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Prevalence of gastrointestinal helminths of small ruminants subjected to traditional livestock management system in Gadau district, Bauchi state Nigeria

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Abstract

Globally, parasitic diseases are one of serious concerns in production and management of livestock. African climate and other environmental factors constitute a favorable condition for the growth of gastrointestinal parasites in animals. This research work was aimed at assessment of prevalence of parasites infesting gastrointestinal tracks of goats and sheep at Gadau District, Northern Nigeria. The results reveal the overall prevalence of 42.7% gastrointestinal parasites in both goats and sheep in the study area. It indicates that sheep were less infected with gastrointestinal parasitic nematodes than the goats. It also revealed that the degree of incidence of gastrointestinal parasitic nematodes infection varies among the age, sex and species of small ruminants in the study area, due to the management system for the small ruminants.

Keywords: Prevalence, helminths, small ruminants, livestock, gastrointestinal, parasites, Gadau, Nigeria

Introduction

Throughout the world, parasitic diseases constitute a major impediment to livestock production [11]. African climate and other environmental factors constitute a favorable condition for the growth of gastrointestinal parasites in animals [10, 26]. In Nigeria, production of small ruminants is limited by the problem of widespread gastrointestinal parasites [6]. Cattle, goats and sheep of all ages are affected by a diversity of internal parasites. This concurrent infection increases clinical severity with weight loss and death [1, 3] causing considerable economic losses. These are big problem for profitable and efficient livestock production in sheep and goats [12]. Despite the large population of sheep and goats and their economic importance, little is known about the prevalence and incidence of small, species diversity and level of infestation of gastrointestinal (GI) parasites in small ruminants in study area [14, 24]. This study was aimed to determine the prevalence of gastrointestinal parasites in small ruminants in Gadau District, Bauchi State, North-eastern, Nigeria.

Materials and Methods

Study area

Gadua district (11°50'08"N 10°10'02"E) located in Bauchi state, North Eastern Nigeria, has an a population of 229,996 at the 2006 census and area of 1,398 km². Hausa are the predominant ethnic group in the area.

Study design and population

The prevalence of GIT parasite of goat and sheep in three villages was designed and determined by a cross-sectional study. The study animals were goats and sheep. The study animals were those reared in traditional animal production system. Animals' bio-data like sex, age and species, and body condition of the goats and sheep were recorded. Dentition by eruption pattern as per was used to determine the age of the study animals as described by [2]. Conventionally, the age was grouped as young (<2years) and adult (>2years). Body condition of the goats and sheep was categorized as good. Medium and poor based on the animal's appearance, transverse processes of lumber vertebrate and manual palpation of the spinus as described by [2].

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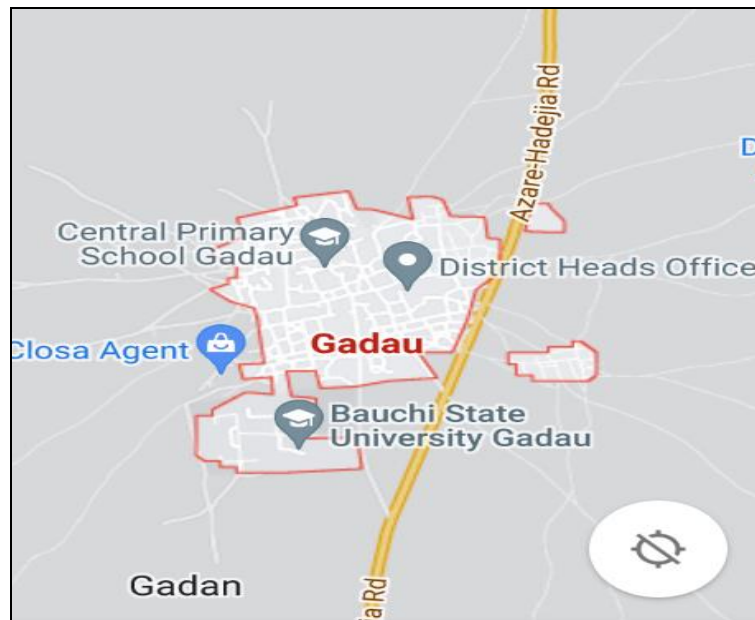


Fig 1: Map of the study area.

Sample collection and laboratory analysis

About 10 g of fecal sample was collected directly and randomly from the recta of sheep and goat that were not dewormed for three months. Fecal samples were obtained from the recta of goats and sheep and transported in ice-cooled containers to Biology laboratory of Bauchi state University Nigeria. Fecal sample was analyzed for helminthic eggs, worms and coccidian oocytes using a modified McMaster technique [18].

A sedimentation technique was used to detect eggs of trematode in the sample. Using fecal sample, nematode larvae was cultured in pooled fecal material (two grams of faces from each animal) and incubated at 26 - 30 0C for a week. The moisture was maintained by addition of water. Identification of cysts or eggs was made on the basis of size and morphology of eggs. Tape worm segments were recognized at the time of collection of fecal samples by the appearance of segments in the feces. The level of infection was classified as light, moderate and severe (massive) according to the number of eggs per gram of feces (EPG) count. Egg counts from 50-799; 800-1200; and over 1200 eggs per gram of feces were considered as light, moderate and severe respectively.

Data Analysis

Data obtained was analyzed using standard statistical tools *i.e.* Mean, standard error (SE) and chi-square test of

independence for comparisons of the positive cases in different animal species using SPSS version 20. The result was considered significant at $p < 0.05$.

Results

Table 1: Prevalence of gastrointestinal parasitic nematodes of goats and sheep in Gadau District, Bauchi State, Nigeria.

Species	Number Examined	Number Infected (%)	Chi Square	P value
Goats	61	41 (67.04%)	0.23	0.626
Sheep	40	25 (62.5%)		
Total	101	66 (65.34)		

As shown in table1, simple floatation technique was used to analyze the total of 101 fecal samples, where, 84.16% of the samples revealed different types of nematodes eggs. Sixty-one (61) fecal samples were from goats while Forty (40) fecal samples were from the sheep. Out of the 61 samples analyzed in goats, 41(67.04%) were positive with different types of nematodes eggs while 20 (32.78%) were negative. Out of the 40 fecal samples analyzed in sheep, 25 (62.5%) were positive with nematodes eggs while 15 (37.5%) were negative (Table 1). There was no significant difference between goat and sheep and the level of parasitic infection at $p < 0.05$.

Table 2: Sex specific prevalence of gastrointestinal parasitic nematodes of goats and sheep in Gadau District, Nigeria

Sex (Goats)	Number Examined	Number Infected (%)	Chi-Square	p-value
Male	35	23 (57.37%)	0.06	0.805
Female	26	17 (42.63%)		
Total	61	40 (65.57)		
Sheep				
Male	27	17 (67.5%)	0.06	0.793
Female	13	8 (32.5%)		
Total	40	25 (62.5)		

Table 2 summarizes the animal gender, showing that out of the 61 goats (35 males and 26 females) examined, 23 (57.37%) male goat and 17 (42.63%) females were infected respectively. Out of 40 sheep (27 males and 13 females) that

were examined, 17 (67.5%) male and 8 (32.5%) female were infected respectively. From these results in the above table, male goats and male sheep were more infected than female sheep and female goats, however; there was no

significant difference in the infection rate ($p < 0.05$) between male and female animals.

Table 3: Age specific prevalence of gastrointestinal parasitic nematodes of goats and sheep in Gadau District, Nigeria

Age group (Goats)	Number Examined	Number Infected (%)	Chi-Square	P-value
Adult	34	19 (57.37%)	0.84	0.359
Young	27	11 (42.26%)		
Total	61	30 (49.18%)		
Sheep				
Adult	21	11 (52.5%)	0.10	0.751
Young	19	9 (47.5%)		

As observed in the table 3 which shows that out of the 61 and 40 goats and sheep that were examined, 57.37% and 52.5% adult goats and sheep were infected with the parasites respectively. Out of 61 and 40 goats and sheep examined, 42.26% and 47.5% of young sheep and goat were infected respectively (Table 3). The results clearly indicate that based on age of the small ruminants, the young animals were less infected than the adult ones., although there was no statistically any significant differences in infection rate at ($p < 0.05$).

Table 4: Body condition specific prevalence of gastrointestinal nematodes of goats and sheep in Gadau District, Bauchi State, Nigeria

Body Condition (Goats)	Number Examined	Number Infected (NL)	Chi-Square	p-value
Poor	39	25 (63.93%)	12.05	0.002
Medium	14	3 (22.95%)		
Good	8	1 (13.11%)		
Body Condition (Sheep)	Examined	Number Infected (%)	Chi-Square	P-value
Poor	20	13 (65%)	2.32	0.002
Medium	11	2 (18.2%)		
Good	9	1 (11.1%)		

As observed in the table 4, the body condition of the animals shows that; out of the 61 goats and 40 Sheep examined, 39 (63.93%) and 13 (65%) are poor body condition goats and sheep respectively, while 14 (22.95%) and 2 (18.2%) are medium goats and sheep respectively, while 8 (13.11%) goats and 1 (11.1%) sheep are good based on the appearance of the animals. The poor animals were found to be more infected. There was a significant relation between body condition of the animals (goats and sheep) and the GIT infection.

Discussion

This study shows the existence of major gastrointestinal parasites with an overall prevalence of 42.7% in the small ruminants at Gadau District, northern Nigeria. It was also discovered that the prevalence was lower in sheep (46.6%) than in goats (48.3%) even though it was not significant at 0.005 confidence level.

The results agree with the results of similar studies by [4], at the University of Maiduguri where sheep had lower (54.0%) infection rate than goats with high prevalence rate (58.0%) of infection. Other findings that reported higher prevalence rates in goats than sheep include [15; 16, 20]. This may be attributable to the fact that sheep develops more resistance than goats [11, 22].

However, no significant difference was recorded at ($p > 0.05$) between both species of sheep and goats. The overall prevalence found in here is less than those of previous findings in goats and sheep in other parts of Nigeria. Findings by (7) revealed a high prevalence rate (87.1%) of a strongyle nematode (*Haemonchus contortus*) and [16] that showed a slightly higher infection rate of 55.8% in goats than in this study. This difference may be due to more escalating trend of helminthosis during confinement period (April to October), and low worm burden during free range (November to March), these periods correspond to the cropping and harvest season respectively [7, 13].

Findings from Ethiopia also confirmed that the mean load of adult nematodes is mostly moderate in both goats and sheep, with the highest parasitic worm burden around the peak of rainy season, showing trends of periodic abundance that tally with the bi-modal annual rainfall pattern [23]. This study clearly indicates that egg counts of parasitic gastrointestinal nematodes were high in the adult animals of both species. This finding corroborates those of [15, 16], that adult animals could have been harbouring matured nematodes from the previous infection during the summer which eventually results in shedding more eggs during the dry season as established by [23]. In this study, however, statistical significance showed that the older animals were less at risk of infection than the young ones. This may be attributed to the fact that young animals are less immune than adult animals that are immune competent to tolerating the infection even though adult ones were exposed to a high infection pressure from the L3-contaminated environment [21]. In this study, the fecal egg count (FEC) was generally moderate, irrespective of sex, in both goats and sheep. This result was agreed with the finding of [25] on the seasonal changes and prevalence of small ruminants' gastrointestinal nematodes in the semi-arid zone of northeast, Nigeria and a study of [23] on the seasonal dynamics and epidemiology of nematodes infections of sheep in the semi-arid region of eastern Ethiopia. This result disagreed with the finding of [9] in Sokoto northwest Nigeria where sex variations among different species of small ruminants infected with *Haemonchus* species of nematodes was confirmed. The level of prevalence of gastrointestinal nematodes infection among the age, sex and species of small ruminants at Gadau District could be attributed to the management system of the animal, in most cases exposing them to the infective stage of the parasites, abusive and indiscriminate use of anthelmintic drugs and lack of basic information on the modern livestock farming [8, 23]. The type of husbandry practices and climatic variations across different geographical regions are factors that influence survival of the parasites [5]. This may thus account for the observed variation in the prevalence rate of gut parasitism reported by different workers [17]. Thus, the findings of this study established that gastrointestinal parasitic nematodes are among the factors affecting small ruminants' industry in the study area.

Conclusion

Based on these findings, gastrointestinal nematodes are endemic in small ruminants (goats and sheep) within Gadau District, Bauchi Nigeria. The present findings revealed high prevalence rate of gastrointestinal parasites which need to be periodically monitored. Further, well-organized and effective control measures to check the parasitic population

should be drawn in through better extension programs to train farmers on the proper usage of anthelmintics.

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