



Dry Season Prevalence of Gastrointestinal Parasites in Ruminants in Sokoto Metropolis

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Authors' contributions

This work was carried out in collaboration among all authors. Author AM designed and supervised the work and authors AMA, AIS and KMM collected the samples and performed all experiments. All authors read and approved the final manuscript.

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ABSTRACT

This study was conducted with the aim of determining the dry season (January-May, 2018) prevalence of gastrointestinal parasites in special breeds of ruminants in Sokoto Metropolis. A total of 100, 85 and 75 faecal samples were collected from Sudanese breed of Sheep, WAD/Sahel Goats and Friesian Cattle respectively. Faecal samples were examined using standard parasitological techniques (Simple flotation and Centrifugal sedimentation). For the Sheep, a total of 51 samples were positive for presence of gastrointestinal parasites. Male animals have higher prevalence (52.9%) than their female (47.1%) counterparts. The major parasites observed were *Eimeria* and Strongyles with prevalence of (64.71%), while the least observed parasites were mixed infections (35.29%). From the total of 85 goat faecal samples examined, an overall prevalence of 54.7% was observed. The prevalence rates for Strongyle, *Eimeria* and mixed infections were 57.5%, 34.0% and 8.5% respectively. The prevalence was more in males than in the females. Strongyleeggs were more, compared to other helminthes eggs. For the Friesian Cattle, sixty (60) samples out of 75 samples analyzed were positive for either Strongyleeggs or *Eimeria* (oocyst) infection or both (mixed) constituting about 80% prevalence. Forty-two (70%) samples were positive for *Strongyle*

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eggs, 14 (23.3%) for *Eimeria* oocyst and 4 (6.7%) for mixed infection of both. From the overall prevalence, female had a high prevalence of 34(56.7%) than male cattle 26(43.3%). Based on the results of the present findings, it was concluded that gastrointestinal parasitic infections also occur during the dry season in Sokoto which may be as a result of carry-over of infection during the succeeding rainy season.

Keywords: Dry season; prevalence; gastrointestinal parasites; special breeds; ruminants; Sokoto.

1. INTRODUCTION

Sheep are kept everywhere in Nigeria especially the northern part due to the variations between their value and ubiquity in the north, and the advance diversity of the humid zone [1]. They are kept in villages, hamlets and by pastoralist in the north and distributed among the northern borders of the country [2]. Parasitic gastroenteritis has been noted as a major constraint to ruminant productivity in terms of pathology and economics importance on clinical and subclinical levels [3]. Studies have shown that helminth parasites are by far the most serious cause of production losses in ruminant farms in sub-Saharan Africa and indeed worldwide [4-6]. In most semi-arid and arid regions of sub-Saharan Africa, ruminants play a vital role in rural economies through the provision of meat, milk, household income, manure and skin [7].

Among the most efficient means of parasitic disease transmission is via ingestion of water and feed contaminated with infective stages [8]. Poor management system has also been attributed massively to the economic losses in ruminant production in sub-Saharan countries [7].

Sudanese breed of sheep is often used to cross breed other local sheep breed in Nigeria such as Balami and Uda to produce a highly rated crossed animal with high meat production and high milk yield [9]. The crossbreeding of it with other breeds yielded a highly rated animal in the Nigerian markets [9].

West African Dwarf (WAD) goats and sheep are the indigenous and commonest breeds of small ruminants in Southern Nigeria. Although a large majority of the estimated 10 million of these animals is traditionally managed in villages in small units [10]. Many are reared intensively in Government owned and other institutional farms. Studies carried out in the Guinea Savannah zone of Northern Nigeria have shown that gastrointestinal parasitic infections are important

in intensively managed flocks, occurring mainly during the rainy season [11,12].

In Nigeria, gastrointestinal nematode infection was predicted as an obstacle to expansion of cattle industry in a study conducted [13] in South Western states of Nigeria where rainy season is prolonged. A checklist was also compiled [11] comprising 16 different species of gastrointestinal nematodes of cattle in northern Nigeria. This study is therefore aimed at determining the dry season prevalence of gastrointestinal parasites of some special breeds of ruminants reared within Sokoto metropolis.

2. MATERIALS AND METHODS

2.1 Study Area

Sokoto is the capital of Sokoto State, located in the North Western part of Nigeria. With a land area of approximately 56,000 square kilometers, it is located between longitudes 11°30' to 13°50' East and latitude 4° to 6° North [14]. The state is bordered in the North by Niger Republic, Zamfara State to the East and Kebbi State to the South and West [14]. Sokoto is located in the Sudan Savannah vegetation belt with sandy soil and a humidity of below 40% year-round except during the rainy season when it rises to 60% [15]. The two dominant seasons are the wet (June-October) and dry (November-May) seasons. The former begins in June and lasts up to October, while the latter begins in November and last up to May [16]. Sokoto state is second in the nation's livestock population with estimates of about 3 million cattle, 4 million sheep, 4.5 million goats and 3 million poultry [17,18].

2.2 Sample Collection

All faecal samples were collected from the animals from January -May, 2018. Individual rectal or freshly voided faecal samples were collected using labeled polythene bags. Each sample contained the following data: sex, age, and breed, and were transported to the Parasitology and Entomology Laboratory of the

Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria for analysis.

2.3 Sample Processing

Simple floatation [19] using saturated salt solution and sedimentation [20] techniques were used on each sample for identification of any form of the parasites. The faeces were examined for the presence of eggs and/or oocysts of gastrointestinal parasites. Differentiation was done based on morphological appearance of the eggs and/ or oocysts encountered. Eggs and oocysts seen were then compared to those in literatures and standard texts books.

2.4 Statistical Analysis

Data were analyzed using descriptive statistics as presented in Tables.

3. RESULTS

Out of a total of 100 faecal samples from twenty Sudanese breed of Sheep examined for presence of any kind of gastrointestinal parasites, in overall, 51 (51.0%) samples were found positive while 49 (49.0%) were negative. Of the 51 positive samples, 27 (52.9%) were from males and 24(47.1%) were from females (Table 1). Prevalence of infection by month was observed to be 11 (21.5%) for the month of

January, 10 (19.6%) for February, 11 (21.5%) for March, 10 (19.6%) for April and 9 (17.6%) for the month of May (Table 1). Samples positive for Strongyle worms were 13 (25.49%), *Eimeria* oocysts 20 (39.22%) and for mixed infection of Strongyles and *Eimeria* were 18 (35.29%) as also shown (Table 2).

From the total of 85 Faecal samples examined from 17 goats (WAD/Sahel), twenty-seven (27) of the samples were from goats below 3 years of age, 28 from goats between 3-6 years of age and 30 are goats greater than 6 years of age. A total 39 (45.9%) samples are from the male goats while 46 (54.1%) are from the female goats. Forty-five 45 (52.9%) of the samples were from West African Dwarf (WAD) goats while 40 (47.1%) were from the Sahel breed of goats.

Overall, forty-seven 47 (55.29%) samples out of the total 85 samples were positive for one parasite type or another (Table 3). Nineteen 19 (48.7%) samples that were positive belonged to the male goats while 28 (60.9%) of the positive samples were from the female goats. Prevalence of infections by months is also as shown with January, April and May having the highest prevalence rate of 21.3% each (Table 3). Among the parasitic infection types identified, 27 (57.5%) were Strongyle infections, 16 (34.0%) had *Eimeria* infection and only 4 (8.5%) had mixed infection of Strongyles and *Eimeria* (Table 4).

Table 1. Prevalence of gastrointestinal parasites in Sudanese breed of sheep

Month	N=100	Sex		No. positive	Prevalence (%)
		Male	Female		
January	20	5	6	11	21.5
February	20	5	5	10	19.6
March	20	5	6	11	21.5
April	20	6	4	10	19.6
May	20	6	3	9	17.6
Total	100	27 (52.9)	24 (47.1)	51	100

M=Male; F=Female

Table 2. Prevalence by infection type of the gastrointestinal parasites found in Sudanese breed of sheep in Sokoto

Month	Infection types			Total
	Strongyle (%)	<i>Eimeria</i> (%)	Mixed (%)	
January	1	4	6	11 (21.5%)
February	4	4	2	10 (19.6%)
March	1	4	6	11 (21.5%)
April	3	4	3	10 (19.6%)
May	4	4	1	9 (17.6%)
Total	13(25.49)	20 (39.22)	18 (35.29)	51(100%)

Out of the 75 samples examined from Friesian Cattle during the dry season in Sokoto, 60(80%) were positive with strongyle worms, *Eimeriaspp.* or mixed infection (Table 5). Strongyle worms were observed to be more prevalent with 42(70%), followed by *Eimeria spp.* 14(23.3%) while mixed infection had a prevalence of 4(6.7%) as shown in (Table 5).

From the overall prevalence, female had a high prevalence of 34(56.7%) than male 26 (43.3%). Prevalence was observed to be higher in the months of January (66.7%), February (46.7%) and March (86.7%) while prevalence of hundred per cent (100%) was observed for the months of April and May (Table 6).

Table 3. Prevalence of gastrointestinal parasites in relation to sex of WAD/Sahel goats during the dry season in Sokoto

Months	N=86	Sex		No. positive	Prevalence (%)
		M	F		
January	15	4 (40.0%)	6 (60.00%)	10	21.3
February	19	4 (50.0%)	4 (50.0%)	8	17.0
March	14	4 (44.4%)	5 (55.6%)	9	19.1
April	20	4 (40.0%)	6 (60.0%)	10	21.3
May	17	3 (30.0%)	7 (70.0%)	10	21.3
Total	85	19 (40.4%)	28(59.6%)	47	55.29

M=Male; F=Female; WAD= West African Dwarf

Table 4. Prevalence of gastrointestinal parasitic infection types in WAD/Sahel Goats during the dry season in Sokoto

Month	Infection types			No. positive	Prevalence (%)
	Strongyle	<i>Eimeria</i>	Mixed		
January	5	3	2	10	21.3
February	4	3	1	8	17.0
March	6	3	0	9	19.1
April	6	4	0	10	21.3
May	6	3	1	10	21.3
Total	27 (57.5%)	16 (34.0%)	4 (8.5%)	47	54.7

WAD= West African Dwarf

Table 5. Prevalence of gastrointestinal parasitic infection type in Friesian Cattle in the dry season of Sokoto

Months	Infection types			Prevalence (%)
	Strongyles	<i>Eimeria</i>	Mixed	
January	2	7	1	10(66.7%)
February	3	3	1	7(46.7%)
March	10	2	1	13(86.7%)
April	13	2	0	15(100%)
May	14	0	1	15(100%)
Total	42(70%)	14(23.3%)	4(6.7%)	60(80%)

Table 6. Prevalence of gastrointestinal parasitic infection in Friesian cattle in the dry season of Sokoto

Months	N=75	Sex		No. positive	Prevalence (%)
		Male	Female		
January	15	5	5	10	66.7
February	15	3	4	7	46.7
March	15	6	7	13	86.7
April	15	6	9	15	100
May	15	6	9	15	100
Total	75	26(43.3%)	34(56.7%)	60(80%)	

4. DISCUSSION

The prevalence of gastrointestinal parasite infection in sheep was observed to be 51%. Similarly, in Ethiopia another study revealed the gastrointestinal parasites prevalence of sheep to be 84.3% in Gechi district [21]. In Perak, Malaysia, another report has also documented a high prevalence of gastrointestinal parasites in small ruminants [22]. A prevalence of 69.64% was also reported in Minna, Niger State, Nigeria [23].

The rate of gastrointestinal infection in sheep varies in different parts of the world [24,25,26]. A variety of factors like grazing habits, level of education and economic capacity of the farmers, standard of management and the anthelmintic use can influence the prevalence of gastrointestinal parasite [27]. The findings of highest prevalence of Strongyles as observed in the month of January and March is contrary to the findings of [27] who reported highest prevalence at the end of April in both adult sheep and lambs.

The finding of higher prevalence rate in males than in females also agrees with the reports of [23] but contrary to the reports of [26]. This may be due to differences in exposure to infection, although females are said to be more prone to GIT nematode infections especially during pregnancy and before weaning or as a result of the variation in stocking density (sex ratio) because more males were sampled compared to their female counterparts.

This study has revealed the presence of helminthes and protozoan parasite eggs/oocyst 54.7% which reflects the vital pathogenic parasites of goat's worldwide [25]. Single infection was more compared to concurrent (mixed) infections with two or more genera of the parasites [26]. This could be attributed to the fairly good management and deworming practices. More of strongyle eggs were seen than were other helminthes eggs [27].

The results have shown high prevalence of the gastrointestinal helminths in the dry season which is contrary to the findings of [28] who reported high prevalence during the rainy season. Prevalence was observed to be more in the young than in the old or adult goat which is in line with the findings of [29]. This suggests a possibility of early introduction of lambs to

grazing fields and subsequent increase in larval uptake.

Studies conducted on beef and dairy cattle from several countries have shown that gastrointestinal parasitism is a widespread condition with no herds reported free from infections [30,31,32]. This study indicated a high prevalence (60%) of gastrointestinal nematodes in Friesian cattle in Sokoto which agrees with another study conducted in calves where the authors reported a prevalence of 61.57% [16]. Some studies conducted in other countries have also documented similar findings [33,34,35]; 84.8% in Bangladesh [36] but contrary to the findings of [33] who reported a prevalence of 11.562% and 31.25% in cows and buffaloes respectively in Gampaha district, Sri Lanka. A similar prevalence was also documented in Jabalpur, India [37].

5. CONCLUSION

Gastrointestinal parasitic infections in ruminants can still occur during the dry season of Sokoto. Infections with strongyle worms is more frequently encountered than *Eimeria* spp infections and or mixed infection with both.

6. RECOMMENDATIONS

Recommendations towards designing strategic or tactical deworming practices, including dry season periods are desirable. This should include the consideration of both the epidemiology of strongyle infections and the prepatent periods of the most abundant nematode parasites in the study area. Control should be made based on prevalence and seasonal variations of the nematode parasites to increase productivity of ruminants in the area.

ETHICAL APPROVAL

The use of animals in this study was approved by the Faculty Research Ethics Committee (FAREC) of Faculty of Veterinary Medicine, UsmanuDanfodiyo University, Sokoto, Nigeria.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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