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PREVALENCE AND INTENSITY OF *paramphistomatidae* FLUKE SPECIES IN RUMINANTS SLAUGHTERED IN UYO LOCAL GOVERNMENT AREA, AKWA IBOM STATE, NIGERIA

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ABSTRACT

Helminth infections of ruminants are a major threat to livestock industries in tropical and subtropical countries of the world. This study was carried out to determine the prevalence of paramphistomosis in cattle and goats slaughtered in Uyo, Akwa Ibom State, Nigeria. A total of 230 ruminants (150 cattle and 80 goats) were subjected to routine post mortem examination for the presence of *Paramphistomum* species. The overall prevalence of *Paramphistomum* infection in the ruminants was 52.61%, with prevalence of 62.6% and 33.7% in cattle and goats respectively. There was no significant difference ($p>0.05$) in prevalence between sexes of the animals in both cattle and goats. Cattle [94, 62.6%] had higher infection than goats [27, 33.7%]. Female cattle (81.8%) were more infected than male cattle (61.2%) ($\chi^2 = 0.054$; $p = 0.816$) while female goats (39.5%) were more infected than males (25.0%) ($\chi^2 = 1.232$, $p = 0.267$). The overall mean intensity was 195.23 and 112.83 were observed for cattle and goats respectively. Prevalence and intensity of infection were breed specific for cattle and goats. Red Bororo had the highest prevalence (70.6%) and intensity of 226.5 than the other breeds of cattle examined while the Yankasa breed had the highest prevalence (39.3%) and intensity of 178.5, than the other breeds of goat examined. In view of the high prevalence of paramphistomosis observed in this study, it is imperative that farmers be adequately educated on the health challenges posed by this parasite on the productivity of their ruminants.

Keywords: Prevalence, *Paramphistomum*, cattle, goat, Uyo, Nigeria

Introduction

Paramphistomosis is a parasitic disease of gastrointestinal tract of domesticated livestock due to infection with *Paramphistomum* species. The major species that cause the disease include *Paramphistomum cervi* and *P. microbothrium*, which are predominantly found in Africa (Symth, 1996). The intermediate hosts of these parasites are freshwater snails belonging to the genera *Lymnae*, *Planorbis*, *Bulinus* and *Fussaria* (Soulsby, 1992).

Paramphistomosis has a wide geographical distribution in subtropical and tropical areas of the world. The disease is a major threat to livestock industry where they cause heavy economic losses, resulting from retarded growth, low food conversion rate, poor milk, meat and wool production and poor quality of hide and skin (Bunza *et al.*, 2008; Kamaraj *et al.*, 2010; Sanchis *et al.*, 2012; Atcheson *et al.*, 2022). Adult paramphistomes which are the major parasites of rumen and reticulum of ruminants cause localized loss of rumen papillae, while the juvenile flukes penetrate the mucosa of the duodenum and upper ileum to plug feed, causing necrosis and haemorrhagic ulcerations called duodenitis leading to severe pathological changes (Soulsby, 1982; Biu and Abbagana, 2007). Death due to immature paramphistomes is very high and may be as high as 80-90% in domesticated ruminants (Juval *et al.*, 2003; IIha *et al.*, 2005; O'Shaughnessy *et al.*, 2018).

In Nigeria cattle and goats rearing and other livestock farming provides a major source of animal protein. It is a good source of income, employment for families, communities, and the nation at large. It provides a significant proportion of the agricultural gross domestic product (Nuru, 1989; FAO, 2019). There are reports on the prevalence of trematodes of the family Paramphistomatidae from ruminants in Nigeria (Bunza *et al.*, 2008; Njoku-Tony, 2011; Dube and Aisien, 2010; Dube *et al.*, 2013; Elenu *et al.*, 2016). Nonetheless, information on the prevalence of cattle and goat paramphistomes from other parts of Nigeria is still scanty, despite its importance in livestock production. Therefore, the objective of the current study was to determine the prevalence and intensity of cattle and goat paramphistomosis in Uyo, Akwa Ibom State, Nigeria.

Materials and Methods

Study Area

This study was conducted in Uyo, the capital city of Akwa Ibom State, Nigeria. Uyo is located in the tropical rainforest belt of West Africa and lies within latitude 5°2′N and longitude 7°55′E. Two seasons exist, the rainy and dry seasons. The rainy season extends from April to November, while the dry season extends from December to March. Uyo has two municipal abattoirs namely Ntak Inyang and Iba-Oku.

Study population and sampling technique

The study populations were cattle and goats of different breeds and sex brought from different parts of Nigeria to the Uyo abattoir for slaughtering. Simple random sampling

method was employed in the selection of animals. Sampling was carried out from May to November, 2015.

Sample Collection

A total of 230 ruminants (150 cattle and 80 goats) of different sexes and breeds slaughtered in the abattoirs were examined for paramphistomum parasites in a cross-sectional study. The contents of the stomach chambers were washed and strained to collect fresh flukes into specimen bottles. Flukes attached to stomach surfaces were carefully removed with a pair of forceps from cattle and goats in separate bottles containing 10% formalin. The specimen bottles were carefully labeled with biological data of the animal such as sex, date of collection and breed. Flukes recovered from each of the infected animals during the survey were counted to determine the intensity (worm burden) of infection.

Identification of Paramphistomatidae flukes

The collected flukes were placed on petri dishes and observed through a stereo microscope for morphological characteristics. Identification was based on morphology of the flukes, shape, posterior sucker (acetabulum), anterior sucker, and terminal papillae as described by Urquhart *et al.* (1996) and Foreyl (2001).

Data analysis

Percentages were used to measure prevalence and Chi-square test was used to determine the level of significance in prevalence according to sex and breeds of animals. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 22 by IBM Corporation, USA. Significance was determined at $p<0.05$.

Results

The prevalence of *Paramphistomum* infection in cattle and goats according to sex is shown in Table 1. An overall prevalence of 121(52.61%) was observed for *Paramphistomum* infections in cattle and goats in Uyo, with a prevalence of 93(54.39%) and 28(47.46%) in males and females, respectively. The prevalence of 94(62.6%) was observed in cattle, female cattle (9, 81.8%) were more infected than males (85, 61.2%). There were no significant differences ($\chi^2 = 0.054$, $p = 0.816$) between the sexes of cattle examined in this study. For goats, the prevalence 27(33.7%) was observed, female goats (19, 39.5%) were infected more than male goats (8, 25.0%). Also, no significant difference ($\chi^2 = 1.232$, $p = 0.267$) was observed between the sexes of the goats examined in this study.

Table 2 shows the prevalence and mean intensity of *Paramphistomum* infection in relation to breed of cattle.

Table 1: Sex Specific Prevalence of *Paramphistomum* Infection in Cattle and Goat Slaughtered in Uyo

Sex	Cattle		Goats		Total	
	Number Examined	No Infected (%)	Number Examined	No Infected (%)	Number Examined	No Infected (%)
Male	139	85 (61.2)	32	8 (25.0)	171	93 (54.39)
Female	11	9 (81.8)	48	19 (39.5)	59	28 (47.46)
Total	150	94 (62.6)	80	27 (33.7)	230	121 (52.61)
χ^2	0.054		1.232		0.590	
Df	1		1		1	
p Value	0.816ns		0.267ns		0.442ns	

Table 2: Prevalence and Intensity of *Paramphistomum* Infection According to the Breeds of Cattle Slaughtered in Uyo

Breeds of Livestock	Number Examined	Number Infected (%)	Mean intensity
Cattle			
White Fulani	75	48 (64.0)	188.4
Red Bororo	17	12 (70.6)	226.5
Adamawa Gudali	58	34 (58.6)	170.8
Total	150	94 (62.7)	195.23
χ^2		0.919	
Df		2	
p Value		0.632ns	
Goats			
Yankasa	61	24 (39.3)	178.5
Gambi	13	3 (23.1)	160.0
Dantudu	6	0 (0.0)	0.0
Total	**80**	**27 (33.7)**	**112.83**
χ^2		4.573	
Df		2	
p Value		0.102ns	

Red Bororo (12, 70.6%) had highest prevalence, followed by White Fulani (48, 64.0%) while Adamawa Gudali (34, 58.6%) had the least prevalence. No Significant differences ($\chi^2 = 0.919$, $p = 0.632$) in prevalence among the breeds of cattle. For breeds of goat, Yankasa (24, 39.3%) had the highest prevalence while Gambi (3, 23.1%) had the least prevalence. No infection was observed in Dantudu breed (Table 2). The overall mean intensity for cattle and goats were 195.23 and 112.83, respectively.

DISCUSSION

The result of this study has revealed that paramphistomosis is prevalent in cattle and goats slaughtered in Uyo, Akwa Ibom State, Nigeria. The prevalence of 62.6% and 33.7% recorded in cattle and goats respectively in the present study is quite high. This finding is consistent with the report of a study in India (Hassan and Juyal, 2006), where the prevalence of 77.64% and 33.30% were obtained for cattle and goats respectively and Dilbato and Bekele (2018) in Gurage Zone, Abeshege distristric of Ethiopia. A study in Sokoto State, Nigeria (Bunza *et al.*, 2008) reported a prevalence 52.2% in cattle, and another study in the Southern part of Nigeria (Dube and Aisien, 2010) observed a prevalence of 30.0% from the rumen and reticulum of privately slaughtered goats and sheep. The high prevalence observed in our study may be due to the presence of appropriate bodies of water that favour the growth and transmission of the parasite, the grazing habit of the ruminants, the contamination of the environment by faecal matter of infected ruminant and the abundance of the snail intermediate host (Opara, 2007). All these factors acting singly or collectively may be responsible for the high prevalence and intensity of infection in this study. Our findings however is in contrast with a study in Kwara State, Nigeria (Elenu *et al.*, 2016) where the prevalence of 16.1% was reported in faeces obtained from cattle. This discrepancy might be attributed to differences in diagnostic technique (Khedri *et al.*, 2015). It may also be because only mature adult female worms lay eggs which are counted in faecal samples. Infection with immature stages and adult males may have gone undetected.

Cattle were more infected than goats. This might be due to the free-range grazing management practices in the rearing of cattle in Nigeria. This increases their chances of picking up infected snails that were attached to pastures (Regassa *et al.*, 2006), while goats are usually reared intensively or semi-intensively (Bunza *et al.*, 2008). Acute infection by juvenile flukes has been reported to lead to sudden death in goats (Loosli *et al.*, 1999). It is possible that the diseases might have caused sudden death to such animals even before they were slaughtered thereby reducing the chances of goats being positive during examination. Females of both cattle and goats sampled exhibited higher prevalence rate than their male counterparts, this finding differ from previous studies in goats (Njoku-Tony, 2011) and cattle (Khan *et al.*, 2008) but similar to the observation of a study carried out in Sokoto (Bunza *et al.*, 2008). The higher prevalence observed in females in this study could be attributed to loss of immunity during pregnancy, birth and lactation which make the female more prone to parasitic infection (Barger, 1993). Different breeds of cattle and goats demonstrated differences in their prevalence rates and intensity of infection, genetic variability, and susceptibility of the breeds to the parasites might have accounted for this observation (Dargie, 1982; Gray *et al.*, 1995; Yusuf *et al.*, 2016).

A major limitation of the present study was that origin of infection in both cattle and goats could not be identified. The animals studied were from the northern part of the country and transported to the southern part for grazing and subsequently as source of meat. As a result, the actual point of infection could not be determined. A detailed malacological study is being conducted in freshwater bodies of the study area to ascertain if the infections originated there or from northern Nigeria. The determination of the presence or absence of snail intermediate hosts of *Paramphistomum* species in the study area will help inform appropriate interventions to alleviate the scourge of this disease on ruminant hosts and reduce economic losses.

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