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The Occurence of Gastrointestinal Helminths in Slaughtered Cattle in Azare, North-East Nigeria

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ARTICLE INFO	ABSTRACT

A Cross-sectional Study was carried out to determine the prevalence of gastrointestinal (G.I.) helminths parasites in slaughtered cattle at Azare abattoir, Katagum Local Government Area, Bauchi State, North-Eastern Nigeria. One hundred and twenty faecal samples were examined using the floatation and sedimentation method. Out of the total samples tested, G.I. helminths infections were detected in 62 samples tested, giving an overall prevalence of 51.6%. Class nematodes are the most diverse class (56.5%), followed by trematodes (35.5%), while cestodes are the least prevalent (8.1%). There was a statistically significant difference in G.I. helminths' prevalence among different classes ($p < 0.05$). Concerning sex and age, there was no statistically significant difference in the prevalence rate of G.I. helminths infection affecting the cattle ($p > 0.05$). The Red Bororo breeds had the highest prevalence of 75%, while the least was recorded in White Fulani and Sokoto Gudali, 40% each. There was a statistically significant difference in G.I helminth infection's prevalence rate to breed ($p < 0.05$). This study revealed that *Fasciola* spp. (15%) is the most prevalent G.I. helminths parasites detected, followed by *Oesophagostomum* spp (11.7%); *Haemonchus* spp. (9.2%); *Strongyloides* spp. (8.3%), *Schistosoma* spp. (3.3%); and *Moniezia* spp. (1.67%). Our findings from the present study revealed a high prevalence of G.I. helminths species affecting cattle in Azare, North-East Nigeria. Therefore, there is a great need for proper advocacy on appropriate management, regular deworming practices, and improved cattle hygiene to boost animal production. This will help in curbing significant loss to Nigeria's economy and the world in general.

1. Introduction

In Nigeria, cattle are among the most prominent domesticated livestock. They always serve as valuable assets in the agricultural sector since they provide animal protein, milk, employment, hide, and skin for leather production and beef during festive seasons [1]. Nigeria is the largest livestock producer in sub-Saharan Africa [2], where it contributes 3.2% to 4% of the country's gross domestic product (GDP) between 1970 to 2005 (Ahmad rowan, 2020). In comparison, cattle solely account for 50% of the total meat production [3]. The population of these cattle in Nigeria is estimated to be 19 million, where most of them are concentrated in the northern region of the country [4]. However, despite the high population of these cattle in Nigeria, the quantity of meat obtained is far below the na-

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tional demand due to many causes, including parasitic infections [4]. As a result of this insufficiency, most of these cattle are imported from Africa's neighbouring countries to meet the meat demand in major cities in Nigeria [5].

Parasitic infections pose a serious health threat to living organisms [6,7], especially G.I. helminths parasites, which affect ruminants, thereby affecting their productive performance [4,8]. G.I. helminths are the ubiquitous parasitic agent that affects livestock more, especially cattle, limiting their production capacities such as reduced meat and milk production. One of the most alarming effects of G.I. helminths is their zoonotic impact, which is always a threat to human health.

G.I. helminths are the parasitic agent that affects cattle in various parts of the world [4,8]. Previous studies carried out from the different geographical locations of Nigeria [9,10] documented a high prevalence of G.I. helminths in cattle, which might cause a decrease in their production capacity. G.I. helminths infection also leads to other economic losses ranging from weight loss, reduced work capacity, infertility, treatment cost, decrease growth rate, and even death [2,9,11]. Nevertheless, one of G.I. helminths' most dangerous effects is their zoonotic impact, which always poses a threat to human health.

However, despite the high prevalence of G.I helminths, which has been reported from various parts of Nigeria, there is a paucity of information on G.I helminths affecting animals in the present study area. Therefore, this study aims to determine the occurrence of G.I helminths of slaughtered cattle in North-east, Nigeria. The findings generated from this study will assists in providing baseline epidemiological data on the prevalence of G.I. helminths affecting cattle in Azare, Katagum Local Government Area of Bauchi State, North-eastern Nigeria, as this is extremely important for the control of parasitic infection, especially zoonotic parasites.

2. Materials and Methods

2.1 Study Area

This study was conducted in Katagum Local Government Area of Bauchi State. Azare has a population of 105,687, making it the 2nd biggest city in Bauchi. It operates on the WAT time zone, which means that it follows Bauchi's same time zone. The present work was a cross-sectional study conducted from June to November 2019 to determine G.I. helminths parasites of cattle slaughtered at Azare abattoir of Katagum Local Government Area (LGA) of Bauchi State, Nigeria.

2.2 Sample Collection and Identification

The ante mortem investigation was conducted from June to November 2019 by using a systematic random sampling method in selecting the cattle slaughtered at the Azare, Bauchi. For each cattle screened, parameters such as the sex, age and breed were recorded. The sex differentiation was based on the appearance of external genitals. The cattle's age was determined using eruption of permanent rostral teeth pattern as reported by Olaogun and Lasisi [12]. Briefly, cattle with the first pair of rostral teeth (temporary incisors) are known to have an average age of 23 months, which is less than two years, while those with second and third rostral teeth are known to have an average age of 3 to 4 years. Finally, those cattle with fully grown pairs have an average age range of 4.5 years and above. Breed identification was based on morphology as reported by Obi et al., [4]. The White Fulani, Sokoto Gudali and Red Bororo constitute 37%, 32% and 22% of the total cattle population in Nigeria [13]. These breeds are well known for their various qualities which include high milk production in addition to their resistance against disease and heat [13-15].

A total of 120 feacal samples from each selected cattle rectum were collected in well-labelled sterile polythene bags and brought to the Laboratory of the Department of Biological Sciences, Bauchi State University Gadau for analysis and examination. All feacal samples were analyzed for the presence of G.I helminths using both floatation and sedimentation methods, as described by Cheesbrough [16]. Floatation methods were carried out to detect cestodes and nematode eggs as they are lighter. In contrast, the sedimentation method was carried out to detect the trematodes eggs as they are heavier.

Briefly, for the floatation method, approximately 1.0g of the feacal sample was picked and transferred into a suitable clean universal test tube. 5ml of saturated salt solution was added, and the mixture was emulsified and sieved into another clean test tube. This is then covered with a clean grease-free microscopic slide, avoiding the air bubbles and over flooding. The slide was removed by inversion and covered with a clean glass coverslip. Each of the samples was examined under the microscope with X10 and X40 objectives, respectively. For the sedimentation method, approximately 1.0g of the feacal sample was transferred into a suitable clean universal test tube. 5ml of distilled water was added, and the mixture was emulsified. The mixture was sieved into another clean test tube, and more distilled water was added and allowed to be settled on a bench for one hour. The supernatant was discarded, and distilled water was added, allowing it to settle for an-

Table 1. Prevalence of G.I. Helminths obtained among cattle in Azare, Nigeria (n=120)

Helminths Parasite class	Helminths Parasites Species	Number Infected (n)	Prevalence (%)
Nematodes	*Haemonchus* spp.	11	9.2
	Strongyloides spp.	10	8.3
	Oesophagostomum spp.	14	11.7
Trematodes	*Fasciola* spp.	18	15.0
	Schistosoma spp.	4	3.3
Cestodes	*Moniezia* spp.	5	4.2
	Total	**62**	**51.7%**

Figure 1. Micrograph of G.I nematode eggs affecting cattle in north-east Nigeria. (A) *Haemonchus* spp. (B) *Strongyloides* spp. and (C) *Oesophagostomum* spp. (mag. ×40)
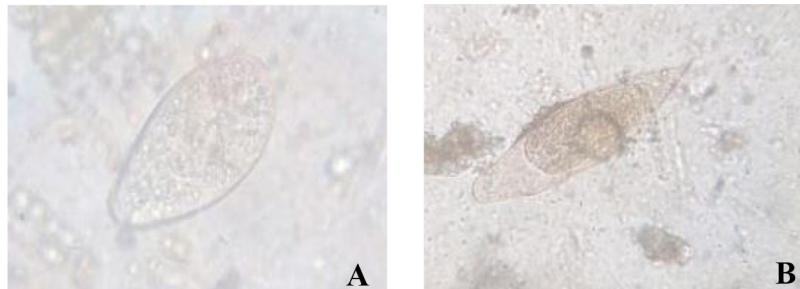

Figure 2. Micrograph of G.I trematode eggs affecting cattle in north-east Nigeria. (A) *Fasciola* spp. and (B) *Schistosoma* spp. (mag. ×40)

Figure 3. Micrograph of G.I cestode eggs affecting cattle in north-east Nigeria. (A) *Moniezia* spp. (mag. ×40)

other hour. A Pasteur pipette was used to drop the sample to the centre of the clean grease-free microscopic slide and examined under the microscope with X10 and X40 objectives, respectively. Also, eggs were identified based on their morphological details, as defined by Soulsby [17].

2.4 Data Analysis

The data gathered from the present study were analyzed using the Chi-square test to establish significant differences in G.I. helminths parasites' prevalence in terms of age, sex, and the different breed types in cattle, using SPSS version 24. The values of p < 0.05 were defined as significant.

3. Results

The present study revealed a high prevalence of G.I. helminth parasites among cattle slaughtered in the Azare abattoir of Katagum LGA of Bauchi State. Out of the 120 cattle sampled, 62 (51.61%) were positive for G.I. helminths infection, while those unaffected were 58 (48.3%). Six different types of G.I. helminths species comprising one cestode, three nematodes, and two trematodes were detected, with *Fasciola* spp. (15.0%) been the most frequently detected G.I. helminths species. On the other hand, *Schistosoma* spp. (3.3%) was the least prevalent. *Oesophagostomum* spp. (11.7%) was the most prevalent G.I. helminths detected among the phylum Nematoda, fol-

lowed by *Haemonchus* spp. (9.2%) and *Strongyloides* spp. (8.3%). *Moniezia* spp. (4.2%) was the only G.I. helminths in the phylum Cestoda, while *Schistosoma* spp (3.3%) was the least prevalent in the phylum Trematoda, as shown in Table 1. Nematodes (*Haemonchus* spp., *Strongyloides* spp. and *Oesophagostomum* spp.) (Figure 1) were the most pervasive helminth class (56.5%), followed by trematodes (*Fasciola* spp. and *Schistosoma* spp.) (Figure 2) (35.5%), and cestodes (*Moniezia* spp.)(Figure 3) was the least class (8.1%). The result revealed a statistically significant difference (x^2=21.9, df=2, p<0.05) in the prevalence of G.I. helminths among different classes.

The prevalence of G.I. helminths infection was further analyzed according to sex and age of the cattle slaughtered. Out of 120 cattle examined, comprising 78 males and 42 females, the occurrence of G.I. infection was highest among males with 34.17%, while females had 17.50% (Table 2). However, the observed differences in the prevalence of G.I. infection to sex were not statistically significant (Table 2). Concerning age, the occurrence of G.I. helminths infection was highest among the 3-4 years age group (59.5%), followed by 0-2 years age group (57.1%), while five years and above had the least prevalence (43.9%). The prevalence observed based on age showed no statistically significant difference (p > 0.05) (Table 2).

Out of the 70 White Fulani breeds examine in the present study, 28 (40%) were infected, and out of 40 Red Bororo breeds examine, 30 (75%) were infected. In terms

Table 2. Prevalence of G.I. helminths obtained among cattle in Azare, Nigeria in relation to sex and age

Variable	Category	Number Examined	Number Infected	Prevalence(%)	x^2	P
Sex	Male	78	41	52.6	0.68	0.79
	Female	42	21	50.0		
Age	0-2	21	12	57.1	1.78	0.43
	3-4	42	25	59.5		
	>5	57	25	43.9		

Table 3. Prevalence of G.I. helminths obtained among cattle in Azare, Nigeria in relation to breed

Breed of cattle	Number Examined	Number Infected	Prevalence	x^2	P
White Fulani	70	28	40		
Red Bororo	40	30	75	10.89	0.04
Sokoto Gudali	10	4	40		
Total	**120**	**62**			

of Sokoto Gudali, out of 10 breeds, only 4 (40%) were infected, as shown in Table 3. However, the result showed a statistically significant difference (p<0.05) in the prevalence of G.I. infection in accordance with breed whereby the Red Bororo presented the highest G.I. helminths infection (Table 3).

4. Discussion

The study from the present study indicates a wide occurrence of G.I. helminths parasites in cattle slaughtered in the Azare abattoir, Bauchi, Nigeria. The findings revealed an overall prevalence of 51.61%. The results were almost similar to what was reported by Njoku *et al.* [18] in south-eastern Nigeria, which found 50.8% of G.I. helminths infestation in cattle. Fortunately, it was lower than the prevalence reported in North-central Nigeria [2] but higher than the prevalence reported in South-western Nigeria [8] where 79.92% and 41.6%, respectively, were obtained. G.I. helminths' prevalence in cattle has been reported from various parts of the world, ranging from 16.98%-86.10% [19-21]. The differences between our findings and other reports could be attributed to variation in the sample size, breeds, climatic condition, a laboratory technique used, season, duration, and place of the study [22].

Six different types of G.I. helminths were detected in the present study. The findings are lower than what was reported by some researchers across the globe, such as Bisimwa *et al.* [23], Nnabuife *et al.* [24], and Lemy and Egwunyenga [25] that reported nine, eleven, and ten different G.I. helminths species, respectively. Similarly, other researchers detected higher G.I. helminths parasites than what was identified in the present study, such as Yahaya and Tyav [1], Nath *et al.* [26], and Telila *et al.*[27] that reported four, five, and six different G.I. helminths, respectively. The relatively high diversity of G.I. helminths parasite, in addition to their high prevalence, shows that G.I. helminths infection among cattle is of great concern in the study area.

Out of the three-class of G.I. helminths detected in the present study, G.I. nematodes were the most frequently detected (56.5%), followed by trematodes (35.5%), then followed by cestodes (8.1%). These findings confirm the reported by Umar *et al.* [3] in Bauchi State, Nigeria, which observed the highest prevalence of nematodes (46.63%) followed by trematodes (31.39%) and cestodes (21.97%). Similar studies conducted by Zawua *et al.* [28] and Bisimwa *et al.* [23] also documented nematodes as the most prevalent G.I. helminths affecting cattle in Benue, Northcentral Nigeria, and Walungu Territory, Eastern Democratic Republic of Congo, respectively. Nematodes G.I. helminths always create considerable problems to livestock production since their infection may lead to a decrease in milk and meat production, hide and skin products as well as stamina of working animals [3,8].

The present study showed that *Oesophagostomum* spp. is the most prevalent G.I. helminths nematode affecting cattle, followed by *Haemonchus* spp. However, the results are in contrast with else studies in Nigeria [2, 10, 28, 29] and other parts of the world such as Kenya [30] and Ethiopia [31] that reported *Haemonchus spp* as the most prevalent G.I. nematode species infecting cattle. The discrepancy in the results might be attributed to different host factors, geographical distribution, season, and climatic conditions.

The finding from the present study shows that *Fasciola* spp. (15%) was the most prevalent G.I. helminths as compared to others. This finding conforms to several studies conducted in Nigeria [2, 3, 25] and other parts of the world such as Ethiopia[27] and Columbia [32] which reported *Fasciola* spp. as the most prevalent G.I. helminths affecting cattle. The high prevalence of *Fasciola* spp. in the present study is higher than the report of Adedipe *et al.* [8] in southwestern Nigeria. They recorded 8.56% in three different breeds of cattle. The high prevalence of *Fasciola* spp. in the present study might be due to the availability of intermediate hosts in the study area, public health and economic concern. The host harbouring parasites to grow to a certain point but not reaching sexual maturity is known as the intermediate host. *Fasciola* spp. are liver trematodes, which are known to be zoonotic and, at the same time, caused financial losses.

Moniezia spp. was the only cestodes detected in the present study. This finding is similar to that of Umar *et al.* [3] who reported and *Moniezia* spp. as one of the cestodes infecting cattle in Bauchi central, north-east Nigeria. Several studies in Nigeria [2, 8] and other parts of the world such as Columbia [32], India [33,] and Ethiopia [27] have shown that Moniezia spp. as the most prevalent cestodes affecting cattle. The low prevalence of Moniezia spp. in the present study might be attributed to the fact that the climatic condition is unsuitable for the survival of their intermediate host, the oribatid mite.

Fortunately, the G.I. parasites' prevalence in the present study is lower than other studies reported from different parts of the world, such as Bangladesh [26]. The differences between the present study and previous studies could be geographical, environmental, and climatic conditions. The period in which the studies were conducted may favour the survival of the parasite and intermediate host's infective stage. Additionally, the variation that existed could also be attributed to differences in the sample size and different laboratory techniques used to assess the G.I. helminths parasites' presence.

Among the different sex groups, the prevalence of G.I. helminth infection was found to be more in males (52.6%) than females (50.0%) even though the difference is was not statistically significant (p> 0.05). This finding confirmed with the results of Umar *et al.* [3] and Telila *et al.* [27,] who reported a higher occurrence of G.I. helminths in the male than female animals. Similarly, earlier findings of Ola-Fadunsin [34] and Raza *et al.* [35] also recorded that male cattle were more likely to be infected with G.I. helminths than their female counterpart. The reason given was since male animals are more aggressive when feeding, and this will increase their chances to pick-up more G.I. helminths eggs on the pasture. However, the discrepancy in susceptibility between the two sexes to G.I. helminths infection may be attributable to intrinsic factors such as genetics, hormone debilitating immune function, which favour the growth and spread of parasites in male guts [2].

In terms of age group, the young category (3-4 years) has the highest prevalence (59.5%), followed by those with less than two years (57.1%), then the adult (25.0%). This finding conforms to an earlier report by Umar *et al.*[3], who documented that young cattle are more susceptible to G.I. helminths than the adult, which has the least prevalence. The higher prevalence of G.I. helminths observed in the young might be attributed to sudden exposure to grassland containing an enormous number of parasites egg and their immune system's naiveness.

Some studies have shown that breed type is a crucial index in the epidemiology of helminth infection among cattle breed as some face greater risk of helminth infection [2,8,30]. In the present study, the Red Bororo breeds were significantly more infected with G.I. helminths than White Fulani and Sokoto Gudali. The prevalence of 75% of Red Bororo and 40% of White Fulani and Sokoto Gudali were lower compared to the 76.92 (Red Bororo), 78.18 (White Fulani), and 89.19% (Sokoto Gudali) as reported by Ola-Fadunsin [2]. The present study's result is contrary to what was reported by Adedipe *et al.* [8] in South-Western, Nigeria. They reported that the White Fulani breeds were the most susceptible to helminths infection (74.8%) than Red Bororo and Sokoto Gudali, which have a prevalence of 72.3% and 70.0%, respectively. A similar result was also reported by Qadeer *et al.* [36] in North-Eastern Nigeria, which showed that White Fulani breeds have the highest prevalence of G.I. helminths infection (25%), then followed by Red Bororo 23% and Sokoto Gudali (14%). The discrepancy in the prevalence obtained could be due to factors such as favourable environmental factors needed for survival and development of most helminths' infectious larval stage and the type of management system in which the cattle are subjected.

5. Conclusion

The present study's result demonstrated a high prevalence of G.I. helminths infection among cattle in the Katagum area of Bauchi State, Northeast Nigeria. All classes of G.I. helminths were detected, with *Fasciola* spp been the most prevalent. There was a statistically significant difference between age and breed, while in terms of sex, there was not. Hence, appropriate antihelminthic and control measures such as environmental sanitation in cattle should be encouraged in addition to public health awareness to mitigate these problems. Therefore, there is a great need to monitor G.I. helminths of cattle to promote animal products, which will help curb significant losses to the Nigerian economy.

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