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Prevalence of Intestinal Helminthes Parasites of Pigs Reared under Intensive Management System in Anambra State

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ABSTRACT

This study investigated the prevalence and risk factors of intestinal parasite infections in intensively managed pigs in Anambra State. A total of 600 pigs from seven farms were randomly selected, and their faecal and blood samples were examined for intestinal parasites, eggs, and haemoparasites. The results showed an overall prevalence of 25.0% for intestinal helminth parasites, with eight species identified, including six nematodes, one cestode, and one trematode. The most common parasites were *Trichuris suis* (29.3%), *Ascaris suum* (13.3%), and *Strongyloides ransomi* (13.3%). The prevalence of infection varied by sex, with females (58.7%) more infected than males (41.3%). The highest monthly prevalence for intestinal helminth parasites occurred in July (44.0%), while intestinal protozoa parasites, haemoparasites, and ectoparasites peaked in August. The study highlights the need for disinfection and control measures to mitigate parasitic infestations in pigs. Statistical analysis revealed significant ($p \leq 0.05$) associations between parasite infections and certain factors, emphasizing the importance of proper farm management practices. The findings of this study will inform strategies for controlling parasitic infections in pigs, ultimately improving productivity and animal health. Regular disinfection and parasite control programs are essential to reduce the prevalence of intestinal parasites and promote sustainable pig production.

Key words: Intestinal, Parasitic, Infestations, *Strongyloides, Ransomi,* Blood , *AscarisSuum*.

INTRODUCTION

The domestic pig, *Suisscrofa,* is a prominent member of the Suidae family reared in most parts of the world. Pig farming is extensively practiced as a family business in Southeast Nigeria (Onunkwo *et al*., 2011). Pigs are primarily reared as sources of meat protein in form of ham, pork, bacon, and gammon while pig skin and hairs are commercially harnessed for leather and brush production respectively. Ownership of livestock is a measure of financial and social status, and a form of cash reserve for solving financial problems in rural African settings (Ekere *et al*., 2018.). Pig keeping has therefore become an indispensible component of the rural economy; contributing significantly to job creation, poverty alleviation and meat production (Akanni *et al*., 2017). Over 38% of worldwide meat production came from pig rearing (Dey *et al.*, 2014).

Pigs contribute about 40% of meat consumed globally (Karaye *et al*., 2016). In Nigeria, pigs are reared exclusively for pork production, to satisfy high demand for meat occasioned by the nation's fast growing human population (Njoga *et al*., 2018), currently estimated at 200 million at 2.6% annual growth rate. Nigeria's average per capita daily protein intake (45.4 g) is lower than the FAO minimum recommendation of 65 g per day (Abonyi *et al*., 2020; Abiodun *et al*., 2017) due to insufficiency and high cost of animal protein.

However, parasitic diseases of pigs have serious challenges and impacts in pig farming in Nigeria. External and internal parasites in swine could have detrimental impact on production, thus, might result in considerable economic losses (Ózsvári, 2018).

In tropical and sub-tropical regions of the world, parasitic infections in pigs are estimated to be second only to African Swine Fever (ASF) in the ranking of diseases affecting swine industry (Keshaw *et al*., 2009). Myer*, et al;*(2008) also reported that even though parasitic diseases are not generally regarded as a cause of death in pigs, losses due to parasitism are estimated to cost two hundred and fifty million US Dollars ($250M) annually. According to Onyenwife *et al. (2023)*10(2.50 %) of thewater samples showed co-infection of Salmonellosis and Cryptosporidiosis while only 2(0.5 %) of stool in the analysis Co-infection of Salmonellosis and Cryptosporidiosis in both stool and water samples from Ayamelum Local Government Area.

MATERIALS AND METHODS

Study Area: The study was carried out in Anambra State in Southeast Nigeria. Anambra State is located in the tropical rain forest zone with a derived savannah (Plate 3.1). It has a tropical savannah climate. Anambra State climate is humid and this humidity is in its highest between March and November. The mean daily temperature is 26.7◦C (80.1◦F). The rainy season and dry season are the only weather periods that recurs in Anambra State. The average annual rainfall in Anambra state is about 2,000 millimetres (2000mm) which arrives intermittently and becomes very heavy during the rainy season. Other climatic conditions affecting the state include harmattan, a dusty trade wind lasting a few weeks of December and January. Anambra State is hot all year round. Anambra state possesses abundant surface water and the state is well drained. The major river systems are the Anambra drainage system to the west and the Mamu sub-basin all of which flow into the river Niger, Onyenweife & Nwozor (2025).

Anambra State has a population of 4,177,828 *(Ndulue et al., 2021)* according to the 2006 Nigeria census and lies at latitude 6.2209^0N and longitudes 6.9370^0 E It is politically divided into three geopolitical zones Anambra North, Anambra South and Anambra Central. The population is predominantly Ibo tribe with some concentration of Hausa, and Yoruba communities. The major occupation of the people is farming, livestock production and trading. Civil servants of both the federal and State government extractions form a significant part of the public service community. The water sources are mainly from borehole, public potable water supply and wells. Pig farm ownership is common. Most pigs were confined within pig pens in clusters organized by the farm owner. Stray pigs were hardly seen in Anambra State due to the State government policy on stray animals in the Anambra State.

Fig. 2.1: Map of Anambra State Showing the 21 Local Government Areas with sample sites

Key locations: APF=Aroma Pig Farm Awka; MPF= Masden Pig Farm Agulu; NPF=Nippon Pig Farm, Oyi; OPF= Oluchi Pig Farm, Ihiala; OPFM= Okwe Pig Farm, Mgbakwu; EPF= Echi Pig Farm, Urum; HPF= Hosanna Pig Farm, Amansea.

Ethical Approval:

Ethical approval for the study was obtained from the Anambra State Agricultural Development Programme, Awka (Appendix I).

Advocacy Visits

Advocacy visits were conducted to pig farmers within the study area. During the advocacy visits, pig farmers were enlightened and sensitized on the proposed research and the justification. This was done primarily to allay their fears and solicit their cooperation. Confidentiality, veterinary advice and services were promised and rendered in return for their cooperation. The provisions of the European convention for the protection of vertebrate animals used for experimental and other scientific purposes were observed.

Research Design

The work was a survey study in which six hundred pigs were selected from cluster farms in the study are for the determination of intestinal parasites. The pigs were grouped into males and females, piglets, growers and finishers. Biological samples (faeces, blood and ectoparasites) were collected at monthly interval from August 2021 to July 2022, and analyzed in the laboratory using standard methods.

Selection of Study Sites (Farms)

A pilot survey was conducted to determine the number of willing farmers and the suitability of their herd population for the study. Farm clusters were identified during the preliminary surveys of both rural and urban areas respectively and consisted of farms ranging from 10 to 20 pig pens. Two farms were purposively selected from farm clusters in each senatorial zone. Thus seven pig farms were randomly selected for the study from the three senatorial zones which consists of AnambraNorth senatorial zone, Anambra South senatorial zone and Anambra Central senatorial zone.

Selection of Sample Size and Sample Size Determination

The sample size was determined using the sample size formula by Daniel (1999).

$$n = \frac{Z^2 P\,(1-P)}{d^2}$$

where;

n= sample size

z= confidence limit at 95%=1.96

d= degree of accuracy or precision= 0.05

p –prevalence in population being tested = 0.50%=0.50

$$n = \frac{(1.96)^2 \times 0.50\,(1-0.50)}{(0.05)^2}$$

The selected pigs consisted of piglets (<4weeks), growers (4-17weeks) and finishers (>17week).

Determination of Prevalence Intestinal Helminthes Parasites of Pigs in the Study Area

This involved three major processes namely:

Collection of faecal samples

Six hundred faecal samples were collected directly from the rectum of the pigs to ensure that they are completely fresh. Twenty (20 g) of faeces was collected from each pig. The samples were placed in plastic containers with tight lids, and 3% formalin admixed to the faeces (approx. 1 mL formalin to 4 g faeces) to preserve the sample and the parasite eggs. The pack was put in icepack food flask and transported to National Veterinery Research Institute Laboratory, Jos for analysis where they were stored in a refrigerator (approx. 4°C) prior to analysis.

Processing of faecal samples for examination

The faecal examination was carried out using Roepstorff and Nansen (2011) method for flotation and sedimentation techniques. One gram of each faecal sample was collected and mixed with 4ml of 10% formol water in a test tube using an applicator stick. The mixture was sieved using a strainer into a beaker. The suspension was transferred into a test tube and 4ml ethyl acetate added. The whole mixture was stirred and centrifuged for 1minute at 3000 r.p.m.

Plastic bulb pipette was used to loosen the layer of fatty faecal debris and was inverted to discard the supernatant. The sediment in the test tube wasturned in upright position, and the sediment resuspended again. Plastic pipette was used to transfer a drop of the suspended sediment to a clean grease free slide which was covered with a clean cover slip and examined microscopically using x10 and x40 objective lens. The ova were identified using morphological features as described by Cheesbrough, (2009).

RESULTS & DISCUSSION

Of a total of 600 pigs sampled for intestinalhelminth parasites, 150 were infected, giving an overall prevalence of 25.0% (Table 4.1). A total of eight intestinal helminth parasites were encountered. These comprised six nematodes, one cestode and one trematode. The most encountered intestinal helminth parasites were *Trichurissuis* (29.3%), followed by *Ascarissuum*(13.3%) and *Strongyloidesransomi*(13.3%). The least encountered was *Paramphistomumsuis* with a prevalence of 6.7%. Others were Hookworm (10.7%), *Oesophagostomum* sp. (10.7%), *Taenia*sp. (8.0%) and *Capillaria* sp. (8.0%).The total average egg per count of the intestinal helminth parasites encountered was 26.1. The total range of egg per gram was 610 – 3298.

In relation to age, the highest prevalence 78(30.0%) of intestinal helminth parasites was obtained among finishers, followed by growers 60(23.5%)(Table 4.4). The least prevalence 12(14.1%) was recorded among the piglets.Statistical analysis showed that there was a significant difference in the prevalence of intestinal helminth parasites in relation to age ($p<0.05$) (P-value=0.003; Chi-square =17.215). In relation to parasite spread, there was no Hookworm infection, *Capillaria*, and *Oesophagostomum* infections among the piglets. Infections with *A. suum* (13.3%), *S. ransomi* (16.7%), *Oesophagostomum* sp. (15.0%) and *Taenia* sp. (8.3%) were higher among growers than

finishers where prevalences of 10.3%, 11.5%, 9.0% and 7.7% were recorded for *A. suum*, *S. ransomi, Oesophagostomum* sp. and *Taenia* sp., respectively.

Figure4.1 showed the prevalence of mixed infections of intestinal helminthes parasites recovered from pigs in the study area. From the result, the mixed infections with *A. suum* and *T suis* recorded the highest prevalence (2.2%), followed by mixed infections with Hookworm and *A. suum* (1.7%). The least prevalence of mixed infections was that of Hookworm and *S. ransomi* (0.7%).

Table 4.1: Occurrence of intestinal helminth parasites in the study area

Intestinal helminth parasite	Occurrence	% Occurence	Average (EPG)	Range (EPG)
Hookworm	16	10.7	46.9	139-610
Ascarissuum	20	13.3	29.3	77-508
Trichurissuis	44	29.3	19.2	121-722
Strongyloidesransomi	20	13.3	22.1	23-418
Capillaria sp.	12	8.0	30.4	44-321
Oesophagostomum sp.	16	10.7	29.1	62-404
Taenia sp.	12	8.0	51.7	106-514
Paramphistomumsuis	10	6.7	23.9	38-201
Total	150	25.0	26.1	610-3298

Key: % = Percent; EPG = Egg per gram

Table 4.2: Prevalence of intestinal helminth parasites of pigs studied in relation to gender in the study area

Gender	No. ex.	No. inf. (%)	Hk	*A.suum* (%)	*T. suis* (%)	*S.r* (%)	*C.*sp. (%)	*O.* sp. (%)	*T.* sp. (%)	*P. s* (%)
Male	290	62(41.3)	10(16.1)	7(11.3)	15(24.2)	7(11.3)	7(11.3)	6(9.7)	6(9.7)	4(6.5)
Female	310	88(58.7)	6(6.8)	13(14.8)	29(32.9)	13(14.8)	5(5.7)	10(11.4)	6(9.7)	6(6.8)
Total	600	150(25.0)	16(10.7)	20(13.3)	44(29.3)	20(13.3)	12(8.0)	16(10.7)	12(8.0)	10(6.7)

Key: % = Percent; Key for intestinal helminth parasites: Hk=Hookworm; *A.suum=Ascarissuum*, *T. suis= trichurissuis*, *S.r- Strongyloidesransomi*, *C.*sp= *Capillaria* sp., *O. sp= Oesophagostomu*sp., *T.* sp=*Taenia* sp., *P. s= Paramphistomumsuis.*

Table 4.3: Prevalence of intestinal helminth parasites of pig in relation to age among pigs in study area

Age	No. ex.	No. inf. (%)	Hk (%)	*A.suum* (%)	*T. suis* (%)	S.r (%)	C.sp. (%)	O. sp. (%)	T. *sp.* (%)	P. s (%)
Piglet	85	12(14.1)	0(0.0)	3(25.0)	5(41.7)	1(8.3)	0(0.0)	0(0.0)	1(8.3)	2(16.7)
Grower	255	60(23.5)	6(10.0)	8(13.3)	14(23.3)	10(16.7)	5(8.3)	9(15.0)	5(8.3)	3(5.0)
Finisher	260	78(30.0)	10(12.8)	9(11.5)	25(32.1)	9(11.5)	7(9.0)	7(9.0)	6(7.7)	5(6.4)
Total	600	150(25.0)	16(10.7)	20(13.3)	44(29.3)	20(13.3)	12(8.0)	16(10.7)	12(8.0)	10(6.7)

Key for intestinal helminth parasites: Hk=Hookworm; *A.suum=Ascarissuum*, *T. suis= trichurissuis*, *S.r- Strongyloidesransomi*, *C.*sp= *Capillaria* sp., *O. sp= Oesophagostomus*sp., *T.* sp=*Taenia* sp., *P. s= Paramphistomumsuis.*

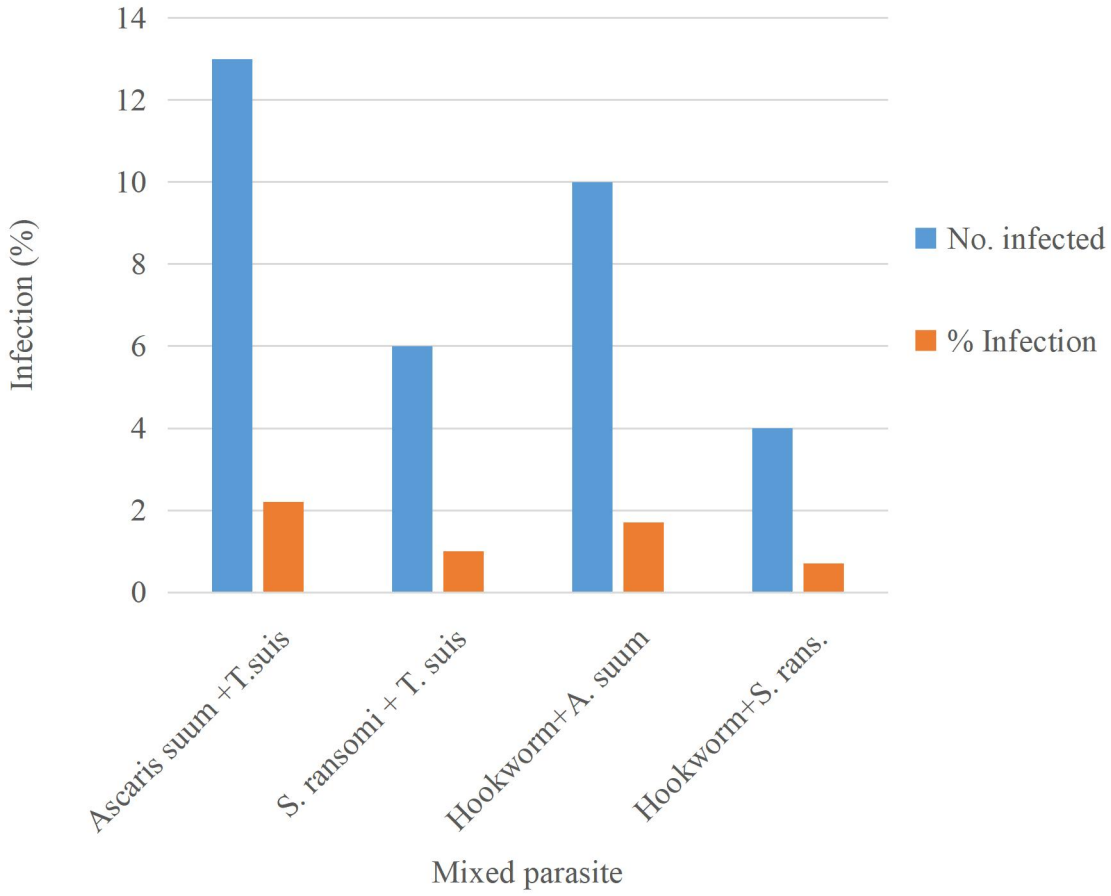

Figure 4.1: Prevalence of mixed infections of intestinal helminth parasites recovered from pigs in the study area

Key: *S.rans=Strongyloidesransomi; A.suum=Ascarissuum*, *T. suis= trichurissuis*; % = Percent

CONCLUSION

This study reveals a high prevalence and moderate intensity of helminth infections in pigs across Anambra State, with eight species identified. Risk factors were pinpointed, enabling effective control measures. About 52.0% of farmers practiced prophylaxis, including hygiene and disinfection. The study bridges the knowledge gap on parasitic diseases and management practices in pig farming, informing strategies to improve pig health and productivity.farmers.

DECLARATION

The Author declared no conflict of interest

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