

Occurrence of Gastrointestinal Parasites in Cattle Slaughtered at Central Abattoir in Katsina Metropolis, Katsina State, Nigeria

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ABSTRACT

Background and Objective: Gastrointestinal GI parasitic infection is a serious concern to cattle breeding and affects the meat yield after slaughter in various tropical regions of the world, especially in Nigeria, where animal health issues are not given needed attention. This study aimed to assess gastrointestinal parasite's occurrence in cattle slaughtered at the Central Abattoir of Katsina.

Materials and Methods: Faecal samples were collected directly from the rectum of 373 sampled freshly slaughtered cattle at the abattoir and examined microscopically following standard procedures. The occurrence of GI parasites was analyzed concerning the sex, age, breed and body condition scores of the cattle. Occurrence is expressed in percentage and its association is tested using Chi-square analysis, at a $p = 0.05$ level of significance. **Results:** Out of the 373 sampled cattle examined, there was an occurrence of gastrointestinal parasites in 224 (60.1%). Regarding the sex, age group, breed of cattle and condition of body scores, female cattle (75.00%), Adamawa Gudali (66.67%) and poor body condition score (75.47%) had the highest occurrence. Chi-square analysis revealed that the occurrence of gastrointestinal parasites in cattle is not significantly associated with the sex and breeds of cattle ($p > 0.05$), while, it is significantly associated with the age and body condition scores of the cattle ($p < 0.05$). *Fasciola hepatica* had the highest occurrence (13.7%) while *Nematodirus* spp., had the lowest occurrence (0.5%) among the species recorded. **Conclusion:** In conclusion, there is a high occurrence of gastrointestinal parasites among cattle slaughtered in Katsina Central Abattoir and *Fasciola hepatica* is the most common gastrointestinal parasite found.

KEYWORDS

Abattoir, cattle, gastrointestinal parasites, occurrence, public health, Katsina

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INTRODUCTION

Parasites (both ecto and endo) have been recognized as major factors which militate against cattle production in the tropics^{1,2}. These parasites cause large economic losses in a variety of ways: they cause losses through lower fertility, reduction in work capacity, involuntary culling, a reduction in food intake and lower weight gain, lower milk production, treatment cost and mortality in heavily parasitized animals³⁻⁵.



Amongst livestock diseases that devastate cattle, GI parasites are of great importance. Gastrointestinal parasites are parasites that inhabit the gastrointestinal (digestive) tract. They include protozoans, helminths and nematodes⁶⁻⁸. In ruminants, results in adverse effects on feed intake, growth rate, carcass weight and composition, wool growth, fertility and milk yield⁹. Gastrointestinal parasite infection disease causes a regular decline in animal performance and has been identified to be a major economic loss in the Northern Parts of Nigeria, where most cattle are reared by nomads and allowed to range freely with little or no veterinary care¹⁰. In addition, these infections enhance susceptibility to bacterial and viral diseases and losses resulting from the condemnation of carcasses and organs as well as the cost of drugs and veterinary care. Having most of these cattle reared at the residences of humans, these zoonotic gastrointestinal parasites could pose serious public health threats to humans, especially children¹¹.

Gastrointestinal parasites like coccidian, ascarid, strongyle, *Setaria* and amphistomes have been reported from countries with tropical and temperate climatic conditions such as India, Bangladesh, South Africa, Sri Lanka, Italy and Mongolia, with a prevalence rate ranging from 20-96%¹²⁻¹⁴. Anthelmintic and antiprotozoal agents have been used to control gastrointestinal parasitic infections over the decades¹⁵. They have succeeded in reducing intestinal parasitic infections but none have been able to diminish the re-infestation of diseases¹⁶. However, excessive use of anthelmintic drugs has led to the development of anthelmintic-resistant parasites, which are being reported from many parts of the world. Further, it has resulted in a fear of anthelmintic residues in the milk and meat of livestock animals¹⁷.

The occurrence of gastrointestinal parasites among cattle slaughtered in abattoirs in Northern Nigeria has been rarely reported. Despite the importance of gastrointestinal parasite infection to cattle and public health, there is a paucity of information on its occurrence among cattle slaughtered in Katsina Abattoirs. Thus, this study aimed to determine the occurrence of gastrointestinal parasites among cattle slaughtered at the Central Abattoir in Katsina Metropolis. This is with a view to providing baseline epidemiological data on gastrointestinal parasites and other livestock diseases of economic and zoonotic relevance.

MATERIALS AND METHODS

Study area: The study was carried out at Katsina Central Abattoir, Katsina State. Katsina State is one of the States that make up the North-Western Region of Nigeria, with a relatively hot temperature that could vary to both extremes. It shares borders with the Republic of Niger to the North, Kano and Jigawa States to the South, Zamfara State to the West and Kaduna State to the South^{18,19}. Katsina Central Abattoir is sited on Latitude 12°58'13.8"N and Longitude 7°35'43.2"E within Katsina, the State Capital, close to Katsina Central Market. It is the major slaughterhouse in the entire Katsina State and supplies meat to vendors in the State Capital and the neighbouring local government areas. An average of 80-90 animals are slaughtered daily in the abattoir, with 45 to 60 of them being small ruminants (goats, sheep and rams) and 15-25 higher ruminants (camels and cattle), with cows taking an average of 8-15 daily. All animals slaughtered in the abattoir are those considered to be halal (acceptable), not haram (forbidden) in Islam. Cattle slaughtered in this abattoir are sourced from various rural areas in Katsina State and a few neighbouring African countries, especially the Republic of Niger.

Study population: The study population consisted of cattle slaughtered at Katsina Central Abattoir of Katsina within the study period.

Sample size determination: A total of three hundred and seventy-three cattle were sampled (n) during the study. The sample size was calculated using the epidemiological formula described and the prevalence of 41.6% was reported by Adedipe *et al.*⁴.

Sample collection: A total of 373 freshly voided cattle faecal samples from the selected slaughtered cattle were collected randomly into a sterile plastic container with a screwed lid directly from the rectum of the

slaughtered cattle over three months, between July and September 2021. Each container was labelled to avoid a mix-up of samples and data collected about the cattle. About 15 mL of 10% formalin was introduced to each collected stool sample to prevent embryonation of the parasitic eggs. The preserved samples were transported to the Laboratory of the Department of Biological Sciences, Faculty of Life Science, Federal University Dutsin-Ma, Katsina State, Nigeria, under cold conditions in coolers with ice blocks for laboratory examination.

Laboratory analysis: Faecal samples were analysed using standard parasitological screening techniques for intestinal parasites, namely, the simple salt floatation technique followed by sedimentation as described by Win *et al.*⁹.

Microscopic examination: One to two drops of the sediment were placed on a glass slide, covered with a coverslip and viewed under a microscope using magnifications of $\times 10$. Eggs were identified by their morphological features. The gastrointestinal parasite was considered to occur in a sample once one or more parasite eggs/oocysts or larvae were observed.

Statistical analysis: Inferential (Chi-square) analysis was used to assess the level of association of parasite occurrence with sex, age, cattle breed and body score condition. A significant level was considered at $p < 0.05$. All statistical analyses were carried out using the SPSS, 20.0 Version.

RESULTS

The results obtained from the study revealed that out of the 373 faecal samples examined, 224 of the cattle were infected with one gastrointestinal parasite or the other, giving an overall prevalence of 60.1% in Table 1. When the occurrence of the GI parasites was analysed concerning the sex of the sampled cattle, the females had the highest prevalence of 60.75%, with 161 out of 265 cattle sampled testing positive for the parasites while the males had 58.33% prevalence, with 63 out of 108 of the males sampled testing positive. There was no significant relationship between gastrointestinal parasite infection with the sex of the cattle ($p > 0.05$) (Table 1).

Analysis of the occurrence of the gastrointestinal parasites in association with the age of the cattle sampled indicated the highest prevalence of 75% in cattle of age group greater than 5 years ($x > 5$), with

Table 1: Prevalence of gastro-intestinal parasites obtained from cattle slaughtered at Katsina Central Abattoir in Katsina metropolis concerning sex, age, breeds and body score

Variables	Category	No. of samples examined	Presence of parasites		Prevalence (%)	Statistical analysis
			+ve	-ve		
Sex of cattle	Male	108	63	45	58.33	$\chi^2 = 0.188$, df = 1, p = 0.375
	Female	265	161	104	60.75	
	Total	373	224	149	60.05	
Ages of cattles (in years)	0 < x < 2	272	153	119	56.25	$\chi^2 = 6.138$, df = 2, p = 0.043
	2 < x < 5	93	65	28	69.89	
	x > 5	8	6	2	75.00	
	Total	373	224	149	60.05	
Breed of cattle	Bunaji (white fulani)	199	113	86	56.78	$\chi^2 = 1.988$, df = 3, p = 0.575
	Rahaji (red bororo)	111	71	40	63.96	
	Bokoloji (sokoto gudali)	48	30	18	62.50	
	Adamawa gudali	15	10	5	66.67	
	Total	373	224	149	60.05	
Body condition score	High	191	101	90	52.88	$\chi^2 = 10.338$, df = 2, p = 0.006
	Moderate	129	83	46	64.34	
	Poor	53	40	13	75.47	
	Total	373	224	149	60.05	

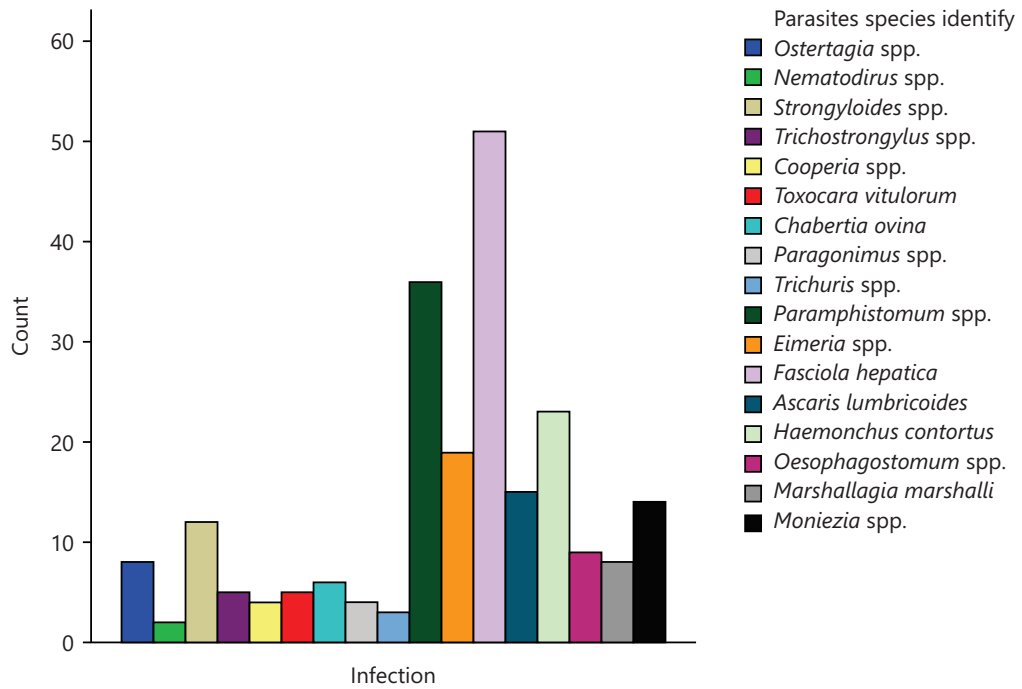


Fig. 1: Distribution of gastro-intestinal parasites obtained from cattle slaughtered at Katsina Central Abattoir in Katsina Metropolis

Table 2: Prevalence of gastro-intestinal parasites obtained from cattle slaughtered at Katsina Central Abattoir

Identified organisms	No. of samples examined (n)	No. of samples positive	Prevalence (%)
<i>Ostertagia</i> spp.	373	8	2.1
<i>Nematodirus</i> spp.	373	2	0.5
<i>Strongyloides</i> spp.	373	12	3.2
<i>Trichostrongylus</i> spp.	373	5	1.3
<i>Cooperia</i> spp.	373	4	1.1
<i>Toxocara vitulorum</i>	373	5	1.3
<i>Chabertia ovina</i>	373	6	1.6
<i>paragonimus</i> spp.	373	4	1.1
<i>Trichuris</i> spp.	373	3	0.8
<i>Paramphistomum</i> spp.	373	36	9.7
<i>Eimeria</i> spp.	373	19	5.1
<i>Fasciola hepatica</i>	373	51	13.7
<i>Ascaris lumbricoides</i>	373	15	4.0
<i>Haemonchus contortus</i>	373	23	6.2
<i>Oesophagostomum</i> spp.	373	9	2.4
<i>Marshallagia marshalli</i>	373	8	2.1
<i>Moniezia</i> spp.	373	14	3.8

6 out of 8 sampled cattle positive, while the age group between 0-2 years ($0 < x < 2$) had the lowest prevalence of 56.25%, with only 153 out of 272 positives for parasites. Prevalence showed a significant affinity with the age group ($p < 0.05$) (Table 1). The study also revealed that the Adamawa Gudali breed of cattle had the highest prevalence of 66.67%, while, the Bunaji (White Fulani) breed had the lowest prevalence of 56.78% of gastrointestinal parasite occurrence. There was no significant association between occurrences of these parasites with the breeds of the cattle slaughtered at the abattoir ($p > 0.05$) (Table 1).

In this study, a very strong significant association ($p = 0.006, < 0.05$) of gastrointestinal parasite infection with body score condition was recorded, with the poor body condition having the highest prevalence of 75.47%, while, the high body score condition had the lowest prevalence of 52.88% (Table 1).

Also, in this study of the occurrence of gastrointestinal in cattle slaughtered at Katsina Central Abattoir, gastrointestinal parasites such as *Ostertagia* spp., *Nematodirus* spp., *Trichostrongylus* spp., *Cooperia* spp., *Toxocara vitulorum*, *Chabertia ovina*, *Paragonimus* spp., *Trichuris* spp., *Paramphistomum* spp., *Eimeria* spp., *Fasciola hepatica*, *Ascaris lumbricoides*, *Haemonchus contortus*, *Oesophagostomum* spp., *Marshallagia marshalli* and *Moniezia* spp., were recorded.

Among the parasites, *Fasciola hepatica* had the highest prevalence (13.7%), while, *Nematodirus* spp., was the least prevalent (0.5%) in Table 2.

Fasciola hepatica had the highest occurrence, with 51 cases while *Nematodirus* spp., had the least, with only 2 in Fig. 1.

DISCUSSION

The results of this study reveal that 60.1% (224/373) of the cattle randomly selected and examined are infected with a variety of GI parasites, thus providing valuable information on the burden of GI parasites among slaughtered cattle in Katsina State. The environmental situations might be accountable for the high prevalence of infection since the animals are unsettled and also the stress of moving them around might facilitate lower immunity and predispose them to higher infection prevalence²⁰. The system of management that these cattle are subjected to as they are always left to wonder about scavenging and feeding indiscriminately on anything they come in contact with and then return to their poorly kept sheds might have also contributed to the high occurrence. Several reports have indicated that poor ranches and environmental conditions and also feeding animals with contaminated food and water could be responsible for exposing them to massive parasitic infections²¹.

The 60.1% occurrence recorded in the study is similar to what was reported by Mensah *et al.*¹¹, who recorded 61.67% among cattle on farms in Kpong. It is far above the prevalence (13.39%) reported by Gunathilaka *et al.*¹⁵ among cattle and buffaloes in Gampaha District, Sri Lanka, 41.6% reported by Adedipe *et al.*⁴ and 50.3% reported by Ibrahim *et al.*²². Whereas, it was quite lower than the 74.3% prevalence reported by Yuguda *et al.*¹⁰ among slaughtered cattle in Bauchi Central Abattoir, 69.64% prevalence reported by Mpofu *et al.*²³ among sheep and goats slaughtered in Minna Modern Abattoir, Niger State, Nigeria, 85% prevalence reported by Sanda *et al.*²⁴ and 90.8% reported prevalence by Squire *et al.*²⁵.

This study reveals that sex, being male or female among cattle has no significant association with gastrointestinal parasite occurrence. This is similar to what was reported by Yuguda *et al.*¹⁰ and Mpofu *et al.*²³, where, there was no significant association between sex with infection. According to Adedipe *et al.*⁴, one major factor that would have accounted for the similar likelihood of both females and males to GI parasites infection is the fact that both the male and female cattle in the local setting in Nigeria are exposed to poor feeding and veterinary care, factors accountable for equal susceptibility to infections. Higher prevalence was observed among the older cattle, which is similar to the report by Mensah *et al.*¹¹, who reported higher prevalence among older animals. Though it differs from the results of Singh *et al.*²⁶, who recorded higher prevalence among younger animals and low in older ones. The high prevalence of infection in older ones could be a result of depreciating immunity in older animals. The significant association between age and the occurrence of GI parasites in this study differs from the report of Mpofu *et al.*²³, who reported no significant relationship between infection with age.

The highest prevalence of GI parasites recorded among the Adamawa Gudali breed in this study differs from the report of Adedipe *et al.*⁴ and Yuguda *et al.*¹⁰, who reported the Bunaji breed to have the most susceptible to GI parasites.

The occurrence of a variety of gastrointestinal parasites (*Strongyloides* spp., *Trichuris* spp., *Eimeria* spp., *Fasciola* spp., *Moniezia* spp. and *Haemonchus* spp.) is consistent with the results of Gadahi *et al.*²⁷, who obtained comparable results and reported that these parasites remain the greatest ruminant's pathogenic gastrointestinal parasites. The record of *Fasciola hepatica* as the gastrointestinal parasite with the highest occurrence (13.7%) among the cattle slaughtered in Katsina Central abattoir is similar to the report of Yuguda *et al.*¹⁰, who had *Fasciola* (15.7%) as the most prevalent among cattle slaughtered in Bauchi Central Abattoir but differs with the report of Mensah *et al.*¹¹, who recorded *Ascaris lumbricoides* as the most prevalent parasites among cattle in Kpong, Mpofu *et al.*²³, who reported *Haemonchus* spp., (25.6%) as the parasite with the highest prevalence and Squire *et al.*²⁵, who reported *Eimeria* spp., with 78.4% as the most prevalent.

CONCLUSION

In conclusion, there is a high occurrence of GI parasites in cattle slaughtered in Katsina Central Abattoir, caused by infection with a variety of GI parasites species and *Fasciola hepatica* is the most common gastrointestinal parasite that occurred in the abattoir. The occurrence of these parasites among cattle slaughtered in the abattoir is age and body condition score related. Age and cattle breed has no association with GI parasites in cattle. There is urgency for supervised veterinary care for cattle to maximize livestock production and meat yield after slaughter. Cattle breeders will need to ensure routine deworming of their cattle. Veterinary examination of cattle before slaughter to ensure they are free from zoonotic GI parasites and other diseases that could be a threat to public health should be adhered to. Consumers of meat slaughtered at the abattoir should ensure meat is properly cooked before consumption. Improved grazing management and hygienic husbandry practices could be adopted to reduce the spread of infections amongst cattle. Other non-chemical control measures such as selection of animals for resistance, vaccination, natural plant medicine and good nutrition could be adopted to check high occurrence.

SIGNIFICANCE STATEMENT

This study discovered a high occurrence of gastrointestinal parasites among cattle slaughtered in Katsina Central Abattoir. The information provided by this study could be beneficial for public health management in Katsina State and livestock farmers.

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