International Journal of Innovation Sciences and Research
Vol.7, No, 12, pp.1298-1304, December, 2018
***Available online at** http://www.ijisr.com*

RESEARCH ARTICLE

PREVALENCE OF GASTROINTESTINAL PARASITES OF SHEEP AND GOATS IN MOKWA, LAVUN AND GBAKO LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

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Accepted 17th November 2018; Published Online 25th December 2018

ABSTRACT

This pilot research was designed to study the prevalence of gastrointestinal parasites of sheep and goats in Mokwa, Lavun and Gbako local government areas of Niger State. During the course of the study, one hundred and fifty faecal samples (fifty each) from adult sheep and goats either male or female were obtained via rectum during the months of December, 20017 to April, 2018. The obtained faecal samples were freshly processed or kept in refrigerator as the case may be, and subjected to direct faecal smear, simple floatation and sedimentation centrifugation methods respectively to identify possible ova or egg or segment of helminths. From the results obtained, all the three local government areas under investigation harbored different types of gastrointestinal parasites at different degree. The order of prevalence of the parasites in descending order was Mokwa, Lavun and Gbako with corresponding percentages of 15%, 23% and 23% respectively. The most common identified gastrointestinal parasites among others were *Haemonchus* spp, *Fasciola* spp and coccidian infection In these results, the following conclusions were drawn: gastrointestinal parasites are present at various stages and degrees in the three local government areas surveyed, which were burden to the small ruminants health, reproduction capabilities and survival at long run; there was a correlation between the location of the places surveyed to the availability of veterinary facilities and parasites density and, there was a difference in animal species susceptibility to helminthiasis of which sheep were lesser than goats. The parasites population could have been more if it were in the full wet season. This pilot research could be used for other remaining local government areas of Niger State to come up with a resounding and complete herd health programme for small ruminants irrespective of where and how they are kept.

Key words: *Prevalence, Gastrointestinal Parasites, Sheep, Goats.*

INTRODUCTION

Gastrointestinal parasites could be defined as assemblage of organisms, with elongated bodies and less creeping habit. Gastrointestinal parasites are usually applied only to the parasitic and non-parasitic species belonging to the phylapaty (flukes, tape worms and round worms) Soulsby, 1982. The infestations by gastrointestinal nematodes of the order of strongyloides in the small intestines especially in the lumen of the abomasum, and of large intestine were more common and identified (Blander *et al*., 1994). Ijaz (2008) documented the highest infestations of gastrointestinal parasites in goats (63.3%). Zhang *et al*., (2006) reported the survey of gastrointestinal parasites in adult sheep of which *Haemonchus contortus, Strichostrongy luscolubriformis* and *Fasciola heapatica* were the most deadly and common among others. Sheep and goats in the chosen pilot areas of this research are suffering from the same gastrointestinal parasitism, pending on it prevalence, as mentioned above, which had led to the misused of available dewormers with resultant resistant in certain areas due to lack of proper outline herd health programme for sheep and goats. Public importance of such misused of antihelminth is that it eventually ended up in humans via the food chain posing lots of health hazards to us. Hence, the importance of this pilot research could not be overemphasized.

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Adejinmmi *et al*., (2015) reported prevalence study on the gastro intestinal parasites of goats was carried out for six months from May to October, 2014 in Ibadan, South Western, Nigeria. Four hundred (400) goats' faecal samples comprising of 103 West African Dwarf and 297 Red Sokoto breeds were collected from goats in households, market places and abattoir. They were examined for intestinal helminth eggs and protozoan oocysts using direct microscopic examination and sodium chloride floatation technique. Out of the 400 faecal samples examined, 303(75.75%) were positive for gastrointestinal parasites. The Red Sokoto breed had a higher prevalence of 217(54.25%) while West African dwarf breed had the lower prevalence of 86(21.5%). Male goat had a prevalence of 163(40.85%) while female had a prevalence of 140(35%). The gastro intestinal parasites observed were *Strongyloides papiillosus*, *Monieza* spp, *Coccidia* spp and *Strongyle* spp. *Strongyle* spp had the highest prevalence while *Monieza* spp had the lowest prevalence. Of the total 217(54.3%) Red sokoto breeds positive for helminths, 120(30%) had mixed parasitic gastro-intestinal infection while 74(18.5%) of the total 86 (21.5%) WAD goats positive for helminth also had mixed infection. We suggest good management practices, prompt diagnosis and treatment with anthelmintic and antiprotozoa drugs and education of animal owners on bio-security as panacea to reduce the risk of infection and increase productivity of the animals. Ogudo *et al*., (2015) documented a cross-sectional survey was carried out in primary schools to determine prevalence, intensity and spatial co-distribution of Schistosomiasis and soil transmitted

helminths (STH) infections in Ogun State, Nigeria. A total of 2148 pupils from 42 schools were examined for Schistosoma and STH infections from urine and fresh fecal samples respectively. Ethyl ether concentration method prepared in sodium acetate – acetic acid – formalin ether was used to concentrate parasites' ova before microscopic examination. The overall prevalence of schistosomiasis and STH infections were 4.0% (95% CI = 3.21–4.92) and 34.64% (95% CI = 32.62–36.69) respectively. *Schistosoma haematobium* and *Ascaris lumbricoides* were the most prevalent across the study area among the *Schistosoma* and STH species respectively. Overall, intensity of infection was higher in males than in females for all *Schistosoma* and STH infections, but with no significant difference (P> 0.05), except for *Trichuristrichiura* (χ^2 = 6.490, P < 0.05). Infection intensity was significantly inversely correlated (χ^2 = 12.953, P < 0.05) with an increase in age group. Co-distribution of *Schistosoma*and STH infections occurred in 15 (35.7%) out of 42 schools, and only 30 children (1.4%) had co-infection of *Schistosoma* and STH. This study provides information on the prevalence and spatial risk of schistosomiasis and STH in Ogun State. This will serve as decision-support tool for Ogun State programme managers to help facilitate integration of schistosomiasis and STH control.

MATERIALS AND METHODS

Faecal Samples Collection

Fresh faecal samples of sheep and goats from Mokwa, Lavun and Gbako Local Government Areas of Niger state were collected and preserved, if need be, prior to its processing in the laboratory.

Procedure of Faecal Sample Collection

- Sheep and goats were properly restrained and tails were raised up with left hand.
- Using the two fingers inside the polyphone bag
- Per rectum, faecal samples were scoped out and the polythene bag turned inside out.

Each feacal sample were well labelled with information such as breed, sex, age date and area of collection.

Direct Faecal Smear Method

Direct Faecal Smear Method. This was a qualitative method of faecal sample examination because small amount of faecal samples were involved.

Materials used in direct faecal smear method were as follow:

- Light microscope
- 2. Slides
- 3. Cover slips
- Water or saline
- Faecal samples
- Methylated spirit

Procedure of direct faecal smear method

- 1-2 drop of saline or water on the slide
- Take a little of the faecal sample on the tip of a glass rod or stick.
- Emulsify the faeces in the saline drop on the slide. Do not make smear so thick.
- It will be covered with cover slip and examine at 10x objective.
- Examination with 40x will be used to detect intestinal flagellates (Ali *et al*., 2008).

Simple Floatation Method: Materials used in this method included the following:

1. Microscope
2. Faecal sample
3. Funnels
4. Beakers
5. Sieves
6. Mortar and pestle
7. Saturated sodium chloride (Nacl).
8. Sample bottles
9. Test tube and t tube rack
10. Distilled water.

Procedure of simple floatation method

- A bit of faecal sample was put in a universal bottle. And about 5 ml of the floatation medium was added.
- With the help of glass rod, afaecal sample was broken down in the medium.
- The mixed contents were sieved into a centrifuge tube or a walled test tube.
- More medium was added to the test tube until a convex meniscus is formed.
- Gently, a cover slip was placed on the preparation and left it for 3-5 minutes.
- The cover slip was removed from the glass tube and placed on the slide and was examined for helminth eggs and oocysts (Khaled *et al*., 2016 and Folaranmi, 1988).

Sedimentation Centrifugation Technique Method: This was the ideal method for the concentration of all eggs and oocysts of helminths. It was specifically used for the recovery of trematode eggs in the faecal samples (and in bile).

Materials used in sedimentation concentration technique method included the following:

1. Faeal samples
2. Water
3. Slides
4. Cover slips
5. Microscope
6. Glass road
7. Funnels
8. Petric dishes
9. Polythene bags
10. Beakers
11. Bandage.

Procedure of Sedimentation Concentration Technique Method

- Faecal sample (5-10g) was broken in the water
- Sieve into a suitable container e.g. a urine conical flask or a beaker
- The broken faecal sample in the suitable container was left on a bench for 30-60 minutes.

- Gently, the supernatant was discarded
- Then, the left over deposit at the bottom of the container was examined for helminth parasites. Pasteur pippete and rubber was used for taking the sample. (Khaled *et al*., 2016 and Folaranmi, 1988)

Statistical Analysis

Statistical analysis of the results obtained were done using the Excel on Microsoft, Statistical Package for Social Sciences (SPSS) and Pearson's Chi square.

RESULTS

Results of the current initial investigations of gastrointestinal parasites (types of endoparasites and analysed data) from faecal samples of sheep and goats from Mokwa, Lavun and Gbako local government areas of Niger State were as contained in the Tables (1,2 3, 4, 5, 6 and 7) above. Types of gastrointestinal parasites identified are contained in Tables (1-3). The most common identified gastrointestinal parasites were *Haemonchus* sp, *Fasciola* sp and coccidian infection. From the statistical analysis (Table 4), expected presence of parasite count within local governments areas were as follows: Mokwa, 15%; Lavun, 23 and Gbako, 23% in comparison to expected absence of parasite in the same order which were 85%, 77% and 77%, respectively. The total of both presence and absence of gastrointestinal parasites in each of the local government areas amounted to 100%. There is a correlation between the location and parasites density. In (Table 5), the Pearson Chi-square value obtained was 2.634. The number of valid cases were zero. 0 cells (0.0%) have expected count of less than 5. The minimum expected count is 44.67. (Table 5). The Pearson values of likelihood ratio, linear and linear associated values were 2741 and 1.969.

Table 1. Prevalence of gastrointestinal parasites (endoparasites) of sheep and goats from Muwo village and Mokwa in Mokwa local government area

S/NO	ANIMALS SPECIES	TYPE OF SAMPLE	ENDOPARASITE	INDENTIFIED
	Sheep and Goat	Faecal sample	Sheep	Goats
1.	sheep and goat	faecal sample	*Nematodirus* sp	--------
2.	sheep and goat	faecal sample	Eggs of *Haemonchus* spp	----------
3.	sheep and goat	faecal sample	-------	
4.	sheep and goat	faecal sample	*Fasciola* spp	*Fasciola* spp
5.	sheep and goat	faecal sample	--------	_____
6.	sheep and goat	faecal sample	Coccidia infection	_____
7.	sheep and goat	faecal sample	----------	Eggs of *Haemunclus* spp
8.	sheep and goat	faecal sample	---------	____
9.	sheep and goat	faecal sample	*Fasciola* spp	----------
10.	sheep and goat	faecal sample	----------	_____
11	sheep and goat	faecal sample	*Fasciola* spp	_____
12	sheep and goat	faecal sample	----------	Eggs of *Taenia* spp
13.	sheep and goat	faecal sample	_____	Coccidia infection
14.	sheep and goat	faecal sample	----------	_____
15.	sheep and goat	faecal sample	_____	_____
16.	sheep and goat	faecal sample	_____	-------
17.	sheep and goat	faecal sample	_____	--------
18.	sheep and goat	faecal sample	_____	Ova of *Fasciola*
19.	sheep and goat	faecal sample	*Nematodirus* spp	_____
20.	sheep and goat	faecal sample	---------	_____
21.	sheep and goat	faecal sample	-------	_____
22.	sheep and goat	faecal sample	--------	_____
23.	sheep and goat	faecal sample	-------	Coccidia infection
24.	sheep and goat	faecal sample	--------	____
25.	sheep and goat	faecal sample	----	____
26.	sheep and goat	faecal sample	____	____
27.	sheep and goat	faecal sample	____	___
28.	sheep and goat	faecal sample	_____	____
29.	sheep and goat	faecal sample	___	_____
30.	sheep and goat	faecal sample	Coccidia infection	_____
31.	sheep and goat	faecal sample	____	*Haemonclus* spp
32.	sheep and goat	faecal sample	____	_____
33.	sheep and goat	faecal sample		___
34.	sheep and goat	faecal sample	____	____
35.	sheep and goat	faecal sample	___	_____
36.	sheep and goat	faecal sample		____
37.	sheep and goat	faecal sample	_____	____
38.	sheep and goat	faecal sample	_____	____
39.	sheep and goat	faecal sample	_____	_____
40.	sheep and goat	faecal sample	_____	_____
41.	sheep and goat	faecal sample	_____	_____
42.	sheep and goat	faecal sample	____	
43.	sheep and goat	faecal sample		
44.	sheep and goat	faecal sample		
45.	sheep and goat	faecal sample		
46.	sheep and goat	faecal sample		
47.	sheep and goat	faecal sample		
48.	sheep and goat	faecal sample		
49.	sheep and goat	faecal sample		
50.	SHEEP AND GOAT	faecal sample		

Table 2. Prevalence of gastrointestinal parasites (endoparasites) of sheep and goats from Kutigi and Doko in Lavun local government area

S/NO	ANIMALS SPECIES	TYPE OF SAMPLE	ENDOPARASITE	INDENTIFIED
	Sheep and Goat	Faecal sample	Sheep	Goats
1.	sheep and goat	faecal sample	___	--------
2.	sheep and goat	faecal sample	____	----------
3.	sheep and goat	faecal sample	-------	___
4.	sheep and goat	faecal sample	*Oesophagostomum* spp	____
5.	sheep and goat	faecal sample	-------	Fasciola spp
6.	sheep and goat	faecal sample	_____	Monieza spp
7.	sheep and goat	faecal sample	*Taenia* spp	____
8.	sheep and goat	faecal sample	---------	____
9.	sheep and goat	faecal sample	*Trichuris* spp	----------
10.	sheep and goat	faecal sample	----------	_____
11	sheep and goat	faecal sample	*Fasciola* spp	_____
12	sheep and goat	faecal sample	----------	_____
13.	sheep and goat	faecal sample	_____	Coccidia infection
14.	sheep and goat	faecal sample	----------	_____
15.	sheep and goat	faecal sample	_____	*Haemonclus* spp
16.	sheep and goat	faecal sample	____	-------
17.	sheep and goat	faecal sample	_____	--------
18.	sheep and goat	faecal sample	*Fasciola* spp	Ova of *Fasciola*sp
19.	sheep and goat	faecal sample	_____	_____
20.	sheep and goat	faecal sample	Coccidia infection	_____
21.	sheep and goat	faecal sample	*Schistosoma* spp	Ova of *Strongyloides* spp
22.	sheep and goat	faecal sample	---------	_____
23.	sheep and goat	faecal sample	-------	_____
24.	sheep and goat	faecal sample	--------	_____
25.	sheep and goat	faecal sample	-------	____
26.	sheep and goat	faecal sample	--------	Ova of *Fasciola* spp
27.	sheep and goat	faecal sample	----	_____
28.	sheep and goat	faecal sample	Ova of *oesophagostomun*	Coccidia infection
29.	sheep and goat	faecal sample	____	____
30.	sheep and goat	faecal sample	_____	_____
31.	sheep and goat	faecal sample	___	_____
32.	sheep and goat	faecal sample	_____	_____
33.	sheep and goat	faecal sample	_____	Coccidia egg
34.	sheep and goat	faecal sample	_____	___
35.	sheep and goat	faecal sample	Eggs of stnongyle	*Haemonchus* spp
36.	sheep and goat	faecal sample	_____	_____
37.	sheep and goat	faecal sample	_____	
38.	sheep and goat	faecal sample	*Haemonchus* spp	
39.	sheep and goat	faecal sample	_____	
40.	sheep and goat	faecal sample	_____	___
41.	sheep and goat	faecal sample	_____	___
42.	sheep and goat	faecal sample	_____	___
43.	sheep and goat	faecal sample	_____	___
44.	sheep and goat	faecal sample	_____	___
45.	sheep and goat	faecal sample	_____	Coccidia infection
46.	sheep and goat	faecal sample	___	___
47.	sheep and goat	faecal sample	____	___
48.	sheep and goat	faecal sample	Segment of *Fasciola* spp	___
49.	sheep and goat	faecal sample	____	___
50.	SHEEP AND GOAT	faecal sample	Coccidia infection	____

In research as contained in (Table6), the animal specie's prone to the gastrointestinal parasites was goats (33) and sheep (28) in that order. Presence cross tabulation, expected count percentage within the sheep is 40.9%, while that of goats was 48.7% (Table 6). Table 7 contained another set of Pearson chi-Square tests of variables such as Pearson Chi-square, continuity correlation, likelihood ratio and linear by linear association were 514a, 329, 515 and 513. 0 cells (0.00%) have expected count less than 5. The minimum expected count is 30:50. In (Table 8), the risk estimate at 95% confidence intervals for sheep and goats was 814.

DISCUSSION

Gastrointestinal parasites infestations impact a lot of havocs in distinct dimensions on small ruminants especially, sheep and goats that are mostly kept by rural and to certain extent, the semi urban dwellers for diverse reasons as observed in this investigation.

Also, similar incidence was documented by Ogudo *et al*., (2015). In this investigation, it was discovered that all the three local governments' areas (Mokwa, Lavun and Gbako) of Niger State were infested with different types of the gastrointestinal parasites at distinct strata. The order of the helminthes infestations of sheep and goats in this research was Mokwa less than Lavun while, Lavun was, equal to Gbako (15%, 23% and 23%). The degree of prevalence of the gastrointestinal parasites (endoparasites) in the three local government areas indicates their locations and proximity to the availability of veterinary services of which Bosso local government area has the most advantage of her location within theumbrella ofstate capital. This results could be compare to the prevalence of gastrointestinal parasites of sheep and goats in and around Rawalpindiand,lslambad, Pakistan where lesser numbers of gastrointestinal parasites were noted in Rawalpindi and, lslambad than other semi urban and villages (Ali *et al*., 2004). The most prevalence gastrointestinal parasites that are common to all three local government areas surveyed in this

Table 3. Prevalence of gastrointestinal parasites (endoparasites) of sheep and goats from Lemu,and Somazhiko in Gbako local government area

S/NO	ANIMALS SPECIES	TYPE OF SAMPLE	ENDOPARASITE	INDENTIFIED
	Sheep and Goat	Faecal sample	Sheep	Goats
1.	sheep and goat	faecal sample	_____	--------
2.	sheep and goat	faecal sample	_____	----------
3.	sheep and goat	faecal sample	_____	
, 4.	sheep and goat	faecal sample	*Oesophagostomum* spp	Ova of *Fasciola* spp
5.	sheep and goat	faecal sample	--------	ova of *fasciola* spp
6.	sheep and goat	faecal sample	_____	*Monieza* spp
7.	sheep and goat	faecal sample	---------	_____
8.	sheep and goat	faecal sample	---------	_____
9.	sheep and goat	faecal sample	_____	----------
10.	sheep and goat	faecal sample	----------	_____
11	sheep and goat	faecal sample	____	_____
12	sheep and goat	faecal sample	---------	Coccidia infection
13.	sheep and goat	faecal sample		Coccidia infection
14.	sheep and goat	faecal sample	-----	*Haemonhus* spp
15.	sheep and goat	faecal sample	_____	-------
16.	sheep and goat	faecal sample	_____	--------
17.	sheep and goat	faecal sample	_____	Ova of Fasciola
18.	sheep and goat	faecal sample	Fasciola spp	coccidia infection
19.	sheep and goat	faecal sample	Ova of *Fasciola* spp	*Ostertagia* spp
20.	sheep and goat	faecal sample	Coccidia infection	_____
21.	sheep and goat	faecal sample	*Schistosoma* spp	____
22.	sheep and goat	faecal sample	---------	____
23.	sheep and goat	faecal sample	-------	ova of bunostomum
24.	sheep and goat	faecal sample	--------	_____
25.	sheep and goat	faecal sample	-------	Ova of *Fasciola* spp
26.	sheep and goat	faecal sample	--------	_____
27.	sheep and goat	faecal sample	----	Coccidia infection
28.	sheep and goat	faecal sample	_____	Ova of Fasciola spp
29.	sheep and goat	faecal sample	____	
30.	sheep and goat	faecal sample	_____	____
31.	sheep and goat	faecal sample	___	____
32.	sheep and goat	faecal sample	_____	_____
33.	sheep and goat	faecal sample	*Strongyloides* spp	___
34.	sheep and goat	faecal sample	__	___
35.	sheep and goat	faecal sample	__	____
36.	sheep and goat	faecal sample	_____	____
37.	sheep and goat	faecal sample	___	Strongyle spp
38.	sheep and goat	faecal sample	__	_____
39.	sheep and goat	faecal sample	____	____
40.	sheep and goat	faecal sample	____	____
41.	sheep and goat	faecal sample	_____	*Fasciola* spp
42.	sheep and goat	faecal sample	____	
43.	sheep and goat	faecal sample	_____	
44.	sheep and goat	faecal sample	_____	
45.	sheep and goat	faecal sample	_____	
46.	sheep and goat	faecal sample	Coccidia infection	
47.	sheep and goat	faecal sample	___	
48.	sheep and goat	faecal sample	____	
49.	sheep and goat	faecal sample	____	
50.	SHEEP AND GOAT	faecal sample	*Fasciola* spp	

Table 4. Local government areas parasites prevalence cross tabulation

			PARASITES PREVALENCE		Total
			YES	NO	
Local governments	MOKW	Count	15	85	100
	A	Expected Count	20.3	79.7	100.0
	LAVUN	Count	23	77	100
		Expected Count	20.3	79.7	100.0
	GBAKO	Count	23	77	100
		Expected Count	20.3	79.7	100.0
Total		Count	61	239	300
		Expected Count	61.0	239.0	300.0

Table 5. Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.634[a]	2	.268
Likelihood Ratio	2.741	2	.254
Linear-by-Linear Association	1.969	1	.161
N of Valid Cases	300		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.33.

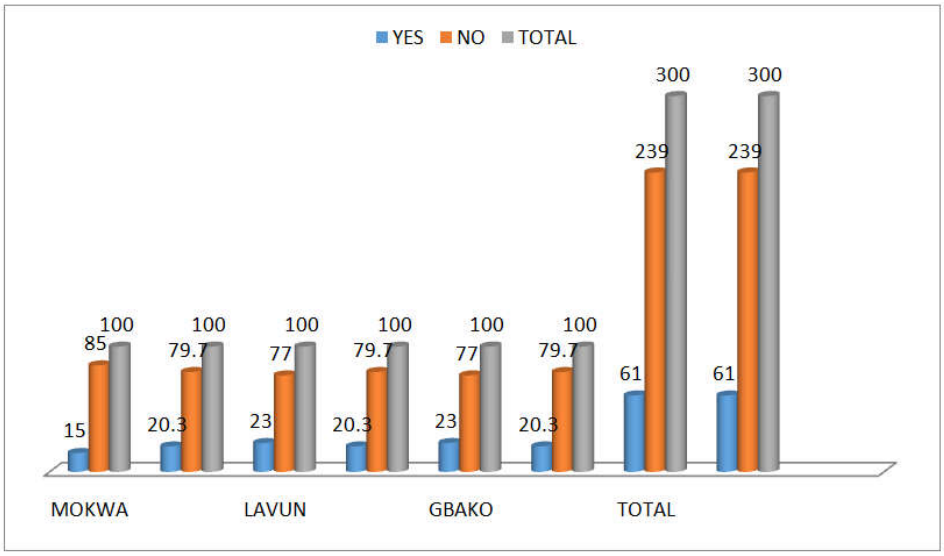

Figure 1. Parasites prevalence in local government areas

Table 6. Species of ruminant parasite prevalence cross tabulationcount

		PARASITE PREVALENCE		Total
		YES	NO	
SPECIES OF RUMINANT	SHEEP	28	122	150
	GOAT	33	117	150
Total		61	239	300

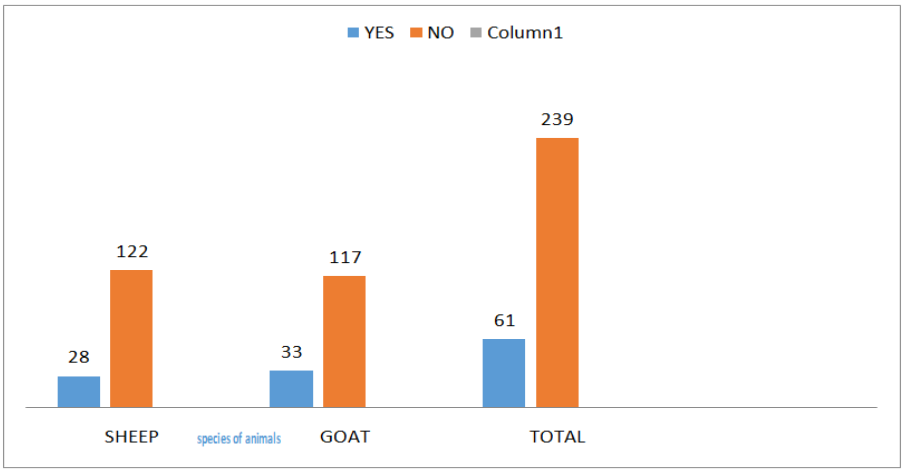

Figure 2. Parasite prevalenece of sheep and goats

Table 7. Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.514[a]	1	.473		
Continuity Correction[b]	.329	1	.566		
Likelihood Ratio	.515	1	.473		
Fisher's Exact Test				.566	.283
Linear-by-Linear Association	.513	1	.474		
N of Valid Cases	300				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 30.50

Table 8. Risk estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for SPECIES OF RUMINANT (SHEEP / GOAT)	.814	.463	1.430
For cohort PARASITE PREVALENCE = YES	.848	.541	1.331
For cohort PARASITE PREVALENCE = NO	1.043	.930	1.169
N of Valid Cases	300		

research were *Haemonchus* spp, *Fasciola* spp and Coccidia infection, respectively. This result is comparable to similar research work carried out by Anenene *et al*., (1994) in which gastrointestinal parasites of sheep and goats in the southeastern Nigeria with coccidian infection, *Haemonchus* spp and *Strongylus* spp being the most dominant helminthes in their report. It is, also, in line with the report of Alade and Bwala (2016) that discovered five species of gastrointestinal parasites eggs infestation such as Strongyle, Strongloides, coccidian occyst, Moniezia, and Trichuris in Yankasa sheep in a semi-arid environment. Similarly, Singh *et al*., (2017) reported different types of helminths infestations in small ruminants with high prevalence during the monsoon season with coccidian infection the major parasite identified.

Conclusions

From the results obtained in this initial pilot research, the following conclusions could be drawn: gastrointestinal parasites are present,at various stages and degrees, in the three local government areas surveyed, which are burden to the small ruminants health, reproduction capabilities and survival at long run;there is a correlation between the location of the places surveyed to the availability of veterinary facilities and parasites density and,there is a difference in animal species susceptibility to helminthiasis of which sheep were lesser than goats.The parasites population could have been more if it were in the full wet season. This pilot research could be used for other remaining local government areas of Niger State to come up with a resounding and complete herd health programmefor small ruminants irrespective of where and how they are kept.

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