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Gastro-intestinal parasites of bovine in Akure abattoirs, Nigeria

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Abstract

The study aimed to determine the prevalence of gastro-intestinal parasites among the cattle in Akure, Nigeria. Two hundred and seventy-five cattle were randomly selected from the abattoirs, 2g of faecal sample aseptically collected were subjected to flotation method to concentrate the eggs, and the smears of the sample were air-dried and stained with hematoxylin and subsequently viewed under the light microscope using 40 X to 400 X magnifications. The results revealed four groups of parasites, these include protozoa, cestodes, trematodes and nematodes. One parasite (*Isoospora belli*) was identified to be protozoan, three parasites (*Taenia saginata*, *Moniezia benedeni* and *Avitilium* spp) were identified to be cestodes, two parasites (*Fasciola hepatica*, *Schistosoma bovis*) were identified to be trematodes, while three parasites (*Nematodirus* spp, *trichuris trichiura* and *trichostrongylus* spp) were identified to be nematodes. Among the parasites, *Enterobius vermicularis* has the highest prevalence of 53.63% in male and 45.83% in female while the least prevalent is *Avitilium* spp which was absent in male cattle but present in female cattle (1.04%). The presence of these zoonotic parasites among the cattle in this area suggests poor veterinary care in the area. It is therefore recommended that the cattle owners and the herdsmen should be properly educated on the use of antihelminth drugs.

Keywords: gastro-intestinal parasites, prevalence, abattoirs, cattle, herdsmen

1. Introduction

Gastro-intestinal parasites are parasites that infect gastrointestinal tracts of humans and other animals. These parasites impact significantly on the production efficiency of cattle herds, causing disease, reducing growth rates and sometimes causing death^[1]. Cattle of all ages, but particularly young cattle, are affected by a diversity of gastro-intestinal parasites. Among these are the roundworms (nematodes), which are primarily parasites of the gastrointestinal tract (a lung worm is included), the liver fluke (trematodes), tapeworms (cestodes) in the small intestine, and single-celled protozoan parasites (coccidia) in the lower intestinal tract^[2]. The burden of these parasites on humans are significant because livestock and their products serve as a major source of animal protein.

Parasitism remains one of the main constraints limiting livestock productions especially in Africa, where most of these animals are kept in extensive system of production. Similarly, helminthiasis caused by nematodes, cestodes and trematodes are regarded as the most important parasitic diseases in the world and as meat consumption is on the increase worldwide to cover for protein demands, there are growing concerns and challenges about meat hygiene and safety^[3]. Among the helminthes, roundworms are considered to be the most economically devastating internal parasites of livestock in Nigeria. Although, cattle can be infected with tapeworms, their effect on animal performance is minimal compared to the roundworms^[4]. Fluke problems are common in areas where there are poorly drained pastures and stagnant pools of water (ponds, ditches etc). This condition favored snail population which in turn serve as intermediate host of some of these flukes.

Problems with flukes arise in conditions that promote snail populations such as poorly drained pastures and stagnant pools of water (ponds, ditches etc.) in the pasture area.

The infection rates of gastro-intestinal parasites are variable depending upon different intrinsic and extrinsic epidemiological and biological factors. The economic losses caused by fluke infections may be in the form of mortality, decreased productivity, reduced weight gain and other means resulting globally from parasitic diseases^[5]. Cattle get infected normally in the rainy season, but in the dry season, the herdsmen migrate in search of water and grazing such

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that thousands of cattle often converge on the few ponds that fail to dry up. In such locations, snail intermediate host is found and they reinforce the parasitic infection already obtained by the cattle during the rainy season [6, 7]. The need to control gastro-intestinal parasites will exist as long as cattle are grazing pastures. This is because grazing on pasture by cattle exposed them to different helminth infections due to ingestion of pasture containing metacercariae of helminthes. However, parasite levels are not the same on all pastures or in all cattle. Pastures that are heavily stocked generally have a higher parasite burden than lightly stocked ones [8]. Cattle in a dry lot are less likely to have heavy worm infections than those on pastures. Young cattle will typically have more internal parasites than older cattle [9]. To reduce the parasite burden and improve meat protein in Nigeria, the intestinal parasites should be identified and methods of controlling the parasites should be developed to fit individual production situations. This study therefore, was undertaken to determine the prevalence of intestinal parasites in cattle slaughtered in abattoirs within Akure City, Ondo State, Nigeria.

2. Materials and methods

2.1 Study area

The study was conducted in Akure city, Nigeria. Akure is the capital and largest city of Ondo State. Ondo is within the South-west and covers a land area of 14,793 square kilometers. It lies between latitude 7°15'0"N and longitude 5°11'42"E. Akure has a population of 484,798. The people are of the Yoruba ethnic group. The study vicinity has a subtropical weather, the raining season is usually from April to October while the dry season begins in November and ends in March.

2.2 Sample collection

Two sampling points were randomly selected within the study area. These abattoirs are well equipped and well-staffed, but the animals slaughtered were brought from traders in various markets located in different locations of Nigeria which include: Kabba (Kogi State), Ilesha Ibariba (Kwara State), Sango market (Akure, Ondo State) and Ibadan-Eleyele and Igbeti (Oyo State). The sampling abattoir points were visited weekly and a total of 275 cows comprising 179 male and 96 female cows of different breeds were randomly sampled from January to December, 2016. Fresh fecal samples were collected directly from the rectum of the freshly slaughtered animals with a glove hand, which were placed into the labelled sample bottles and taken to the research laboratory of the Biology department, Federal University of Technology Akure, Nigeria for examination and identification.

2.3 Examination of fecal samples

The test tube flotation technique was employed in analyzing the collected fecal samples. The fecal samples were analyzed in the following manner: 2g of fecal sample was mixed thoroughly (using an applicator stick) with about 2mls of normal saline solution in a test tube, the sample was then homogenized by stirring with the same applicator stick and the test tube filled to the brim with a saline solution. A cover slip was placed on the test tube and the test tube was placed inside a test tube rack undisturbed for about 15-20minutes to allow eggs of lower density float to the surface of the saline solution and adhere to the cover slip. The cover slip was finally taken off the test tube, placed on a sterile slide and air-dried. The preparation was then stained with hematoxylin for contrast and subsequently viewed under the light microscope

with magnification of 40X, 100X and 400X.

2.4 Data analysis

The prevalence of infection among the examined cattle was calculated using the number of infected cattle divided by the number of cattle examined. All data obtained were subjected to Chi-square analysis at the 0.05% level of significance using statistical package for social sciences (SPSS) Version 20.0.

3. Results

The study area comprises of public abattoir (government owned) and private abattoir (individual owned). A total of 275 cattle were examined in the study area, of which 175 cattle were examined in a public abattoir while 100 cattle were examined in private abattoir. The result as presented in Table 1 which showed that 212 cattle of the total examined cattle (275) were infected with various gastro-intestinal parasites with a total prevalence of 77.1%. In the public abattoir, 135 cattle were infected with parasites given a prevalence of 77.1% while 77 cattle were infected in private abattoir with a prevalence of 77%. The results showed that there is no significant difference in the prevalence of gastro-intestinal parasites between the public and private abattoirs ($P > 0.05$). The infections were further classified as single (parasite dwelling alone) and mixed infections (parasite cohabiting with other parasites).

The examination of fecal samples in a public abattoir as presented in Table 2 and it revealed that 70 cattle were infected with single parasite while 65 cattle harbor more than one type of parasite (mixed infection), but the prevalence of single infection was higher in private abattoir (43.0%) than the public abattoir (40.0%). In contrast, the prevalence of mixed infection was higher in a public abattoir (37.1%) than the private (34.0%).

Result in Table 3 showed that of the 275 cattle examined in the Akure metropolis, 179 (65%) were male cattle while 96 (35%) were female cattle. This showed that the meat of male cattle were usually preferred to the female cattle. This is because the male meat was usually soft and easy to cook, unlike the female meat that is usually tough and require more time to be cooked. In addition, the herdsmen preferred selling the male cattle and keep the female for milk production and reproduction. The female cattle are later sold after they are very old. This account for the toughness of their meat. Result in Table 3 further showed that of the 179 male cattle examined 141 of them were infected with different gastro-intestinal parasites, this amounts to a prevalence of 78.7% among the male cattle while 71 female cattle out 96 were infected with parasites amounting to a prevalence of 73.1%. Chi-square analysis of the gender prevalence showed that gastro-intestinal infection among the male cattle is significantly higher than that of the female cattle ($P < 0.05$).

Table 4 showed that four groups of parasites were identified in the study area. These include protozoa, cestodes, trematodes and nematodes. One parasite (*Isoospora belli*) was identified to be protozoa, three parasites (*Taenia saginata*, *Moniezia benedeni* and *Avitellium* spp) were identified to be cestodes, two parasites (*Fasciola gigantica*, *Schistosoma bovis*) were identified to be trematodes, while three parasites (*Nematodirus* spp, *trichuris trichiura* and *trichostrongylus* spp) were identified to be nematodes. Among the groups, nematodes have the highest prevalence of 62.01% in male and 54.17% in female cattle. While the least prevalence of the group is protozoa (2.23%) and (3.13%) in male and female cattle respectively. Among the nematodes, *Enterobius*

vermicularis has the highest prevalence of 53.63% in male and 45.83% in female and the least prevalent from the protozoan group is *Isospora belli* with 2.23% and 3.13% in male and female cattle respectively. It was generally observed that *E. vermicularis* was the most prevalent parasite (53.63%) in the study area while *Avitellium* spp (0%) and *Trichostrongylus* spp (0%) were the least prevalent. *Avitellium* spp and *Trichostrongylus* spp were noted to be absent in male but present at low prevalence in female (1.04%).

Table 1: Prevalence of Gastrointestinal of Gastrointestinal Parasites of Cattle at Various Abattoir in the Study Area

Site	Number Examined	Number Infected	Prevalence (%)
Public	175	135	77.1
Private	100	77	77.0
Total	275	212	77.1

Table 4: Prevalence of Gastrointestinal Parasites According to Parasite Groups

Parasite	Male (N=179)	Prevalence (%)	Female (N= 96)	Prevalence (%)
	Number Infected with		Number Infected with	
Protozoa				
<i>Isospora belli</i>	4	2.23	3	3.13
Cestode				
<i>Moniezia benedeni</i>	8	4.47	1	1.04
<i>Avitellium</i> spp.	0	0	1	1.04
<i>Taenia saginata</i>	8	4.47	12	12.50
Total	16	8.94	14	14.58
Trematode				
<i>Fasciola gigantica</i>	3	1.68	1	1.04
<i>Schistosoma bovis</i>	7	3.91	1	1.04
Total	10	5.59	2	2.08
Nematode				
<i>Nematodirus</i> spp	13	7.26	6	6.25
<i>Enterobius vermicularis</i>	96	53.63	44	45.83
<i>Trichostrongylus</i> spp	0	0	1	1.04
<i>Trichuris trichuria</i>	2	1.1	1	1.04
Total	111	62.01	52	54.17
Grand Total	141	78.75	71	73.95

4. Discussion

The results of the current study demonstrate that there is high prevalence (77.1%) of gastrointestinal parasites among the cattle slaughtered for consumption in Akure metropolis. This result is a reflection of the quality of meat consumed in the area. For instance beef tapeworm (*Taenia saginata*) and *Fasciola gigantica* which caused bovine fasciolosis usually lead to reduced growth rate and market value among the cattle. In addition, *Fasciola gigantica* leads to liver abscesses and perforation which account for major reason why cattle livers are rejected by the consumers. Similarly, Bovine schistosomiasis caused by *Schistosoma bovis* as observed in the study. This finding has been supported by the works of Gatong and Guthuma^[10], Biffa *et al.*^[11], Gathong and Guthuma^[10] reported helminth prevalence of 56.2% in Kenya and Biffa *et al.*^[11] reported prevalence of 82.2% in Ethiopia. Similar results were reported by Fabiyi and Adeleke^[12] who reported prevalence of 65.4% among cattle in Jos abattoir and Schillhorn-vanveen *et al.*^[13] reported a prevalence of 71.1% in Soba near Zaria, Nigeria. Both authors in their separate works reported high prevalence of 65.4% among cattle in Jos abattoir and 71.1% in Soba near Zaria respectively. Afolabi and Olususi,^[14] recently reported the prevalence of fascioliasis among the slaughtered cattle in Akure. High prevalence of gastro-intestinal parasites reported in the study may be due to the environmental condition which favors the proliferation of these parasites in the endemic areas. In

Table 2: Prevalence of Single and Mixed Infections at Various Abattoirs Public N=175 Private N = 100

Infection	No. Infected	Prevalence (%)	No. Infected	Prevalence (%)
Single	70	40.0	43	43.0
Mixed	65	37.1	34	34.0
Total	135	77.1	77	77.0

N = Number examined at each abattoir.

Table 3: Prevalence of Gastrointestinal Parasites According to Cattle Gender

Sex	Number of Examined	Number of Infected	Prevalence (%)
Male	179 (65%)	141	78.7
Female	96(35%)	71	73.9
Total	275(100%)	212	77.1

addition, poor sanitation in abattoir might also contribute to the high prevalence, thereby increasing the risk of cattle contracting these parasites. The correlation between sanitation and prevalence has also been reported by Anene *et al.*^[15, 16], and Fakae and Cheijina^[17]. The authors in their separate works observed that poor sanitation of the abattoirs is the major factor that contribute to high prevalence of helminth parasites in southeastern Nigeria. It was also observed that there is no significant difference in the prevalence of infection between private and public abattoirs ($P > 0.05$). This suggests that there is little or no inspection carried out to ensure the cleanliness of the abattoirs. Hence, the cattle owners and butchers can afford to kill any kind of cattle not minding their health condition and the implication of infected meat to the populace. The high level of infections could also be attributed to low attention given to the veterinary care in the area, coupled with the chronic nutritional stress and the suitability of the climate for survival. This has been supported by Biffa *et al.*^[11]. As the reason for the high prevalence in Ethiopia. Among the groups of intestinal parasites examined, the nematode group recorded the highest prevalence of (36.1%). This is because most of the cattle slaughtered in the study area are supplied by the Fulani herdsmen who subjected the cattle to free grazing especially along the river banks where these cattle can easily ingest the metacercariae of these nematodes. The high prevalence of nematodes among the cattle has also been supported by the works of Ajayi *et al.*^[18] and Fabiyi^[19]

who reported that cestodes and nematodes constitute the major cause of serious morbidity associated with the ruminants in both northern and western Nigeria respectively. The lowest prevalence parasite was recorded in protozoa group (2.0%). This result concurred with the works of Shitta and Akogun^[20], and Yohanna *et al.*^[21]. The authors reported the prevalence of (7.0%) and (4.6%) of protozoan infection among the cattle in Wakari abattoir in Taraba and Jos abattoirs respectively.

This study further revealed that the prevalence of parasites between male (78.7%) and female cattle (73.1%) is significantly different ($P < 0.05$). This shows that the male cattle are more susceptible to the gastro-intestinal parasites than the female cattle. A similar result has been reported by Shitta^[22], the author reported a prevalence of gastrointestinal parasite in male cattle (38.04%) as compared to that of their female counter parts (32.10%) in Adamawa State. This variation in infection rates between genders of cattle has also been reported by Yohanna *et al.*^[21]. The authors observed a prevalence of (72.2%) in male as against that of the female examined (44.0%) in Jos abattoir.

High prevalence of gastro-intestinal parasites observed in all the abattoirs calls for proper sanitation in the area and regular inspection by the health officers. Most of these parasites are zoonotic and hence can infect man when the meat are not properly cooked before consumption. The presence of these zoonotic parasites among the cattle also suggests poor veterinary care in the area. It is therefore recommended that the cattle owners and the herdsmen should be properly educated on the use of antihelminth drugs and the need to keep the animals in the ranch rather than allowing them to freely graze around. Keeping the animals at the ranch is expensive, therefore, government intervention is required in the establishment of ranches in the country and also in subsidizing the drugs for the cattle farmers. This will not only help to improve the quality of meat consume in the area but also reduce the prevalence of zoonotic infections among human population.

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