Gastrointestinal Helminthiasis in Cattle at Selected Abattoirs in Anambra Central Senatorial Zone, Anambra State, Nigeria

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ABSTRACT

Background: Cattle are a major source of livelihood, animal protein, flexible income, employment, farm energy and manure, yet gastrointestinal parasitic diseases hamper their thriving and productivity. **Objective:** In this study, a total of 150 cattle from Awka, Amansea and Nkwor-Ogidi abattoirs in Anambra State, Nigeria were subjected to gastrointestinal parasites examination from the months of April to June, 2021 to determine the prevalence of gastrointestinal helminthiasis in the study areas. **Material and Methods:** Faecal samples were collected and examined for the presence of intestinal parasites using direct smear and formol-ether concentration methods which was later viewed under the microscope. **Results:** The results revealed that 78% of the total cattle examined were positive to intestinal parasites. The result also showed the presence of six different intestinal parasite species, in which the trematode group (*Fasciola gigantica* and *Schistosoma bovis)* recorded the highest prevalence of 57.3%, while the nematodes (*Ascaris spp* and *Strongyloides spp*) had the least prevalence of 14.6%. Statistical analysis showed that there was a significant difference in the prevalence of intestinal parasites in the cattle (p=0.002). **Conclusion:** The overall prevalence of the different types of gastrointestinal parasites recorded is high enough to cause major health issues in the cattle and low cattle productivity thereby leading to economic loss. This high prevalence of parasitic infection also poses a serious risk to the human population because most of these parasites are zoonotic and can also infect man through the consumption of meat that is not properly cooked, so adequate control measures should be implemented.

Keywords: Anambra State; Cattle; Gastrointestinal Helminthiasis; Infection; Nigeria

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INTRODUCTION

Gastrointestinal helminths come in three major classifications namely cestodes (tapeworms), nematodes (roundworms), and trematodes (flukes) [1]. Helminths infection of medical importance are mostly caused by nematodes (such as *Ostertagia ostertagi, Capillaria bovis, Trichuris discolor, Strongyloides papillosus*), Cestodes (such as *Moniezia benedeni, Taenia saginata*) and Trematodes (such as *Fasciola gigantica, Amphistomes*) in both man and animals [2]. These are parasites that infect intestinal tracts of cattle and also impact significantly on the production efficiency of cattle herds, causing disease, reducing growth rates and sometimes causing death [3]. The burden associated with the parasite on cattle includes disrupting the host nutrient absorption, causing weight loss, reduced food conversion, abortion, infertility and diseases [4]. Transmission of Gastro-intestinal (GIT) parasites is fairly direct in most cases; the infective eggs or oocyst are passed with the faeces when the animal defecates, the next animal would be infected if they graze in the contaminated areas [5]. In heavy infections, there is drastic decrease in the economic returns and reduced milk yield in cattle due to parasites which also interfere with the digestion by mal-absorption of essential minerals like calcium and vitamins for the milk production in the mammary glands [6]. The most important predisposing factors of helminth infection are grazing habits (feeding on contaminated pastures and feeding or drinking from contaminated water source). Others are climate, nutritional deficiency, pasture management, immunological status, vector or presence of intermediate host and the number of infective larvae and egg in the environment [7]. Cattle intestinal parasites must be controlled because as cattle continue to graze on pastures, they are exposed to different helminthes infection especially metacercariae [8]. Prevention and control of parasitism is based on knowledge of factors that affect both the survival of parasites in the environment and transmission to the host. Completely eliminating parasites is difficult using the treatment and management methods only. However, one can reduce the severe effects of cattle parasites by deworming. It is possible to prevent the occurrence of most parasitic diseases of cattle and to prevent their spread by taking prompt precautionary and preventive measures such as, advanced prophylactic vaccinations and strict hygiene measures [9].

MATERIALS AND METHODS

Study area

The study was carried out in Awka, Amansea and Nkwor-Ogidi in Anambra state. Awka (Igbo: Oka) is the capital city of Anambra state, Nigeria [10]. Awka is located at latitude of 6° 12' 25"N and longitude of 7° 04' 04"E and it is sited in a tropical valley but most of the original rainforest has been hot due to clearing for farming and human settlement. The town is in the tropical rainforest vegetation of Nigeria and the occupation of Awka people is farming, while some are skilled iron workers, civil servants and traders [11]. Amansea is located in Awka North Local Government Area of Anambra State. It is within the Awka capital territory and is bounded to the South by Awka town, to the North by Mamu River, Ebenebe town, to the West by Mgbakwu and to the East by Ezinato/Ubibia stream. The town is within the rainforest region of Nigeria with an annual rainfall of 1000-1500mm and it is located at latitude of 6° 26' 32"N and a longitude of 7° 12' 64"E. The town's population is estimated to be 15,000 to 20,000 [12]. Ogidi is the headquarters of Idemili North Local Government area, Anambra State, Nigeria andhas an estimated population of 70,000. Its neighboring towns are Abatete, Nkpor, Umunnachi, Umuoji, Ogbunike and Umudioka [12]. Ogidi's geographical coordinates are 6° 9' 0"N and 6° 52' 0"E [11]. The entire study area is characterized by two seasons, wet season from April to October and dry season from November to March.

Sample size determination

Cattle used in the study were selected through the simple random sampling technique. The sample size

was determined using the equations given by [13].

$$n = \frac{Z^2 - PQ}{e^2}$$

Where Q= 1 − P,

Z = 1.96,

e = precision error (0.05), and v

P = expected prevalence of about 50%.

Therefore, n = $1.96^2 \times (0.5)(1 - 0.5)/(0.05^2) = 150$

Study design and sample collection

A total of 150 faecal samples were collected from the slaughtered cattle between the months of May and June 2021. Notes were also taken on the gender and breed of each cattle examined. The samples from each cattle were stored in a specimen bottle and labeled which were transported to the Laboratory of the Department of Parasitology and Entomology of Nnamdi Azikiwe University Awka, Anambra State for further laboratory examinations.

Collection and examination of faecal material

The collection of the faecal samples was carried out between 6:00am and 8:00am when animals are usually taken to the abattoirs for slaughtering. Following the slaughtering of cattle, fresh faecal samples were randomly collected from both male and female cattle at Awka, Amansea and Nkwor-Ogidi abattoirs. The intestine of the cattle was dissected after slaughtering to expose the faeces, thereby allowing fresh faecal samples to be collected from the rectum using a pair of hand gloves. Each of these specimen was collected in different, clean sterile universal containers and labelled appropriately indicating the sex, breed, time, date and place of collection and was transported to the laboratory of the Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka where they were examined for the presence of helminthes eggs and adult worms. Intestinal parasites were identified using direct smear method and formol-ether concentration as described by Williams, 2013 [14].

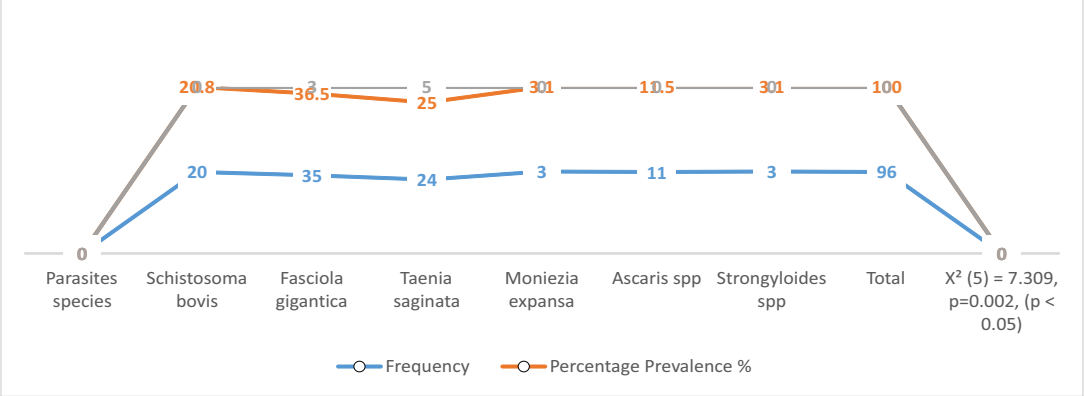
Data analysis

The data collected were stored in the Microsoft Excel Spreadsheet and analyzed using Statistical Package of Social Science (SPSS) version 26.0 IBM Corporation. Chi-square statistics were used to test the association between variables and to determine the level of significance of *P* value.

RESULTS

Figure 1: Prevalence of gastrointestinal parasites according to species in the selected abattoirs in Anambra state

The result shows that six species of intestinal parasites were prevalent in the abattoirs in the three study areas. *Fasciola gigantica* has the highest prevalence of 36.5%, while *Moniezia expansa* and *Strongyloides spp* has the least prevalence of 3.1% each. Statistical analysis showed that the prevalence of six species of intestinal parasitic helminthes is statistically significant (p = 0.002).

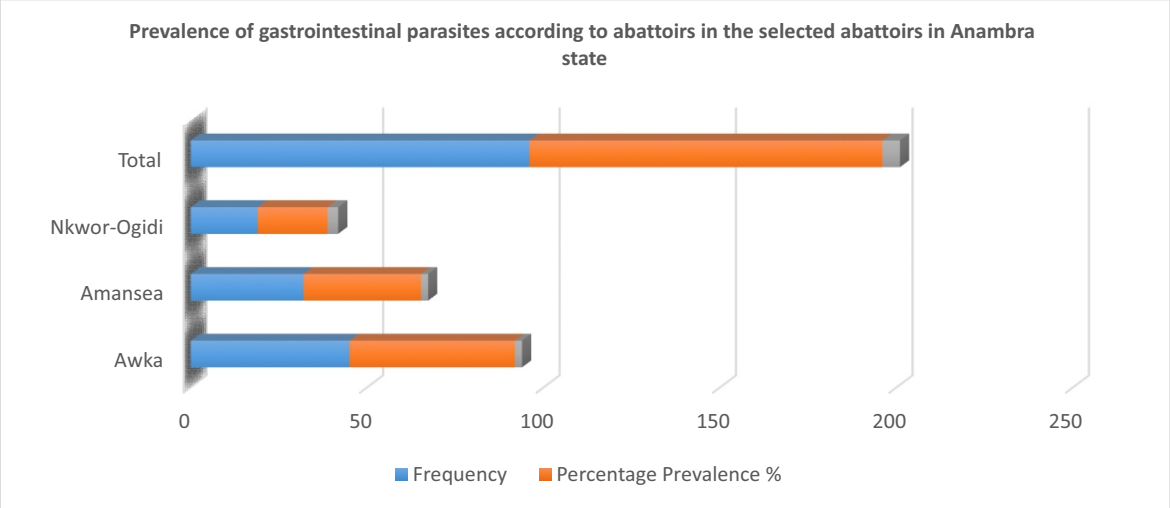


X² (5) = 7.309, p=0.002, (p < 0.05)

Figure 1: Prevalence of gastrointestinal parasites according to species in the selected abattoirs in Anambra state

Figure 2: Prevalence of gastrointestinal parasites according to abattoirs in the selected abattoirs in Anambra state

The result shows the prevalence of intestinal helminthiasis in the selected abattoirs (Nkwor-Ogidi, Amansea and Awka) in Anambra state. The statistical analysis showed that there was no significant difference. This indicates that the prevalence of intestinal parasites was not dependent on the selected abattoirs (p = 0.275).

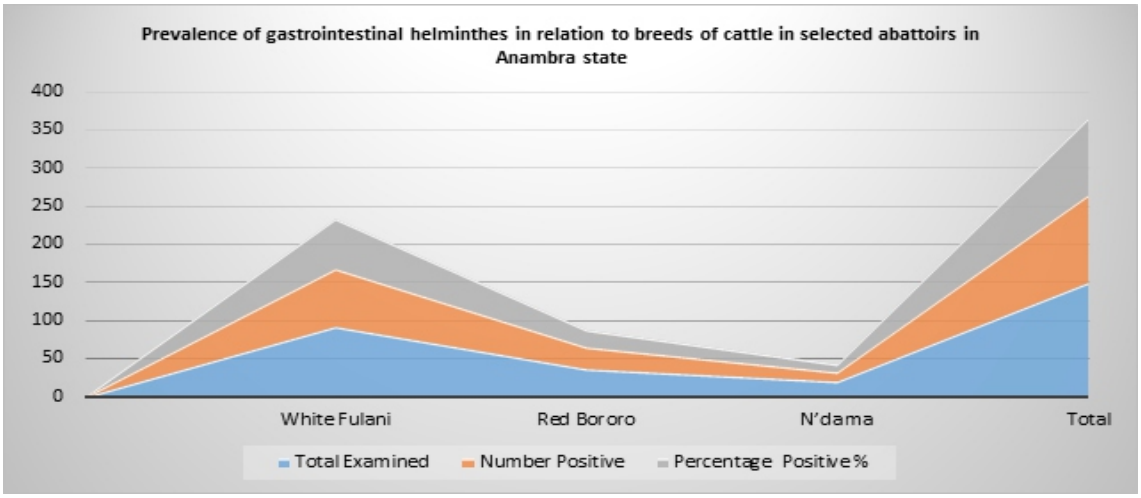


X^2 (2) = 1.410, p=0.275, (p > 0.05)

Figure 2: Prevalence of gastrointestinal parasites according to abattoirs in the selected abattoirs in Anambra state

Figure 3: Prevalence of gastrointestinal helminths in relation to breeds of cattle in selected abattoirs in Anambra state

On the prevalence of helminthic infestation by breed of cattle, it is found that White Fulani breed had the highest prevalence 66.0%, while N'dama breed had the least prevalence of 10.4%. The statistical analysis showed that there is no statistical difference/significance in the prevalence of gastrointestinal parasites in relation to breeds of cattle. So the intestinal parasite is not dependent on the breeds of cattle (p = 0.199).

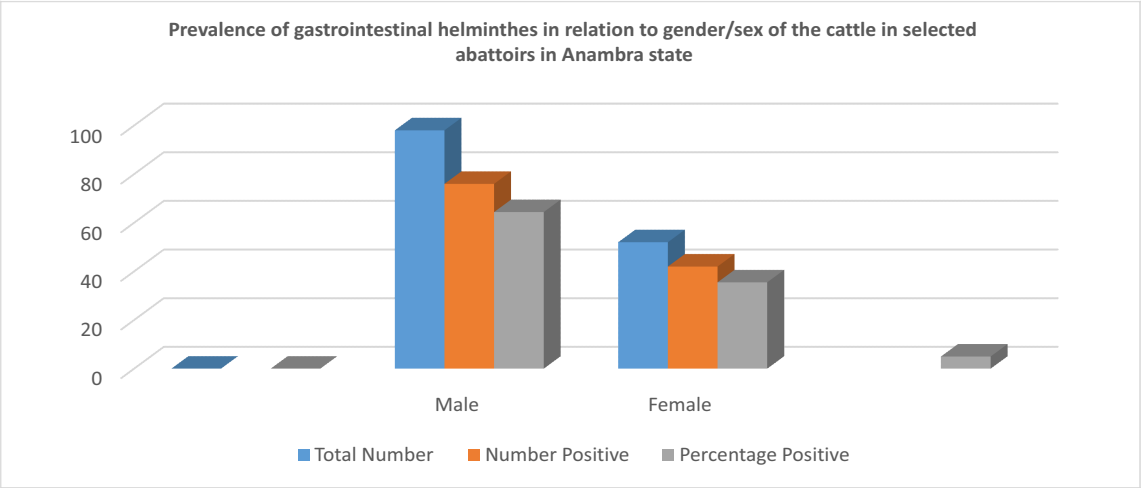


X^2 (4) = 6, p=0.199, (p > 0.05)

Figure 3: Prevalence of gastrointestinal helminthes in relation to breeds of cattle in selected abattoirs in Anambra state

Figure 4: Prevalence of gastrointestinal helminthes in relation to gender/sex of the cattle in selected abattoirs in Anambra state

The result shows that the male cattle had more infection of 48 (64.4%) than the female with 42 (35.5%). Chi-square analysis showed that the distribution of helminthes based on sex/gender is not statistically significant (p = 0.157).



X^2 (1) = 2, p=0.157, (p > 0.05)

Figure 4: Prevalence of gastrointestinal helminthes in relation to gender/sex of the cattle in selected abattoirs in Anambra state

DISCUSSION

In the gastrointestinal helminths study done at selected abattoirs in Anambra State Nigeria, report shows that out of 150 slaughtered cattle screened for intestinal parasites, 118 (78%) were positively infected with intestinal helminthes. This prevalence is supported by Yakubu *et al*., 2012 that reported a prevalence of 75% in Yola [15]. Other studies by Olubukola *et al*., 2014 and Oscar *et al*., 2018 reported a prevalence of 41.6% in Ibadan, South-Western Nigeria and 44.2% in Anambra State [16, 8].

The differences observed might be due to variation in the periods or season in which the studies were conducted. High prevalence of intestinal parasites reported in this study could be due to the difference in management systems like improper sanitation in the abattoirs and cattle rearers not educated on the use of antihelminthic drugs as was also documented by Regassa *et al*., 2006 [17]. It is also observed in the present study that statistically, there was no significant difference (p > 0.05) at the three study sites/abattoirs even though Awka abattoir had the highest prevalence of 46.9%. The study showed that six intestinal parasites were identified based on their morphological features. The parasites found include *Fasciola gigantica, Schistosoma bovis, Taenia saginata, Moniezia expansa, Ascaris spp,* and *Strongyloides spp.* The highest prevalent species was the *Fasciola gigantica* (36.5%), while the *Moniezia expansa* and *Strongyloides spp* had the least prevalence of 3.1%.

In this study, the trematode group recorded the highest prevalence of 57.3%, while the nematode recorded a prevalence rate of 14.6%. This result is comparable to that of Yeneneh *et al.,* 2012 and Abebe *et al*., 2011 who reported 60.4% and 52.5% in their respective studies [18, 19]. This variation could be associated with differences in geographical, ecological and climatic conditions since the presence of trematode infection is dependent on the availability of the intermediate host. Although

statistically, the result shows no significant difference ($p > 0.05$) in the prevalence based on species of parasitic helminthes.

The study also showed that male cattle had a higher prevalence of gastrointestinal helminths 64.4% compared to the females 35.5%. This report is similar to a study of Hambal *et al*., 2018 [20] that also reported a higher prevalence rate of gastrointestinal helminths in male (60%) than in female cattle (27.9%). This might be due to the fact that males are more exposed to grazing areas than females. There was a statistical significance difference ($p > 0.05$) among male and female cattle in the present study.

CONCLUSION

The overall prevalence of the different types of gastrointestinal parasites recorded is high enough to cause major health issues in the cattle and low cattle productivity thereby leading to economic loss. This high prevalence of parasitic infection also poses a serious risk to the human population because most of these parasites are zoonotic and can also infect man through the consumption of meat that is not properly cooked, so adequate control measures should be implemented.

We therefore recommend proper pasture management in grazing areas, also the cattle breeders should be enlightened on the importance of proper sanitation in the abattoirs and cattle owners should be educated on the use of anti-helminthic drugs. Veterinary service delivery systems should be appropriated for the diagnosis and treatment of parasitic diseases. Further extensive research should be carried out in the study areas so as to come up with a proper control measure program in addition to what was recommended above.

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Author contributions: EOO, NNJ, LCE and OPI conceptualized and designed the study and also wrote the first draft of the paper. EOO and NNJ developed the protocol and contributed in the writing and revision of the manuscript. EOO and LCE conducted study analyses. EOO and OPI oversaw study implementation and monitoring. EOO and NNJ edited the publication. All the authors read, approved the final manuscript and agree to be accountable for all aspects of the work.

Data availability: The data used to support the findings of this study are available upon reasonable request from the corresponding author.

Conflict of interest: The authors declare that they do not have any conflicts of interest.

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Ethical approval: The study was approved by the institutional Ethics Committee.

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