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HELMINTH PARASITES OF GOATS AND SHEEP AT SLAUGHTER HOUSE IN LAFIA, NASARAWA STATE, NIGERIA

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ABSTRACT

Helminth parasites have been recognized as one of the major constraints to both goat and sheep production in Nigeria and other developing countries. A study aimed to determine helminth parasites of goats and sheep at slaughter in Lafia from June to July 2019. Two hundred fecal samples were collected and analyzed from 100 goats and 100 sheep using the direct smear method. The fecal sample examined revealed an overall prevalence of 155(77.5%), with goat having 80(80.0%), sheep 75(75.0%). Thirteen helminth parasites were identified with nematodes the most prevalent 103(66.5%), trematodes had 35(22.6%), and cestodes the least with 17(10.1%) and there was a statistically significant difference among the parasites (P<0.001). According to sex, females 59(43.7%) were more infected than males 25(38.5%) and there was a statistically significant difference (P<0.001). Age of sampled animals (Goat and Sheep) showed that <1 year had 28(18.1%), younger animals within the ages of <2 years 65(41.9%) were more infected with helminth parasites than adult animals from <3 years (13.5%) and >33 had 25(16.1%) and there was no statistically significant difference in age (P>0.312). According to breeds, the West African dwarf goats and sheep were more infected 104(52%), the Fulani breeds 73(36.5%) and the least was Balami sheep with 13(6.5%), Uda goat 10(5%) and there was a statistically significant difference among the breeds (P<0.001). This study revealed a high prevalence of helminth parasites of goat and sheep at slaughter in Lafia which may reduce productivity. It is recommended that goats and sheep be dewormed regularly.

Keywords: Helminth, Goat and Sheep, Slaughter House, Lafia.

INTRODUCTION

The word helminth in a general term meaning worm; all helminths are multicellular eukaryotic invertebrates with tube-like or flattened bodies that exhibiting bilateral symmetry. They are triploblastic (with endo, meso and ecto-dermal tissues). Parasitic helminths of small ruminants belong to the phylum Platyhelminthes (flatworms) and Nemathelminths (roundworms) (David, 2010; Mohammed *et al.*, 2017).

Infections due to helminth, or helminthiasis, refer to complex conditions caused by parasites of the nematoda, cestoda, and trematoda. Although all grazing sheep and goats may be infected with the above-mentioned parasites, low worm burdens usually have little impact on animal health. But with the increased number of worms, the effects in the form of reduced weight gain and decreased appetite may occur. With heavier worm burdens clinical signs such as weight loss, diarrhea, anaemia, or sub-mandibular oedema (bottle jaw) may develop (Van and Mayhew, 2013).

Sheep contributes about 30% of the total domestically produced meat in Nigeria (Ahmed and Egwu, 2014). It requires less capital as they can be completely maintained on pastures, browses, and agricultural waste products. They are generally considered to be four breeds or races of sheep native to Nigeria, the Balami, Uda, Yankasa, and West African Dwarf. In Nasarawa State, it serves as a good asset to agricultural aspects, used for religious purposes; also, it contributes hugely to the economy (Gebretsadik *et al.*, 2012). However, helminthiasis seems to be one of a major threat to sheep production in Nigeria (Naderi *et al.*, 2008). The prevalence of helminth infection has been reported from 25.1% to 92% in different areas at different time in Nigeria (Abd El-Tawab, 1998; Abd El-Salam and Mahran, 2004).

In goat, helminthiases continue to be one of the major constraints for goat production in many areas of the world including Nigeria (Jatau *et al.*, 2011). Studies in various parts of the world have shown that the high incidence of these infections is seasonally related (Yadev and Khajuria, 2006). Although they occur in all age groups, they are found to be more prevalent in kids when exposed to contaminated feed and water (Murthy and Rao, 2014). In most of the studies *Haemanthus contortus*,*Strongyloidespapillosus*,

Trichostrongyluscolumbriforms,*Fasciolaspecies* and *Moniezia benedeni* reported as the most common helminths of found in goats. Helminthiasis has for many years been recognized as a major problem in livestock rearing (Mohammed *et al.*, 2017).

MATERIALS AND METHODS

Study area

The study was carried out at Lafia abattoir, Lafia Nasarawa State, Nigeria. Nasarawa State is located in the North Central part of Nigeria between Latitude 8'35ºN and longitudes 8'32º E (Figure 1); mean temperature of 32ºC and altitude 181.53m. It is bounded by so many districts and other local governments (NIMET, 2016). The dry season is from November to April and the wet season from May to October. During the period of study most of the rains fell between May and October. The driest months were December, January, and March. The mean monthly maximum temperatures were from 31.8°C - 39.10°C minimum from 17.1°C - 26.2°C (NIMET, 2016).

Determination of the sample size

The sample size was determined using the following equation (Samukaddam and Garad, 2006**)**

$$n = \frac{z^2 pq}{d^2}$$

10.0% Prevalence of helminthiasis infection was adopted Omoike *et al.* (2014)

where;
n =minimum sample size
z =Percentage point of standard normal distribution curve, which curve defines 95% confidence interval as 1.96 (constant).
P =prevalence from previous study = 10.0%
q =1-p
d =Maximum sampling error allowed at 95% confidence limit that is 0.05

$$n = \frac{(1.96)^2 (0.1) (0.9)}{(0.05)^2}$$

n=138.3

Therefore, a total of 200 samples were collected 100 from sheep and 100 from goats using convenient sampling techniques on the basis of the availability.

Sample Collection

The study was carried out from the period of June to July, 2019. The fecal samples were collected from 100 goats and 100 sheep using convenient sample technique. Collection of samples was made at the abattoir, which was visited early in the morning before the butchers start the slaughtering process. About 3 – 5kg of fecal samples were collected directly from the rectum of freshly slaughtered goats and sheep using sterile gloves and placed into a clean sterile container with 10% formalin as a preservative. Each container was clearly labelled with unique identification sex, age, and breed. Samples were then transported to the Zoology Laboratory of the Federal University of Lafia, for further identification of helminth parasites.

Sample Processing

All samples collected were analyzed parasitological using direct smear. About 1g of the samples each were collected using a clean spatula and was inserted into a Petri dish. 2ml of normal saline solution was added to the sample which was then sieved into a 250ml beaker. The solution was collected using a pipette, which was placed on a clean grease-free microscopic slide, a drop of lugose iodine was added to the solution for clarity and a sterile coverslip was used to cover the prepared sample. The sample was then placed on the stage of the microscope, which was viewed using a X10 objective lens for the detection of helminth parasites (Kassa*et al.*, 2016).

Statistical analysis

Descriptive statistics were presented as frequency and percentages. Chi-square test ($\chi 2$) or Fisher's exert test (where necessary) were used to test for the association for categorical (non-continuous) variables. All statistical analyses were performed with Statistical Package for Social Sciences version 25 (IBM SPSS Inc., Chicago, IL, USA) for Windows. All statistics were two-tailed and a *P*-value <0.05 was considered statistically significant.

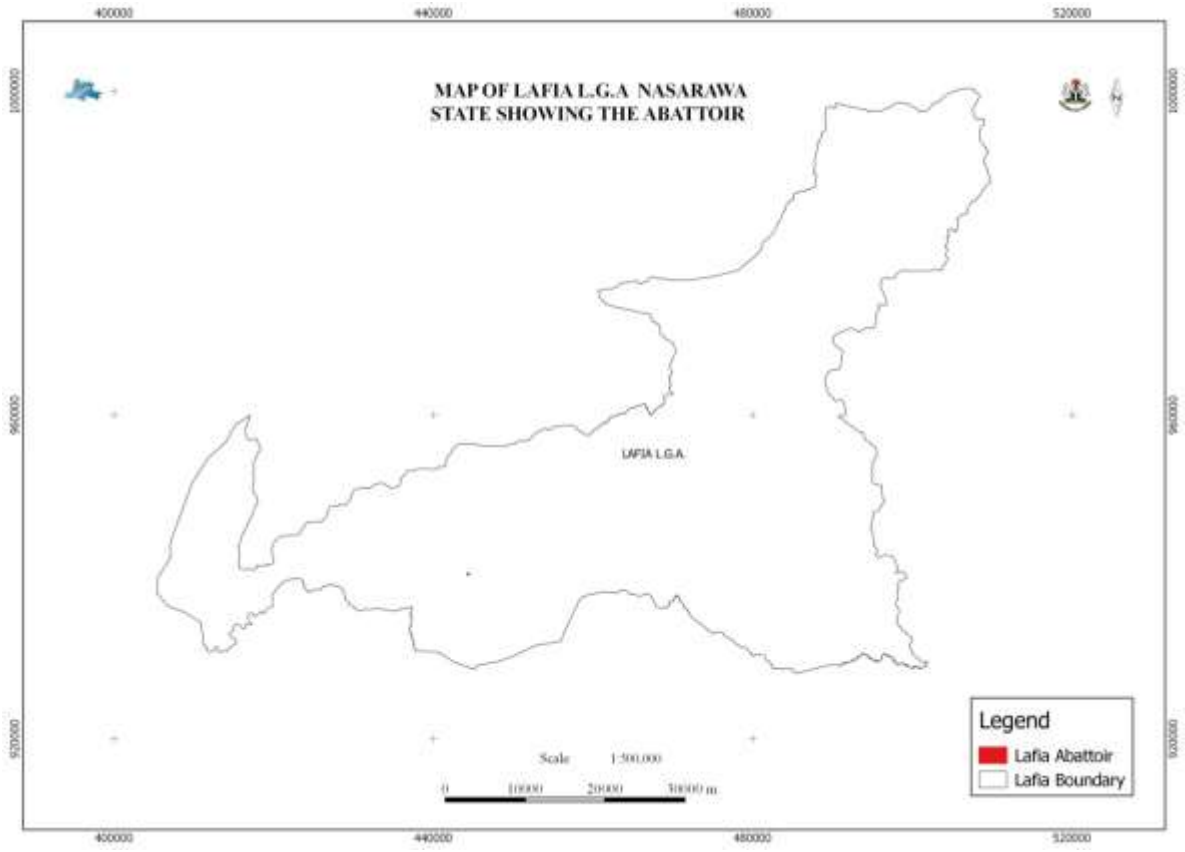

Figure 1: Map of study location

RESULTS

A total of two hundred animals (100 sheep and 100 goats) were screened for the presence of helminth parasites. Nematode was recorded to have the highest prevalence rate with 103 (66.5%), followed by trematodes 35 (22.6%), with cestodes been the least infected with 17 (10.1%). Among the nematode, Hookworm had the highest prevalence of 34 (21.9%) followed by 15 (14.6%) *Ascaris lumbricoides*, in trematodes *Fasciola gigantica* had 19 (54.3%) and in cestodes *Diphyllobotum latum* had the highest prevalence of 10 (58.8%) as showed in Table 1. However, the prevalence of nematode helminth was statistically significant ($\chi 2$ =28.17, *P* = <0.001) which is in contrast with Trematode and Cestode that does not show any significant difference ($\chi 2$ = 4.78, *P* =0.092, $\chi 2$ = 1.63, *P* = 0.201) respectively.

A total of 200 samples were examined for helminths infections, 155 (77.5%) were found to be infected with at least one type of infection (Table 2). The infection was more prevalent in Goat 80 (80.0%) than Sheep 75 (75.0%).

Gender-specific prevalence of parasite showed that the female ruminants 59 (43.7%) were more infected by helminth parasite than the male animals 25 (38.5%) (Table 3) ($\chi 2$=12.08, *P*= <0.001). The prevalence of helminth parasites about the gender of ruminants was statistically significant.

Age-specific prevalence of parasite shows that animals from the age of 1 year had the highest prevalence of 80 (40.0%), followed by animals within 1 to 9 months 39 (19.5%), animals within the age of 2 years 48 (24.0%), the least are animals within the age of 2 to 3 years of age with the prevalence of 33 (16.5%) as shown in (Table 4). ($\chi 2$= 3.57, *P* = >6.312). There was no statistically significant association between the prevalence of parasites in the age group.

Out of 100 goats examined, the highest was of the West African Dwarf breed 57 (57.00%), followed by Fulani goat breed 33 (33.00%) and the least was the Uda 10 (2.00%). Out of 100 sheep examined, the highest was the West African Dwarf with 47 (47.00%), followed by Fulani with 40 (40.00%), with Balami being the least with 13 (13.00%). As shown in (Table 5). ($\chi 2$ = 24.63, *P* = <0.001) There was a statistical significance in breeds.

Table 1: A checklist of the prevalence of helminth parasite of Goats and Sheep at slaughter house in Lafia

Parasites	Goat (n = 100) n (%)	Sheep (n = 100) n (%)	Total (n = 200)	χ^2	*P-value*
Nematodes			103(66.5)		
Hookworm	16 (15.5)	18 (17.5)	34 (33.0)	26.38	0.000
Ascaris lumbricoides	6 (5.8)	9 (8.7)	15 (14.6)		
Trichuris globulosa	2 (1.9)	9 (8.7)	11 (10.7)		
Trichostrongylus spp.	4 (3.9)	3 (2.9)	7 (6.8)		
Dictyocaulus	11 (10.7)	0 (0.0)	11 (10.7)		
Haemonchuscontortus	11 (10.7)	0 (0.0)	11 (10.7)		
Ostertagia	4 (3.9)	3 (2.9)	7 (6.8)		
Enterrobius vermicularis	4 (3.9)	3 (2.9)	7 (6.8)		
Trematode			35(22.6)		
Fasciola gigantica	11 (31.4)	8 (22.9)	19 (54.3)	4.78	0.092
Paramphistomum	7 (20)	5 (14.3)	12 (34.3)		
Schistosome	0 (0.0)	4 (11.4)	4 (11.4)		
Cestode			17(10.1)		
Diphyllobotum latum	4 (23.5)	6 (35.3)	10 (58.8)	0.615	0.436*
Monieza	5 (29.4)	2 (11.8)	7 (41.2)		

*Fisher Exact Test

Table 2: Prevalence of helminth parasites of Goats and Sheep at slaughter house in Lafia, Nasarawa State

Animal	Number Examined	Number Infected (%)
Goat	100	80 (80.00)
Sheep	100	75 (75.00)
Total	200	155 (155.00)

Table 3: Prevalence of helminth parasites of Goats and Sheep in relation to gender

Animals	Male	Female	Total	χ^2	*P-value*
	n (%)	n (%)			
Goat	28 (18.3)	50 (32.7)	78 (51)	0.001	0.001*
Sheep	48 (31.4)	27 (17.6)	75 (49)		
Total	76 (49.7)	77 (50.3)	153 (100)		

*Fisher Exact Test

Table 4: Prevalence of helminth parasites of Goats and Sheep in relation to age

Age groups (Month)	Goat	Sheep	Total	χ^2	*P-value*
	n (%)	n (%)			
< 10	16 (10.3)	12 (7.7)	28 (18.1)	3.57	0.312
10 – 21	36 (23.2)	29 (18.7)	65 (41.9)		
22 – 33	16 (10.3)	25 (16.1)	41 (26.5)		
> 33	12 (7.7)	9 (5.8)	21 (13.5)		

Table 5: Prevalence of helminth parasites of Goats and sheep in relation to breed

Breed	Goat	Sheep	Total	χ^2	*P-value*
	n (%)	n (%)			
West African Dwarf	57 (28.5)	47 (23.5)	104 (52)	24.63	0.000
Fulani	33 (16.5)	40 (20)	73 (36.5)		
Balami	0 (0.0)	13 (6.5)	13 (6.5)		
Uda	10 (5)	0 (0.0)	10 (5)		

DISCUSSION

This study was aimed at evaluating the current status of helminth parasites in sheep and goat at a slaughterhouse in Lafia, Nasarawa State Nigeria, using the specie, age, sex, and breed of the host, the animals of this region are infected with a variety of the helminth parasites. The various parasites recovered during the present study have also been reported from other studies done in Lafia abattoir, Nasarawa State by Adua *et al.* (2017) and Pam *et al.* (2020) and from other researchers in Minna modern abattoir, Niger State, and

Gwagwalada abattoir, Abuja, Nigeria by Eke *et al.* (2019) and Solomon *et al.* (2014) respectively (Solomon *et al.*, 2014; Adua *et al.*, 2017; Eke *et al.*, 2019; Pam *et al.*, 2020).
Results in this present study showed high helminth parasite prevalence in goat and sheep this could be that the farmers lack proper management practices towards these animals. This is in agreement with the earlier report of Adrein *et al.* (2001).

The study showed that nematode had a higher prevalence than trematodes and cestodes, this could be because of the high rainfall experienced which could lead to the favourable condition of the development of the infective stage larvae. This is in line with report of Pam *et al.* (2020) in their study done at same study site and from other part of the world by Al-Robaiee *et al.* (2019) in Kirkuk city, Iran (Al-Robaiee *et al.*, 2019; Pam *et al.*, 2020). The reasons are that nematodes do not require intermediate hosts and both larval and adult stages are all infective stages of the parasite (Gibbon, 2001). Trematodes however recorded lower rates. This may be they require intermediate hosts to complete their life cycle and so transmission is dependent on the availability of an intermediate host (*Lymnaea spp*) and snails are dependent on the season for survival (Soubly, 2006).

The study showed that goats were more infected than sheep, this could be that goats in Lafia are managed under extensive pastoralism in which a large number of animals are kept together which could increase the degree of pasture contamination leading to higher prevalence rate. The higher prevalence in goats as compared to sheep is in agreement with reports of Fikru *et al.* (2006). This could be due to slow or less development of immunity in goats to helminth parasites compared with the situation in the sheep, the later faced prolonged challenge over generations, but in goats, the less availability of sufficient browsing area and expansion of crop agriculture forced them to graze with the other species that had good resistance.

The study further revealed that sex of animals showed an association with the prevalence of the parasites, the higher prevalence in females than the males may be due to some physiological peculiarities of the female animals, which usually constitute stress factors thus, reducing their immunity to infections, also the females happen to be lactating which leads to weakness/malnutrition. Concerning the gender, the study revealed a high prevalence 31.4% of parasites in male sheep than their female counterparts 17.6%, and among the goats female goats have the higher prevalence 32.7% than their counterparts male 18.3%. The study showed none statistical significant different. The study is discordant with the report of other studies that reported that ender does not really have direct influence on the epidemiology and distribution of intestinal parasites among sheep and goats (Adua and Hassan, 2016; Eke *et al.*, 2019; Pam *et al.*, 2020).

The result proved that there was a higher prevalence rate in younger animals than in the older ones between the ages of 2 to 3 years of age. The higher prevalence recorded in younger animals as compared to the adult ones could be due to the fact that younger animals are more susceptible to infections than adults. This finding is in agreement with most literature (Dunn, 1978; Shah-Fischer and Say, 1989; Nwosu *et al.*, 1996; Keyyu *et al.*, 2003; Nganga *et al.*, 2004) from different corners of the world. This may be that adult animals may acquire immunity to parasites (Urquhart *et al.*, 1996) through frequent challenge and expel the ingested parasites before they establish infection; (Shah-Fischer and Say, 1989).

There was a higher prevalence rate observed in West African Dwarf breed in both goat and sheep animals in the study area as compared to other breeds such as the Fulani, Uda, and Balami. This could be as a result of their abundance in the study area, because Uda, Fulani, and Balami breeds are more resistant to infections than the West African Dwarf breed. Also, this finding is in contrast with that of (Pavlovic *et al.*, 2011). Their findings revealed a low level of infections in the West African Dwarf breed using intensity scale which may be associated with the type of vegetation the animals are exposed to in the different areas, because some plants such as *Acacia* can reduce the level of infection.

CONCLUSION

The present study showed that it is beyond doubt that sheep and goats of Lafia are infected by a large number of helminth parasites which could be responsible for economic losses in a variety of ways, therefore, efforts should be made to control helminthiasis which requires detailed knowledge of these parasites and it is believed that the present study will provide some help for the same. The study also showed that sex, age, and breeds appear to be the major limiting factors for the prevalence of helminth parasites.

RECOMMENDATIONS

Based on the above conclusion, I recommend the following:
i. Strategic deworming of animals, when conditions are most favourable for larval development on the pasture, using broad spectrum anthelmintic.
ii. Education and awareness creation for farmers with regards to the epidemiology of parasitic diseases. They should be taught the best parasite control strategy and management practices through extension.
iii. Proper inspection of animals should be done at the slaughterhouse, to ensure that already infected animals are not been slaughtered to the general public for consumption.

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