFUGATION

As demonstrated by Soulsby (1986), Sargent *et al* (1998), Cheesbrough (2000). About 3g of faecal material was emulsified in 30 ml of distilled water in a beaker and was filtered through sieves with mesh of 30, 60 and 90 mm. The strained material was immediately transferred into centrifuge tubes and centrifuged at 352g for 5 minutes. Sugar solution of specific gravity (S.G 1.2) was added to the sediment in each centrifuge tube until a convex meniscus was formed. Each tube was then covered with a glass cover slip and allowed to stand for 10 minutes. Each cover slip was then gently lifted from each tube and placed on a clean grease-free glass slide and examined under the x10 and x40 objectives of the microscope for the presence of eggs of parasites.

DATA ANALYSIS

The prevalence of GI parasites of pigs was determined using the formula; Prevalence = Positive sample/ Total sample x 100. And all the data generated were further analyzed using (Sergeant, 2018). Epitools epidemiological calculators to determine the prevalence and 95% confidence interval.

RESULTS

Out of a total of 300 fecal samples examined, 245 were positives with eight different species of intestinal parasites of pigs, with an overall prevalence of 99.7%, as depicted in Table 1. *Ascaris suum* had the highest prevalence of 30.6%, followed by *Metastrongylus spp.* 17.5%, *Cryptosporidium spp.* 17.1%, *Trichuris suis* 10.6%, *Eimeria spp.* 10.2%, *Oesophagostomum spp.* 6.12%, *Isospora suis* 4.0% and *Paragonimus westermanii* 3.6%.

Table 1: Prevalence of gastrointestinal parasites of pigs sampled in different farms in Abakaliki, Ebonyi State.

Species of Parasites	Numbers of Positive	Prevalence (%)	95 % CI (Lower & Upper)
Eimeria spp.	25	10.2	7.0-14.6
Metastrongylus spp.	43	17.5	13.3-22.8
Trichuris suis	26	10.6	7.3-15.1
Oesophagostomum spp.	15	6.12	3.7-9.8
Paragonimus spp.	9	3.6	1.9-6.8
Ascaris suum	75	30.6	25.1-36.6
Cryptosporidium spp.	42	17.1	12.9-22.3
Isospora suis	10	4.0	2.2-7.3
Total	245	99.7	73.4-135.3

DISCUSSION

Parasites of pigs and their potential to infect humans could become a major issue among the public if not kept in check. The existence of parasitosis with overall prevalence of 81.67% of pigs in the study area, agrees with a similar study in Burkina Faso where a prevalence of 92.0% was recorded (Tamboura *et al*., 2006). Similar results have been reported in other African countries over the past years (Nsoso *et al*., 2000). Also higher prevalence had also been recorded in other countries, like India (Kumar 2002). The high

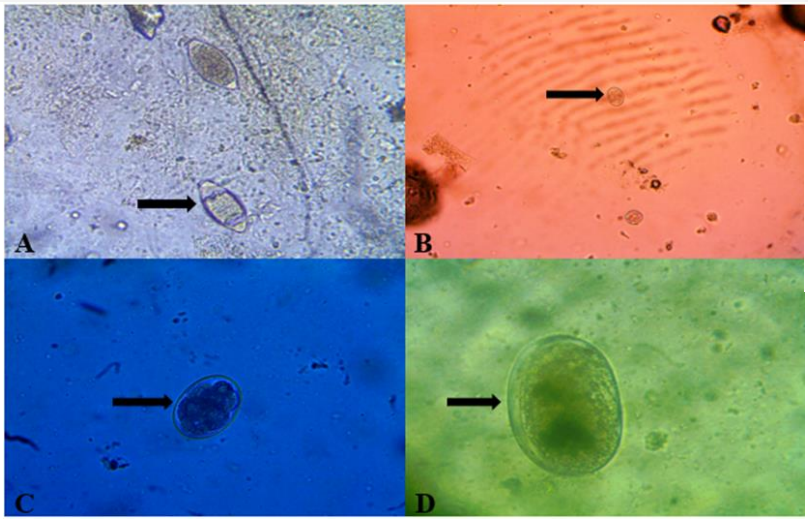

Figure 1: Photomicrograph (**A**) Shows Egg of *Trichuris suis* (**B**) unsporulated oocysts of *Eimeria spp*. (**C**) *Egg of Oesophagostomum spp* (**D**) Egg of *Paragonimus spp*. (×40)

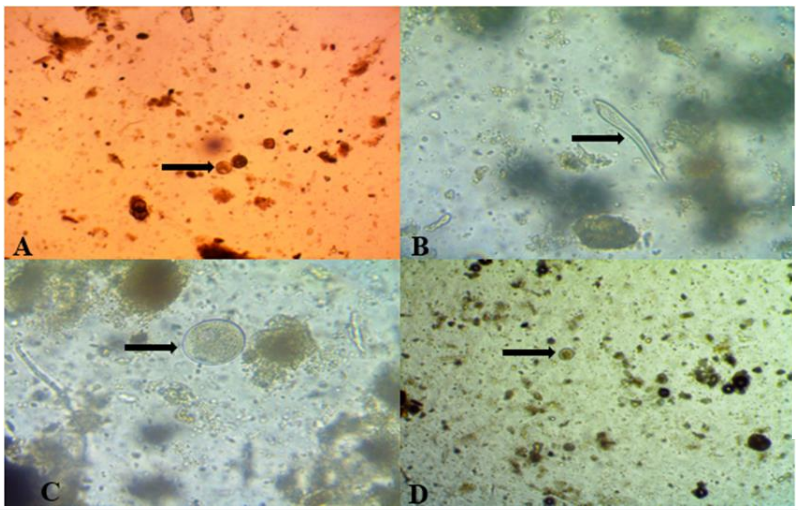

Figure II: Photomicrograph (**A**) Shows Oocysts of *Cryptosporidium* (**B**) Adult strongyle worm (**C**) Egg of *Ascaris suum* (**D**) Oocyst of *Isospora suis* (× 40)

prevalence mostly recorded in African countries cannot be unconnected to lack of an effective control system which would however, to put it into practice, require more information about the epidemiological pattern, no or poor deworming programs in farms, veterinary access and a better education of the farmers.

In the present study *Ascaris suum* was the most prevalent helminth ova (30.6%) in all age categories of pigs examined, and it is in line with similar studies in Ethiopia (Tomass *et. al*., 2013), and other studies in India (Kumar *et al*., 2002) and in other parts of Nigeria (Nsoso et al., 2000, Ngowi *et al*., 2004). On the contrary, Tiwari *et al*. (2009) reported no evidence of *Ascaris suum* infection in Granada, West Indies, this could be attributed to farm management, proper hygiene and access to veterinary services. Interestingly, 6.12% of the pigs shed *Oesophagostomum* species eggs, this is lower than the rate of 45% in Belize Gibbons *et al.* (1989), 27.6% in Thika district, Kenya Kagira *et al*. (2008) and 15.6% recorded in Burkina Faso by Tamboura *et al*. (2006). This may be as a result of the number of farms sampled, which can generate a higher prevalent or as a result of the type of management practices employed on the farms and ecological differences.

This study also revealed the prevalence of 10.6% for *Trichuris suis* and this is in tandem with a study in Tanzania by Esrony *et al*. (1997), where a lower prevalence of 5.0% was recorded. This support the statement that despite the potential of long survival time for *Trichuris suis*, its egg mortality is higher under field conditions (Nansen and Roepstorff 1999). The prevalence of *Cryptosporidium* species was 17.1% and this is consistent with the report of Morgan *et al*. (1999) and Tomass *et al*. (2013), this can be due to contamination of forages and water sources by *Cryptosporidium* oocyts either through the faeces of humans, cattle, and infected stray pigs. The nematode *Metastrongylus spp*. recorded a prevalence of 17.5% in this study, but this is in contrast with other reports, okorafor *et al*. (2014) recorded a very low prevalence of 0.99%, this could probably be as a result of sample size and proper farm management.

The prevalence of *Isospora suis* was 4.0% and it is lower than the 26.4% reported for *Isospora suis* in Ontario, Canada (Aliaga-Leyton et. al., 2011) and 20.7% reported in Ibadan, Oyo State, Nigeria (Okorafor *et .al*., 2014), the low prevalent in this study could be attributed to ecological differences and sample sizes. The present study revealed prevalence of *Eimeria spp*. 10.2%, lower than 12% reported in Ethiopia (Jufare *et al*., 2015) and 10% reported by Geresu *et al*. (2015), the low prevalence in this study can be contrasted with others on the grounds of disparities in survival of the oocysts in different ecological environments and proper managements and access to potent antihelminthics.

CONCLUSION

Eight gastrointestinal parasites of veterinary importance were found to infect pigs in Abakaliki. *Ascaris suum* was the most common parasite with higher prevalence in pigs examined. In the present study, it can be deduced that gastrointestinal parasitism can occur in any farm irrespective of the type of housing, and management practices. Improved husbandry system and modern management practices should be embraced to enhance preventive measures against helminthosis. These measures should include prophylactic and therapeutic antihelmintic programs which would ultimately lead to productivity. Further investigations are recommended for molecular detection, of the parasites isolated to species level.

ACKNOWLEDGEMENTS

We sincerely appreciate the efforts of laboratory staff of the parasitology laboratory of National Veterinary Research Institute, Vom, Plateau State, Nigeria, for their assistance in this research work.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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