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

Abstract

Prevalence study of gastrointestinal parasites of different goat breeds was carried out on 240 faecal samples of goats comprising of 69 West African Dwarf, 55 Kano brown, Borno red 52 and 64 Red Sokoto breeds from two abattoirs in Akure, Ondo state, Nigeria. They were examined for intestinal helminth eggs using direct microscopic examination and sodium chloride floatation technique. Out of the 240 fecal samples examined, 56 (23.33%) were positive for gastrointestinal parasites. Sokoto red breed had a higher prevalence of 22 (34.38%) while West African dwarf breed had the lower prevalence of 12 (17.38%). Female goat had a higher prevalence of 35 (30.43%) while male had a prevalence of 21 (17.07%). The gastrointestinal parasites observed were *Strongyloidesstercoralis*, *Monieza* spp., *Fasciola* spp.,*Ascarislumbricoides*, *Ancylostomaduodenale*, *Diphyllobothriumlatum*, *Haemonchuscontortus* and *Trichostrongylus* spp. *Strongyloidesstercoralis* had the highest prevalence while *Moniezas*pp, *Haemonchuscontortus* and *Trichostrongylus* spp. had the lowest prevalence. Of the total 64 (26.67%) Sokoto red breeds, 22 (34.38%) had the highest gastrointestinal infection while of the total 69 (28.75%) West African dwarf goats, 12 (17.38%) had the lowest gastrointestinal infection prevalence. 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 Anthelminthic drugs

Introduction

Goats are crucial species of ruminant livestock around the world, mostly in tropical and subtropical areas. It plays a crucial role in small-scale farming and the agricultural economy of developing cultures by creating jobs and boosting household income.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.

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 (such *Ascaris lumbricoides* and *Trichuris trichiuria*), trematodes (like *Fasciola hepatica*), and cestodes (like 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 anthelminthics 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 parasite species among farm animals.Thus, this research aims to evaluate the prevalence of gastrointestinal parasites and determine the influence of sex, breed and location on the prevalence of gastrointestinal helminths of goats in the study area.

Materials and Methods

Study area

Two major abattoirs in Akure, Ondo State,Nigeria was considered for the study. Animals were usually slaughtered early in the morning between the hours of 6.30 am and 8.00 am daily for a period of three months. Faecal samples were randomly collected from the intestines of slaughtered goats of both sexes (exotic and indigenous).

Study population

A total number of 240 goats were examined for the prevalence of gastrointestinal parasites. The study population consists of 125 male goats, 115 female goats brought to the abattoir for slaughter. The breeds of goats were Sokoto red, Kano brown, Borno red, West African dwarf.

Examination of collected faecal samples

The faecal samples of the goats were collected very early in the morning.Hand gloves were used to collect the samples from the rectum collected in clean labeled sterile universal vials, preserved in 10% formalin, and taken to the laboratory for microscopic examination using ×10 and ×40 magnification.Three diagnostic techniques were used for the faecalsamples' examination, this includes

formal ether concentration technique, sedimentation technique, and floatation techniqueas described by WHO (1994) with slightly modification.

Identification of parasites

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

Statisticalanalysis

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. Statisticaldifference was based on $p<0.05$.

Result

Prevalence of gastrointestinal parasites from different goat breed

The number and percentage of different goat breed samples collected from two different abattoir was presented in Table 1, while the prevalence of gastrointestinal parasite infection among different goat breeds was represented in Table 2. Out of 240 examined faecal samples collected for gastrointestinal parasites study, 56 (92.81%) were positive of gastrointestinal parasite infection. The goat breed with the highest prevalence was Sokoto red breed(34.38%), followed by Kano brown breed (21.82%), then Borno red breed(19.23%) and the least gastrointestinal parasites prevalence was recorded with West African dwarf goat breed (17.38%). The distribution of parasite ova in all the goat breeds showed no significant difference ($X^2 = 6.284$,*p* value=0.099).The prevalence of gastrointestinal parasites infection between goat breeds in all faecalsamples examined showed that Sokoto red breed had the highest parasites prevalence (34.38%) and west African dwarf breed had the least prevalence (17.38%) as shown in Table 2.

Table 1: Number and percentage of different 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 infection 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 (X^2) = 6.284, *p* value = 0.099, degree of freedom (df) = 3

Prevalence of gastrointestinal parasites recovered from two different abattoirs from the study area

As shown in Table 3, abattoir II had the highest prevalence of parasites of 55.46%; while abattoir I had the least prevalence of 44.44%, there is a significant statistical difference (*p*value =0.013) in

prevalence of gastrointestinal parasites comparing the two abattoirs (I and II). Eight (8) parasites of various genera were encountered in the faecalsamples examined (Table 3 and Figure 1). These include; *Strongyloidesstercoralis, Ascaris lumbricoides, Fasciola* spp., *Haemonchuscontortus, Ancylostoma duodenale, Trichostrongylus*spp., *Diphyllobothrium latum,* and *Moniezia*spp. In Abattoir I, *Strongyloidesstercoralis*was the most prevalent (25.00%) intestinal parasite encountered followed by *Ancylostoma duodenale* (17.86%), while *Moniezia*spp. (7.14%), *Haemonchuscontortus* (7.14),and *Trichostrongylus* spp. (7.14%) were the least prevalent gastrointestinal parasites observed. In abattoir II, *Strongyloidesstercoralis*was the most prevalent(45.71%) intestinal parasite encountered followed by*Ancylostoma duodenale*(20.00%), and *Ascaris lumbricoides* (20.00%), *Fasciola* spp., *Haemonchuscontortus, Moniezia*spp. and *Trichostrongylus*spp. was not encountered in abattoir II as shown in Table 3. The parasite was highest prevalence was *Strongyloidesstercoralis* and the least prevalent parasite were *Monieziaexpansa, Trichostrongylus*spp. *and Haemonchuscontortus* (Figure 1).

Table 3: Prevalence of parasites recovered from the studied Abattoirs

Parasite	Number of goat and prevalence infections		Total (%)
	Abattoir I (%)	Abattoir II (%)	
S. stercoralis	7 (25.00)	16 (45.71)	23 (36.51)

D. latum	3 (10.71)	5 (14.29)	8 (12.70)
A. duodenale	5 (17.86)	7 (20.00)	12 (19.05)
A. lumbricoides	4 (14.29)	7 (20.00)	11 (17.46)
M. expansa	2 (7.14)	0	2 (3.18)
H. contortus	2 (7.14)	0	2 (3.18)
Fasciola spp.	3 (10.71)	0	3 (4.76)
Trichostrongylus spp	2 (7.14)	0	2 (3.18)
Total	28 (44.44)	35 (55.46)	63

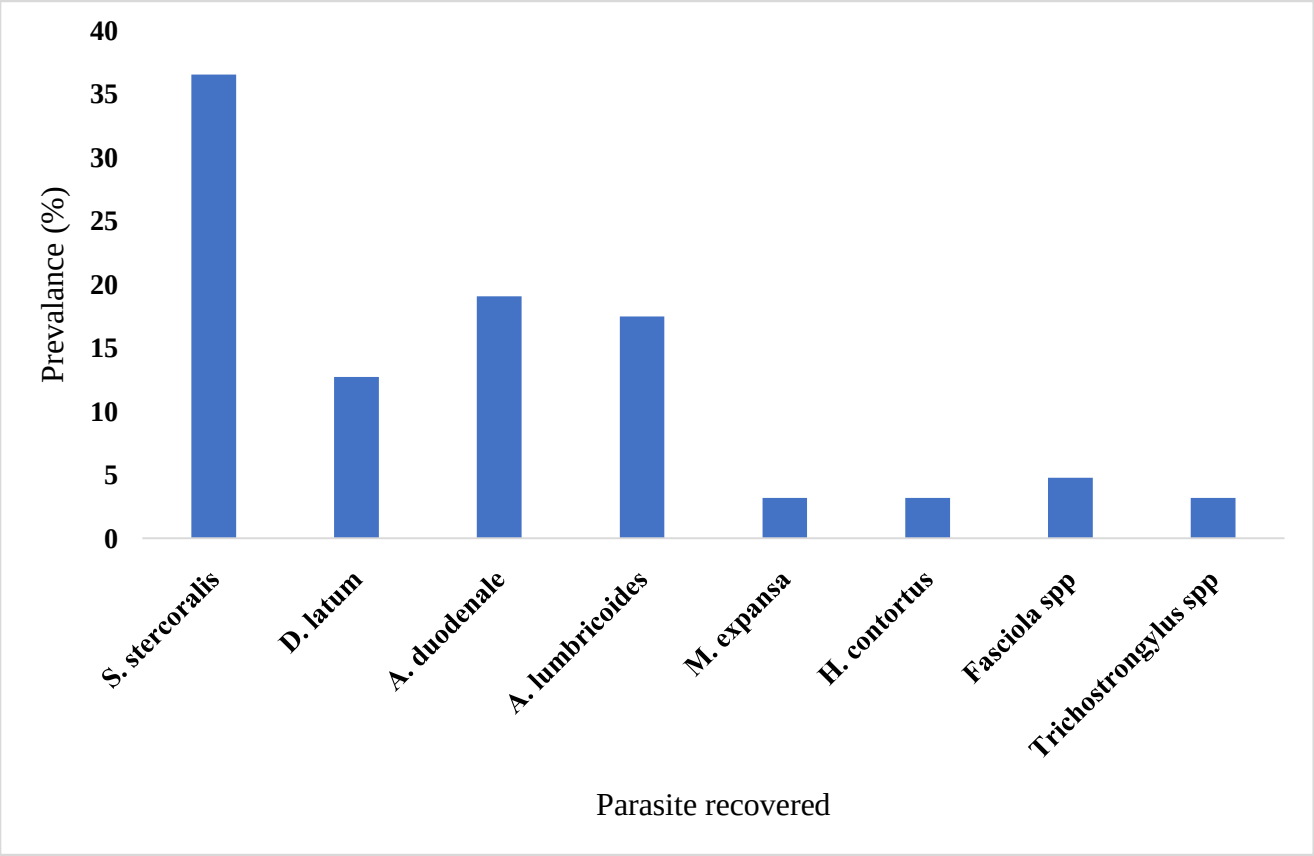

Figure 1: Prevalence of gastrointestinal parasites recovered from goat

Table 4: Prevalence of parasite infection male and female different goat breed

	Male	Female

Goat breed	Number examined	Number infected (%)	Number examined	Number infected (%)	Total number examined	Total 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 (X^2) = 6.225, *p* value = 0.013, degree of freedom (df) = 1

Prevalence of gastrointestinal among goat gender from the study area

Table 4 present the prevalence of gastrointestinal parasites among the goat breed gender.Female goat (30.43%) had the highest prevalence of gastrointestinal parasites infection compare to their male counterpart (17.07%). There was a significant difference (*p* = 0.013) comparing the infection rate in relation to gender. 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 gastrointestinal parasites of 26.67% followed by male Kano brown goat breed (15.15%) and male Borno red goat breed (15.15%).

Discussion

With regard to the level of parasitic infection observed during thisstudy;the prevalence of gastrointestinal parasites revealed that *Strongyloides*spp. was the highest prevalent parasite, this was similar to the reported ofOdoi *et al.* (2007). The high prevalence of *Strongyloides* in abattoir II can be associated with the environment in which the goats were being reared, and also by poor animal management. Goats were reared in mixed crop-livestock systems, where a few numbers of goats were

herded together in the same area during the dry and wet seasons. This system of rearing could causehigh rate of parasitic infection due to possibilities of re-infection in contaminated pastures. Other factor that might likelyassociated with the prevalence of gastrointestinal parasitic infection in goats could be frequent access to communal grazing and browsing of forages. 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 Gadahi*et 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 Khanjari*et 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 *Moniezi*a spp. (Diop *et al.*,2015). High prevalence of *Haemonchus* and *Trichostrongylus* have been recorded in other studies (Tsotetsi and Mbati, 2003; Ayaz *et al.,* 2013; Tsotetsi *et al.,* 2013). The high and lowin 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 Emiru*et 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 Badasoand 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 in 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, this finding is in agreement the report of Ovutor*et al.* (2014) and Adejinmi*et al.*(2015); who in their respective studies reported that helminth parasites are more prevalence 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 livestock need to be put to check periodically.The result of this research willbe of great assistance in understanding the epidemiology of the gastrointestinal parasites of goats in Akure and its environs. The result of this research revealed that gastrointestinal parasites are prevalence in small ruminants in Akure 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 goat meat in the study area.It is recommended that good management practices, prompt diagnosis, and treatment with anthelminthic and anti-protozoa drugs 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

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