

# Prevalence of Gastrointestinal Parasite in Four Goat Breeds Slaughtered in Two Major Abattoirs in Akure, Ondo State, Nigeria

## Abstract

Goats harboured number of gastrointestinal parasites and high infestation of intestinal parasite in livestock such as goat could result to inefficient feed utilization leading to reduced growth rate in young animals, reduced weaning weights, low milk production, enhanced susceptibility to other diseases and poor meat production; thus, there is need to constantly study and carry out routine check on intestinal parasites of livestock time to time for proper management. This study was carried out within the period of three month, 240 faecal samples of ready to be slaughter goats were randomly examined comprising of 69 West African Dwarf, 55 Kano brown, Borno red 52 and 64 Red Sokoto breeds from two abattoirs in the study area. Examination for intestinal helminth was carried out using sodium chloride floatation technique and direct microscopic examination method. Out of the 240 goat faecal samples examined, 56 which represent 23.33% were positive for gastrointestinal parasites. The highest prevalence of gastrointestinal parasites (34.38%) was recorded from Sokoto red breed followed by Kano brown (21.88%) and Borno red (19.23%); while West African dwarf breed had the lower prevalence of 17.38%. There is significant difference ( $p < 0.05$ ) in prevalence of gastrointestinal parasites among the goat breeds. Between the goat gender, female goat has the highest prevalence of gastrointestinal parasites (30.43%), this was not significantly higher ( $p > 0.05$ ) when compared with prevalence of gastrointestinal prevalence in male (17.07%). Among the parasites recovered, *Strongyloides stercoralis* was the most prevalence (36.51%), followed by *Ancylostoma duodenale* (19.05%) and *Ascaris lumbricoides* (17.40%). There is need for good and effective animal health management in the studied Abattoirs. Thus, the incidence of these parasites revealed in this study can be decreased by the use of effective management techniques, quick diagnosis and anthelmintic therapy, and education of animal owners on the importance of animal health.

Keywords: Gastrointestinal parasites, Abattoirs, Helminth eggs, and Anthelmintic drugs

## Introduction

Goats are crucial ruminant livestock around the world, mostly in tropical and subtropical areas. It plays an important role in small-scale farming. According to Nwosu et al. (2007), owning a goat may in some cases be a rural household's only source of realizable wealth due to the socioeconomic significance linked to goat ownership. Goats and other farm animals are valuable because there is a high demand for nutrient-dense animal protein (Anaeto et al. 2009). Due to their lower purchase price, improved fecundity, profusion, availability, and ease of domestication, goats, as small ruminants, have few benefits over large animals (Yesufu et al. 2017; Sila et al. 2019).

The management and rearing of goats are impacted by a variety of gastrointestinal parasites. Small ruminant production is still severely hampered by the high mortality rates brought on by parasitic diseases of the gastrointestinal tract (Perry et al. 2002). The inappropriate handling and unclean conditions in the tropics allow parasitism to flourish in animals. Nematodes (*Ascaris lumbricoides* and *Trichuris trichiuria*), trematodes (*Fasciola hepatica*), and cestodes (tapeworms) are few gastrointestinal parasites that afflict ruminants. According to Osakwe and Anyigor (2007), goat intestinal parasites have a negative economic impact on underdeveloped farming communities. Ineffective digestion of the meal results in young animals growing more slowly, lighter animals at weaning, less milk being produced, increased susceptibility to other diseases, and subpar meat production (Barger, 1997). These parasites are a problem for both small- and large-scale farmers worldwide, but there is a greater incidence in sub-Saharan Africa in general and Nigeria in particular due to the availability of a wide range of agro-ecological factors suitable for diversified host and parasite species (Onaga et al. 2009).

The use of anthelmintics and antiprotozoal medicines to control intestinal parasite infections in ruminants has been successful over time (Gunathilaka et al. 2018). None of these, however, has been

able to reduce the spread of parasitic illnesses. However, excessive anthelmintic use has resulted in anthelmintic residues in farm animal milk and meat, as well as anthelmintic-resistant parasites (Mohammed et al. 2019; Fissiha and Kinde 2021). In-depth knowledge of the pathophysiology and epidemiology of these parasites, the context of immunity, and control over the host are essential for an anthelmintic and antiprotozoal approach to be effective. In order to prevent and treat illnesses in their earliest stages of infection in farm management methods, it is necessary to periodically study the prevalence of gastrointestinal parasites among farm animals. Thus, this research aims to evaluate the prevalence of gastrointestinal parasites and determine the influence of goat breeds and gender prevalence of gastrointestinal helminths of goats in the study area.

## **Materials and Methods**

### **Study Area**

Two major abattoirs in Akure where goat usually slaughter and sold was considered for this study. Akure is located in South-western Nigeria and is the capital and largest city in Ondo State. The estimated population of the area is about 744,000. The city is characterised with two seasons, the rainy season which lasted for about 8 – 9 months and dry season which lasted for about 3 – 4 months.

### **Description of the Goat Rearing Method in the Study Area**

The goat rearing site is not far from the abattoir, the major method of rearing in both abattoir is not conventional. Goats were reared in open field enclosed with wired fence; and they were allowed to browse forage during the day, while they return to their pen during the night. Abattoir II is characterised with little or minimum management with moderated water supply plan. However, abattoir II is characterised with mixed rearing of goats and other livestock with poor animal management and poor water supply.

### **Study Population**

A total number of 240 goats age between 9 – 12 months were randomly examined for gastrointestinal parasites study. The study population consists of 125 male goats, 115 female goats brought to the abattoir for slaughter. The breeds of goats collected were Sokoto red, Kano brown, Borno red, West African dwarf.

### **Examination of collected faecal samples**

The faecal samples of the goats were randomly collected between the hours of 6.30 am and 8.00 am in the morning. Hand gloves were used to collect the samples from the rectum into a clean labeled sterile faecal sample bottle, preserved in 10% formalin, and taken to the laboratory for microscopic examination using  $\times 10$  and  $\times 40$  magnification. Flootation technique diagnostic techniques was used as described by WHO (1994) with slightly modification.

### **Identification of parasites**

Identification of parasites was done using bench aid for intestinal parasites (WHO, 1994). Faecal egg counts (FEC) were determined by the modified McMaster technique (MAFF, 1986). Distinguishable nematode eggs, trematode and cestode eggs were identified directly.

### **Statistical analysis**

The data generated were subjected statistical analysis using statistical package for social sciences (SPSS) version 26. Chi-square analysis was used to determine the statistical difference between the variables such as gender and breed. Statistical difference was based on  $p < 0.05$ .

## **Result**

### **Prevalence of Gastrointestinal Parasites from Different Goat Breeds**

Table 1 showed the distribution of different goat breeds examined for gastrointestinal parasites from two abattoir. The prevalence of gastrointestinal parasite infection among different goat breeds was

represented in Table 2. Out of 240 examined faecal goat samples collected for gastrointestinal parasites study, 56 which represent 23.33% of total sample collected were positive for gastrointestinal parasites infection. The goat breed with the highest gastrointestinal parasites prevalence was Sokoto red breed with 34.38% parasites prevalence followed by Kano brown breed (21.82%), Borno red breed (19.23%) and the lowest gastrointestinal parasites prevalence was recorded with West African dwarf goat breed (17.38%). The distribution of gastrointestinal parasites in all the goat breeds showed no significant difference ( $\chi^2 = 6.284, p \text{ value} = 0.099$ ).

Table 1: Distribution of Goat Breed Examined for Gastrointestinal Parasites from Two Abattoirs in Akure Metropolis.

Goat Breed	Abattoir 1 (%)	Abattoir 2 (%)	Total (%)
Sokoto red	32(26.67%)	32(26.67%)	64(26.67%)
Kano brown	29(22.92%)	26(22.92%)	55(22.92%)
Borno red	27(21.67%)	25(21.67%)	52(21.67%)
West African dwarf	32(28.75%)	37(28.75%)	69(28.75%)
Total	120 (50%)	120(50%)	240

Table 2: Prevalence of Gastrointestinal Parasites among Different Goat Breeds in the Study Area

Goat breed	Number examined	Number infected	Prevalence (%)
Sokoto red	64	22	34.38%
Kano brown	55	12	21.82%
Borno red	52	10	19.23%

West African dwarf	69	12	17.38%
Total	240	56	23.33%

Chi-square ( $\chi^2$ ) = 6.284,  $p$  value = 0.099, degree of freedom (df) = 3

### Prevalence of Gastrointestinal Parasites Recovered from Goats Slaughtered at Different Abattoirs from the Study Area

As shown in Table 3, goats slaughtered at abattoir II had the highest prevalence of parasites of 55.46%; while goats slaughtered at abattoir I had the lowest prevalence of 44.44%, there is statistical difference ( $p$  value = 0.013) in prevalence in gastrointestinal parasites recovered from goats slaughtered from these two abattoirs (I and II). Eight (8) parasites of various genera were encountered in the faecal samples examined of the slaughtered goats (Table 3 and Figure 1). The parasites recovered include *Strongyloides stercoralis*, *Ascaris lumbricoides*, *Fasciola* spp., *Haemonchus contortus*, *Ancylostoma duodenale*, *Trichostrongylus* spp., *Diphyllobothrium latum*, and *Moniezia* spp. At abattoir I, *S. stercoralis* recovered from slaughtered goats was most prevalent (25.00%) intestinal parasite encountered followed by *An. duodenale* (17.86%), *A. lumbricoides* (14.29%), *D. latum* and *Fasciola* spp. (10.71%) while the lowest was *Moniezia* spp., *H. contortus* and *Trichostrongylus* spp. with prevalence of 7.14%. Among the recovered parasites recovered from goats slaughtered at abattoir II, *S. stercoralis* was more prevalent intestinal parasite with 45.71% followed by *An. duodenale* and *A. lumbricoides* with 20.00% prevalence, while *D. latum* was the lowest with prevalence of 14.29%. The most prevalence parasite among the slaughtered goats was *S. stercoralis* with total prevalence of 36.51%; followed by *An. duodenale* and *A. lumbricoides*, 19.05% and 17.46% respectively (Figure 1).

Table 3: Prevalence of Parasites Recovered from the Studied Abattoirs

Parasite	Number of goats and prevalence infections		Total (%)
	Abattoir I (%)	Abattoir II (%)	
<i>S. stercoralis</i>	7 (25.00)	16 (45.71)	23 (36.51)
<i>D. latum</i>	3 (10.71)	5 (14.29)	8 (12.70)
<i>A. duodenale</i>	5 (17.86)	7 (20.00)	12 (19.05)
<i>A. lumbricoides</i>	4 (14.29)	7 (20.00)	11 (17.46)
<i>M. expansa</i>	2 (7.14)	0	2 (3.18)
<i>H. contortus</i>	2 (7.14)	0	2 (3.18)
<i>Fasciola</i> spp.	3 (10.71)	0	3 (4.76)
<i>Trichostrongylus</i> spp.	2 (7.14)	0	2 (3.18)
Total	28 (44.44)	35 (55.46)	63

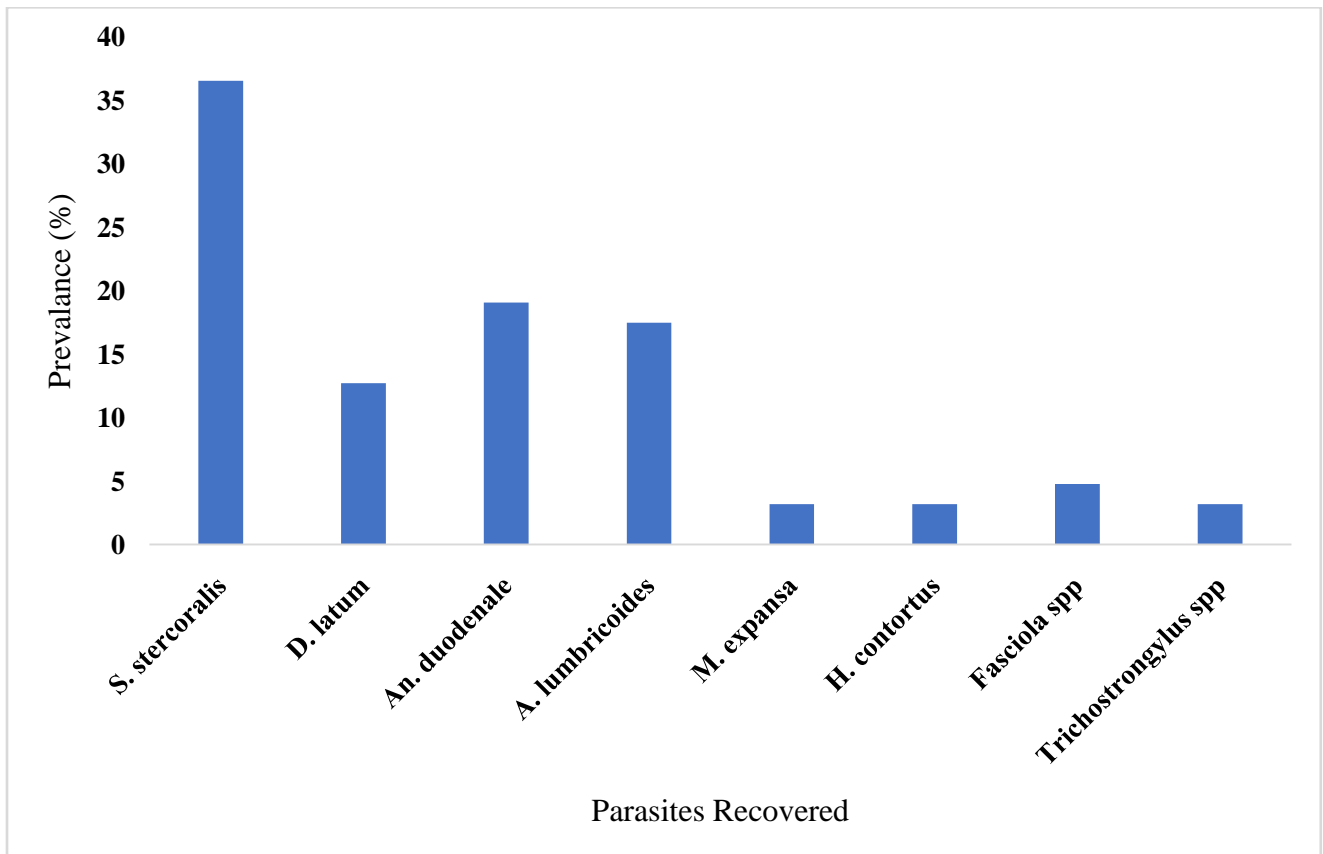


Figure 1: Prevalence of Gastrointestinal Parasites Recovered from Goat

**Prevalence of Gastrointestinal among Goat Gender from the Study Area**

Table 4 presented the prevalence of gastrointestinal parasites among the goat breed gender. Female goat (30.43%) had the highest prevalence of gastrointestinal parasites infection compared to their male counterpart (17.07%). There was a significant difference ( $p = 0.013$ ) when compared infection rate in between both goat genders. Among the breed, female Sokoto red goat breed was found to have highest prevalence of gastrointestinal parasites of 41.18% followed by female Kano brown goat breed (21.81%). Likewise, among the male, the male Sokoto red goat breed has the highest prevalence of gastrointestinal parasites of 26.67% followed by male Kano brown goat breed (15.15%) and male Borno red goat breed (15.15%).

Table 4: Prevalence of Parasite Infection Male and Female Goat Breeds

Goat breed	Male		Female		Total number examined	Total number infected (%)
	Number examined	Number infected (%)	Number examined	Number infected (%)		
Sokoto red	30	8 (26.67)	34	14 (41.18)	64	22 (34.38)
Kano brown	33	5(15.15)	22	7 (31.89))	55	12 (21.81)
Borno red	32	5(15.63)	20	5(25.00)	52	10(19.23)
West African dwarf	30	3(10.00)	39	9(23.07)	69	12(17.39)
	125	21(17.07)	115	35(30.43)	240	56(23.33)

Chi-square ( $\chi^2$ ) = 6.225,  $p$  value = 0.013, degree of freedom (df) = 1

## Discussion

With regard to the level of parasitic infection observed during this study; the prevalence of gastrointestinal parasites revealed that *Strongyloides* spp. was the highest prevalent parasite, this was similar to the reported of Odoi *et al.* (2007). The high prevalence of *Strongyloides* in abattoir II could be associated with the environment in which the goats were being reared, and also by poor animal

management. Goats in the study area are reared in mixed crop-livestock systems, where a few numbers of goats were herded together in the same pen and allowed to move about at interval to forage. This system of rearing could cause high rate of parasitic infection due to possibilities of re-infection in contaminated pastures. However, lower infections in abattoir I could be associated with improvement in management in terms of housing, feeding and healthcare for the animals. This study revealed the presence of eight gastrointestinal parasites which include *Strongyloides* spp., *Ascaris* spp., *Haemonchus* spp., *Trichostrongylus* spp., *Moniezia* spp., *Ancylostoma* spp. and *Fasciola* spp. This agrees with the findings of Gadahiet *al.*(2009) who reported that these parasites are the most pathogenic gastrointestinal parasites of small ruminants.

Prevalence of *Fasciola*spp. was low, this was in accordance with the report of Khanjariet *al.*(2014). However, infections may have been low in goats due to their foraging behaviour, which minimizes chances of ingesting the metacercaria which are found on plants closer to the ground. The only cestode observed in the study area was *Moniezia* spp. The occurrence of this parasite is associated with the ingestion of mites infected with cysts of *Moniezia* spp. (Diop *et al.*,2015). High prevalence of *Haemonchus* and *Trichostrongylus* have been recorded in other studies (Tsetetsi and Mbat, 2003; Ayaz *et al.*, 2013; Tsetetsi *et al.*, 2013). The high and low in different gastrointestinal parasite species could be due to different geographical location, host factors and climatic conditions required for the development of free-living stages of these parasites.

The result of present study revealed that female had highest prevalence compared to male, this higher prevalence in females maybe due to the physiological condition of the animals during pregnancy and lactation (production activity) and also the absence of sufficient food required for production which may lead to the lowering of the body resistance of the females, this findings was similar to the findings of Emiruet *al.*(2013) and Vieira *et al.*(2014) in Ethiopia and Brazil, where females were more susceptible to parasite infection than males, this was attributed to lowered resistance of female animals due to their reproductive events and insufficient/unbalanced diet against higher needs. However, these

findings were contrary to the finding of Tariq *et al.* (2008), Ayaz *et al.* (2013) and Nabi *et al.* (2014), as well as Badaso and Addis (2015), who reported that males of all ages had high prevalence than females and attributed to the genetic predisposition and differential susceptibility owing to hormonal control. The disparity in both findings can be attributed to different geographical locations where these studies were conducted.

Sokoto red goat breed had the highest prevalence while West African dwarf goat breed had the lowest prevalence, though not significant; this finding is in agreement with the report of Ovutoret *et al.* (2014) and Adejinmi *et al.* (2015); who in their respective studies reported that helminth parasites are more prevalent in exotic breeds than indigenous breeds because of their efficient life cycle ranging from the very simple to the extremely complicated stage. The high prevalence in Sokoto red goat breed might be due to the system of management that these goats were subjected to as they were always left to wander about scavenging and feeding indiscriminately on anything they come in contact with and then return to their poorly kept and unhygienic ranches.

## **Conclusion**

The prevalence rate of helminthiasis in goats slaughtered for food purpose need to be put to check periodically. The result of this research will be of great assistance in understanding the epidemiology of the gastrointestinal parasites of goats' slaughter in Akure metropolis and its environs. The result of this research revealed that gastrointestinal parasites are a little bit prevalent in small ruminants in the studied abattoirs. This study will assist veterinarians and livestock workers as they should certify that only healthy small ruminants examined are slaughtered. It will also help farmers in organizing animal husbandry system, maintenance of proper health, feeding and sanitary condition, deworming, towards maximum productivity of goat meat in the study area. It is recommended that good management practices, prompt diagnosis, and periodic treatment with anthelmintic and anti-protozoa drugs should be implemented to reduce the risk of gastrointestinal infections of goats and other ruminants.

## **Declarations**

### **Ethics approval and consent to participate**

Not applicable

### **Consent for publication**

Not applicable

### **Availability of data and materials**

All analysed data involved in this study are included in this manuscript

### **Competing interests**

The authors declare that they have no competing interests

### **Funding**

This research work did not receive external funding

### **Authors' contributions**

AHA, OTA, and AAV design research and involved in field and laboratory work. AAV carried out statistical analysis. Interpretation of the analysis result was done by AHA and AAV. AHA write the first draft of the manuscript. AVA correct and improved content of the manuscript. OTA and AAV review the manuscript. All author read and approved the final manuscript.

### **Acknowledgements**

The authors appreciate the Laboratory Technologist of the Department of Biology, Federal University of Technology, Akure for their support.

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