



STUDIES ON THE PREVALENCE OF GASTRO-INTESTINAL NEMATODES IN RUMINANT ANIMALS SLAUGHTERED IN BIU LOCAL GOVERNMENT ABATTOIRS, BORNO STATE, NIGERIA

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ABSTRACT

An epidemiological study was conducted from September-November, 2022 on the prevalence of gastrointestinal nematodes species among naturally infected ruminants slaughtered in Biu Local Area of Borno state, using centrifugal flotation techniques. Out of three hundred and eighty four (384) ruminants (162 goats, 110 sheep and 112 cattle) examined in the three selected abattoirs (Biu, Miringa and Buratai), 239 (62.34%) were infected. Miringa had the prevalence rate of 64.65%, Biu 63.89% and Buratai 63.16%. Although the highest faecal egg counts was recorded in Cattle 66.07%, the difference in prevalence rate between the different location and species of the animal were statistically insignificant $p < 0.05$. The parasites identified were *Ascaris lumbricoides* 33.81%, *Ancylostomidae* spp 30.93%, *Trichostrongylus* spp 16.54%, *Strongyloides stecoralis* 11.27%, *Haemonchus contortus* 5.51%, and *Entoribius vermicularis* 1.91%. Fulani cattle breed had the prevalence rate of 20 (71.43%), Wad Sheep 45 (66.18%) and West African Dwarf goat 80 (65.57%). The difference in prevalence rate between the different breed of all the animals were not statistically significant $p < 0.05$. The prevalence rate was 47 (72.31%) in male goats, 20 (41.67%) sheep and cattle 31 (67.39%) whereas female counterparts had 50 (51.55%), 48 (77.41%) and 43 (65.15%) in goat, sheep and cattle respectively. Both young and adults were infected with GI nematodes. Gastrointestinal nematodes are endemic in the study area. Therefore, mass administration of anthelmintic drugs, regular vaccination as well as educating the livestock's farmers toward insuring production of healthy meat and improvement of their welfare is required to control the parasite in the study areas.

Keywords: Nematodes, Ruminant Animals, Prevalence, Slaughtered, Biu

INTRODUCTION

Ruminant animals form a significant proportion of the livestock production in Nigeria and possess obvious advantage over other livestock such as playing significant roles in the life of rural households (Aruwayo *et al.*, 2015).

Nematode or roundworms as popularly called are the most numerous multicellular animals that are non segmented and cylindrical in shape found throughout the world either as free-living organism or as parasite to other higher organisms (plants and Animals). There are about 20,000 described species of nematode ranging from microscopic to large species that can be seen with naked eyes. Generally, Helminths are known to be a major constraint to ruminant's well-being and productive performance Rajput *et al.*, 2006; Hesterberg *et al.*, 2007; Keyyu *et al.*, 2005.

Gastrointestinal helminths are ubiquitous parasitic agents of livestock, especially ruminants and are known to limit cattle production in many areas and countries Rajput *et al.*, 2006; Hesterberg *et al.*, 2007. Mortality of animals due to parasitic diseases may not be alarming at times but their indirect effects on livestock productivity and their zoonotic impact on human health are considerably greater Ballweber *et al.*, 2006; Nwosu *et al.*, 2007; Ekong *et al.*, 2012. Indirect losses associated with helminth infections include the reduction in productive potentials such as decreased growth rate, weight loss, diarrhoea, anorexia and sometimes anaemia Nahed-Toral *et al.*, 2003; Gonzalez and Ganzalez, 2004.

The ruminant animals slaughtered at abattoirs across Biu Local Government area are mainly for consumption. This research was aimed to determine the prevalence, identification of parasite's species and animal's species in

naturally infected goat, sheep and cattle in Biu Local Government areas of Borno State.

MATERIALS AND METHODS

Study Area

The study was conducted in three abattoirs of Biu Local Government Area of Borno state. This includes, Biu town abattoir, Miringa abattoir and Buratai abattoir from September, 2022 to November, 2022. Biu is in the South Senatorial Zone of Borno state in North-Eastern Nigeria. It is located between latitude $10^{\circ} 36'40''$ N, $12^{\circ} 11'42''$ E and longitude 10.6111° N, 12.195° E and lies on the Biu plateau at an average elevation of 626 meters above Sea level (Britannica, 2009). The Local Government Area falls within the Northern Guinea savannah and the Sudan savannah regions and has a semi-arid climate with average temperature of 32° C. The local government area features two distinct seasons' dry and rainy seasons and has a land mass of about $3,423.86$ km². The total human population in the area is 176,072 in according to the 2006 census. The town located 172km from Maiduguri the state capital and is the administrative headquarter of the local government, other develop areas attached to the local government include Buratai, Garubula, Miringa, Madara-Girau, Yawi, and Gunda among others. Biu is home to many tribes but the most populous tribe is Babur (Pabir). Agriculture is an important economic activity for the people in the area.

Sample Size Determination

The sample size was determined using sample size techniques of Andrew Fisher's recommended by Getachew *et al.*, (2017). Constant value of z-score 1.96 and confidence level of 95%.

$$\text{Sample size} = \frac{(z - \text{score})^2 \times \text{standard Deviation} \times (1 - \text{standard Deviation})}{(\text{confidence interval})^2}$$

Sample size = 384

Sample Collection

A total of 384 fresh faecal samples were collected directly from the rectum of each animal into well-labeled sterile zip-lock bag and transported in ice packs to the Biology Laboratory, Department of Biology, Faculty of Natural and Applied Science, Nigerian Army University Biu, where they were examined for egg(s) of gastro-intestinal nematodes microscopically. The eggs were identified on the basis of their morphological features using a laboratory guide for identification of gastro-intestinal parasites describe by Marco et al. (2019).

Parasitological Examination

Parasitological examination was done by floatation techniques following the standard procedures described by (Krishi, 2015).

Data Analysis

All data collected were analysis using chi-square and simple percentages to determine the prevalence of gastro-intestinal nematodes. 95% confidence level ($p < 0.05$) was used to measure the association between the species of the animals, sex and breed. All analyzed was done in Microsoft Office Excel --Version 2010

RESULTS

Out of the total 384 ruminants examined (162 goats, 110 sheep and 112 cattle), 239 (62.34%) were found positive for one or more gastro-intestinal nematodes. Cattle had the

highest prevalence followed by sheep and goats with 74 (66.07%), 68 (61.82%) and 97 (59.88%) respectively. The different in infection rate between the different species in each and all location were statistically not significant as shown in table 1.

The nematode parasites identified are presented in table 2. Out of these, *Ascaris lumbricoides* were more prevalence of 141 (33.81%) while *Entoribius vermicularis* had the least 8 (1.91%) in the ruminants examined. The Prevalence of GI nematodes based on animal's breed is shown in table 3. The West African Dwarf (WAD) goat and sheep breed were more infected with prevalence rate of 80 (65.57%) and 45 (66.18%) respectively, while the white Fulani breed 20 (71.43%) was the highest in cattle. The Prevalence of GI nematodes based on sex of animals is shown in table 4. Female sheep 48 (77.41%), Male goats 47 (72.31%), and male cattle 31 (67.39%) were more infected with the GI nematodes, while male sheep, female goats, and female cattle were less infected when compare with their counterpart with 31 (67.39%), 50 (51.55%) and 43 (65.15%) prevalence rate respectively. The different in prevalence rate between the sex of all the animals were statistically significant $p > 0.05$. The Prevalence of GI nematodes based on age of animals is shown in table 5. Adult cattle (79.02%), adult goat (65.83%) and adult sheep (65.52%) were more infected with the GI nematodes, while young sheep, goat and cattle were less infected when compare with their counterpart with 47.86%, 42.86 and 32.26% prevalence rate respectively.

Table 1: Prevalence of GI nematodes in different species of ruminants in various locations in the study area

Location	Species	No. Examined	No. Infected	Percentage (%)	P – Value
Biu Town	Goat	88	52	59.09	1.73
	Sheep	50	34	68.01	
	Cattle	42	29	69.05	
	Total	180	115	63.89	
Miringa	Goat	35	21	60.01	0.93
	Sheep	32	18	56.25	
	Cattle	37	25	67.57	
	Total	104	64	64.65	
Buratai	Goat	39	24	61.54	0.14
	Sheep	28	16	57.14	
	Cattle	33	20	60.61	
	Total	100	60	63.16	
Grant Total	384	239	62.24		
	Goat	162	97	59.87	0.24
	Sheep	110	68	61.81	
	Cattle	112	74	66.07	
	Total	384	239	62.24	

Table 2: Prevalence of GI Nematodes Parasite Species in the Study Area

Parasite Species	Goat (%)	Sheep (%)	Cattle (%)	Total (%)
<i>Ascaris lumbricoides</i>	51 (32.3)	44 (28.1)	46 (45.1)	141(33.81)
<i>Ancylostomidae</i> spp	46 (29.1)	49 (31.2)	34 (33.3)	129(30.93)
<i>Trichosrongylus</i> spp	30 (18.9)	39 (24.8)	0	69(16.54)

<i>Strongyloides stecoralis</i>	14 (8.9)	11 (7.1)	22 (21.6)	47(11.27)
<i>Haemonchus contortus</i>	11 (7.0)	12 (7.6)	0	23(5.51)
<i>Entoribius vermicularis</i>	6 (3.8)	2 (1.3)	0	8(1.91)
Total	158 (38.82)	157 (38.57)	102 (25.06)	417

Table 3: Prevalence of Gastro-intestinal Nematode Infection in Different Breed of Ruminants in the Study Area.

Species	Breed	No. Examined	No. Infected	Percentage (%)	P – Values
Goat	Wad Goat	122	80	65.57	6.68
	Sahelian	40	17	42.5	
	Total	162	97	59.88	
Sheep	Wad Sheep	68	45	66.18	1.43
	Balami Sheep	42	23	54.76	
	Total	110	68	61.81	
Cattle	Sokoto Gudali	27	17	62.96	0.51
	Red Bororo	57	37	64.91	
	White Fulani	28	20	71.43	
	Total	112	74	66.07	0.33
Grand Total		384	239	62.24	

Table 4: “Prevalence of GI Nematodes in Different Sex Group of Goats, Sheep and Cattle in the study area”

Species	Sex	No. Examined	No. Infected	Percentage (%)	P - Value
Goat	Male	65	47	72.31	6.98
	Female	97	50	51.55	
Sheep	Male	48	20	41.67	14.65
	Female	62	48	77.41	
Cattle	Male	46	31	67.39	0.06
	Female	66	43	65.15	
Total		384	239	62.24	

Table 5: Prevalence Rate Based on Animal’s Age in the Study Area

Species	Age	No. Examined	No. Infected	Percentage (%)
Goat	Young	42	18	42.86
	Adult	120	79	65.83
Sheep	Young	23	11	47.86
	Adult	87	57	65.52
Cattle	Young	31	10	32.26
	Adult	81	64	79.02
Total		384	239	62.24

DISCUSSION

An overall prevalence of 239 (62.34%) was observed among ruminants animal slaughtered in this study area. These agreed with the finding of Owhoeli *et al.* (2014) who found 62.1% prevalence rate of helminths in exotic and indigenous goats slaughtered in selected Abattoirs in Port Harcourt, South-South, Nigeria. Cattle had the highest prevalence rate of 74 (66.07%) followed by sheep 68 (61.81%) and then goats 74

(59.87%). The high prevalence in the cattle and sheep is possible due to the grazing habit where cattle and sheep graze closer to the ground festering opportunity of exposure of the parasite (Asif *et al.*, 2008). The different in prevalence rate between the different species was not statistically significant $p < 0.05$. This may be to due the fact that all the species graze in the same pasture.

However, the result of this study is contrary to the finding of Takeet *et al.* (2016) on prevalence of gastrointestinal parasites of cattle in Abeokuta, Ogun State who reported higher prevalence rate of 95.12% and Yuguda *et al.* (2018) that reported 74.3% on gastrointestinal helminths of slaughtered cattle in Bauchi central abattoir, Bauchi State, Nigeria. Subsequently, Luka *et al.* (2018) reported low prevalence rate of 42.63% on gastrointestinal parasites of bile and faeces of slaughtered cattle and sheep from Maiduguri municipal abattoir, north eastern Nigeria and Inuwa *et al.* (2021) that reported 51% on prevalence of gastrointestinal nematodes of small ruminants slaughtered at Bauchi central abattoir, Bauchi State, Nigeria. The variations of this study with other studies may be due to the different type of rearing system and the nature of posture environment.

The Five different species of gastro-intestinal nematode encountered during the study were also reported in the previous studies by other researchers (Fabiyyi, 1987; Usman *et al.*, 2016 and Yuguda *et al.*, 2018). The different in prevalence rate by species or coinfection depend on the management system, exposure, location, awareness and environment of the animals (Yuguda *et al.*, 2018). In this study *Ascaris lumbricoides* was recorded in high prevalence (33.81%) in all three species of the ruminant animals examined. All other species encountered were reported by various researchers in different part of the country on ruminant's animals (Aliyu *et al.*, 2020 and Yuguda *et al.*, 2018) with different prevalence rate. Many factors may be responsible for this variation ranging from agro-climatic variations (Akanda *et al.*, 2014), environmental factors and managements system.

It was also observed that female sheep and cattle animals had higher infection of the parasites than males. This agreed with the general understanding of helminthic infections that female animals are more susceptible to helminthiasis than male due to some physiological peculiarities of the female animals, which usually constitute stress factors that reduce their immunity to infections (Aliyu *et al.*, 2020). This agreed with Usman *et al.*, 2016 who reported high prevalence rate in female of sheep and goat in slaughtered ruminant animals in katagum Local Government, Bauchi State.

The result in this study also indicated that, the adult animals have higher prevalence rate when compared with young. This agreed with previous report of Jegede *et al.* (2015) and Luka *et al.* (2018) but contrary with other studies which show that adult and old animals develop acquired immunity against helminthic infections as they get mature due to repeated exposure and this will help expel the parasite before it establish itself in the gastrointestinal Tract (Taswar *et al.*, 2010; Dagnachew *et al.*, 2011).

The result of this study shows that gastrointestinal nematodes are endemic in the study area. Therefore, it is recommended, mass administration of anthelmintic drugs, regular vaccination as well as educating the livestock farmers toward insuring production of healthy meat and improvement of their welfare in the study area.

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CONFLICT OF INTEREST

None

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