PREVALENCE OF SINGLE AND MULTIPLE INFECTIONS BY GENERA, BREED, SEASON, SEX AND AGE OF SHEEP IN GOMBE STATE

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ABSTRACT
Helminthosis still remains a problem responsible for losses in ruminant production in Gombe State and Nigeria as a whole.Prevalence of single and multiple infections of gastrointestinal parasite of Sheep in Gombe State, Nigeria were assessed between March and October, 2017. Three hundred faecal samples comprising 130 Yankasa, 73 Balami and 97 Uda breeds were collected from households, sheep and goats markets and abattoir. The samples were subsequently processed for gastro-intestinal parasite presence and identification using floatation method as described by Soulsby. Six genera of parasites were observed namely; Coccidia, Haemonchus, Trichuris, Strongyle, Fasciola, and Oesophagostomun. Coccidia infection (33.30%) was the most predominant while Fasciola and Haemonchus (2.50% each) were least. Out of the 300 samples examined, 230 samples were found positive among which 67.30 and 32.60% had single and multiple infections respectively. Infection varied significantly ($P< 0.05$) with breed with overall prevalence of 70.80, 74.00 and 86.60% for Yankasa, Balami and Uda respectively. Season and age had significant influence ($P<0.001$) on infection prevalence. Prevalence of single and multiple infections were 21.70 and 8.30% for dry and 30.0%, 16.7% for the wet seasons respectively while the corresponding none infection rates were 20.70 and 2.70%. Majority of the sheep were infected by two or more parasite genera. Coccidia parasite was the most predominant followed by nematode and trematode. Furthermore, Uda in the wet season and younger sheep were more prone to gastrointestinal parasite infection.

Key word: Prevalence, infections, breed, Sheep and season.

INTRODUCTION
Gastrointestinal parasite infection results in negative influence on both average daily weight gains and growth rate of wool (Asif *et al*., 2008). Males are generally more susceptible than females due to the production of androgen hormone which lowers immune response (Asif *et al*., 2008). There is higher infection in suckling than young and adult possibility due to stronger immunological response. Tariq *et al.* (2010) reported that older animals recover from parasitic infection faster as immunity increases with age; due to repeated exposure (Dagnachew *et al*., 2011). During rainfall the number of infective larval stages increase and animal are also more susceptible to infection (Kantzoura *et al.*, 2012). Despite the remarkable achievement in the discovery of gastrointestinal parasite drugs with increased spectra of activity, nematode infection and disease remain some of the greatest limiting factors in the production of sheep worldwide (Regassa *et al*., 2006). A study like the present will not only contribute to determining the prevalence of single and multiple infections of gastro-intestinal parasite by genera, breed, season, sex and age but will also lead to overall effort to tackle the gastrointestinal parasite and their menace. This may include efforts at prevention, control and treatment and, ultimately selection and breeding for tolerance/resistance. This could lead to increased productivity which is an essential goal in any livestock enterprise. Increased productivity may translate into improvement in livelihood/welfare of the populace (Tariq *et al*., 2010). In addition, the study might provide useful information for further research.

MATERIALS AND METHODS

Area of the Study

The research covered the three senatorial zones of Gombe State comprising North, Central and South. Gombe State lies within the North East region of Nigeria and occupies a total land area of about 20,265 Km^2.

Breeds of Sheep Used

Three breeds of indigenous sheep found in Nigeria and available in Gombe state were used for this study. They include: Yankasa, Balami and Uda.

Study Design and Sampling

The study was carried out between March and October, 2017 where random faecal and blood samples were collected from 300 sheep. The total sample size was calculated according to Thrusfield (2005) using 95% confidence and expected prevalence of 89.1% from previous study of James (2014) and desired precision of 5% as follows: $n = 1.96^2 P_{exp} (1- P_{exp}) / d^2$

Where n = sample size

P_{exp} = expected prevalence (89.1% of James, 2014)

d = desired absolute precision of 5% (0.05).

The value of 150 samples obtained using the above relation, was multiplied by 2 to avoid sampling error in accordance with (Jatau *et al*., 2011). Stratified random sampling was applied to collect the 300 samples comprising of 130 Yankasa, 73 Balami and 97 Uda sheep used. The samples were collected from Gombe peri urban and urban households, abbatoir and sheep and goat markets.

Faecal sample collection and analysis

Fresh faecal sample (5g) was collected using the fingers, directly from the rectum of the sheep into the universal containers, labeled and stored. The samples were subsequently processed for gastro-intesinal parasite presence and identification according to Soulsby (1986).

Data Analysis

Data collated were carefully entered in to Microsoft Excel spread sheet and cross checked for analysis. Description statistics were used to assess the prevalence of gastrointestinal parasite infections.

Table1: Prevalence of single and multiple infections by Genera

	Parasite	No. of Positive Samples		%
Single:	Coccidia spp.	48		31.00
	Haemonchus spp.	32		20.60
	Strongyle spp.	59		36.10
	Trichuris spp.	9		5.80
	Fasciola spp.	8		5.20
	Oesophagostomum spp.	2		1.30
Total		**155**		**67.40**
Multiple:	Coccidia+ Haemonchus spp.	23	30.70	
	Cocc. + Strongyles spp.	17	22.70	
	Cocc. + Oesophagostomum spp.	6		8.00
	Strongyle + Haemonchus spp.	16		21.30
	Cocc.+ Strongyle + Haemonchus	13		17.30
Total	spp.	**75**		**32.60**

%= percentage, spp. = specie

Table 2: Prevalence of single and multiple infections by breed, season, sex and age

Factor	Infection			LS
	None	Single	Multiple	
Breed:				χ df 4 = 9.46*
Yankasa	38 (12.70)	58 (19.30)	34 (11.30)	
Balami	1(6.30)	38 (12.70)	18 (5.30)	
Uda	13(22.30)	59 (19.70)	25 (8.30)	
Season:				χ df 2 = 53.98***
Dry	62(20.70)	65 (21.70	25 (8.30)	
Wet	8(2.70)	90 (30.00)	50 (16.70)	
Sex:				χ df 2 = 4.04NS
Male	42(14.00)	75 (25.00)	33 (11.00)	
Female	28(9.30)	80 (26.70)	42(14.00)	
Age:				χ df 2 = 21.29***
Young	23(7.70)	92 (30.70)	52(17.30)	
Adult	47(15.70)	62 (21.00)	23(7.70)	

Key: *** = P<0.001, * = P<0.05, NS =Not significant, = Chisquare, df =Degree of freedom, LS = Level of significance and values in bracket are percentages.

RESULTS AND DISCUSSION

Out of the 300 samples screened for gastrointestinal parasites, 230 samples were found positive, 67.30 and 32.60% had single and multiple infections respectively (Table 1). The prevalence of single infection ranged from 1.30 for Oesophagostomum to 36.10% for Strongyles and those of multiple infections were Coccidia + Haemonchus (30.70%),Coccidia + Strongyle (22.70%), Coccidia + Oesophagostomum (8.00%), Strongyle + Haemonchus (21.30) and Coccidia + Strongyle + Haemonchus (17.30%). The result of the present study indicated that Coccidia infection was the most predominant; this disagrees with Asif (2008) who reported dominance of nematodes in their work. The present study also agrees with the high prevalence of Coccidiosis reported by Dagnachew *et al.* (2011). The prevalence of both Haemonchus and Strongyles were quite high. This agrees with the findings by Hassan *et al.* (2013) who reported 39.24 and 11.21% for Haemonchus and Strongyles respectively. The prevalence of Fasciola in this study was however low which disagrees with Asif (2008) who reported high prevalence of Fasciolosis in the Jhelum valley. Infection varied significantly (P<0.05) with breed (Table 2). The prevalence of single infections were; 19.30, 12.70, and 19.70% for Yankasa, Balami and Uda respectively while the corresponding values for multiple and none infections were 11.30 and 12.70%, 5.30 and 6.30%, and, 8.30 and 22.30%. The significant difference in gastrointestinal infection prevalence among breeds of sheep in the present study had similarly been reported by Basier and Love (2003).The higher overall parasite prevalence in Uda than the others, suggest that Uda is probably more susceptible to gastrointestinal parasite infection which is in disagreement with Mbap and Chiroma (1998) who reported among Nigerian sheep breeds that Yankasa had the highest gastrointestinal prevalence while Balami had lowest value. The single and multiple infection prevalence however varied significantly (P<0.05) by breed which is probably due to breed difference. The significant difference in single and multiple infection prevalence by breed is also an indication of variation in their ability to cope with infection in Gombe probably due to differences in their natural habitat. Season and age also had significant influences (P<0.001) on infection prevalence. The prevalence of single and multiple infections were 21.70 and 8.30% for dry and 30.00%, and 16.70% for the wet seasons respectively while the corresponding none infections were 20.70 and 2.70%. The finding in this study that single and multiple infections were lower in the dry than wet season is in agreement with Hassan *et al.* (2013). The desiccating effects of the dry

season most likely affected the survival, growth and development of the infective stages and hence lower infection. The single and multiple prevalence by age were 30.70 and 17.30% for young and, 21.00 and 7.70% for adult respectively. The high infection observed in young than the adult could be attributed to the fact that younger sheep were at risk of infection with eggs than in adults. Aging however was also considered a strong risk factor in gastrointestinal parasite infection (Hassan *et al*., 2013). Dagnachew *et al.* (2011) also documented that adult animals developed acquired immunity against helminth infection as they mature. This is due to repeated exposure and the increasing ability to expel the parasite before it becomes established in the gastrointestinal tract. The influence of sex on single, multiple and none infections in this study was not significant and the range of values of single and multiple infections observed are in agreement with the findings of other researchers in other countries (Dagnachew *et al.*, 2011).

CONCLUSIONS AND RECOMMENDATIONS

In general, the study indicates that gastrointestinal parasite infection was an important health problem in the study area especially as regard to poly-parasitism. Majority of the sheep were infected by two or more parasite genera. Coccidia parasite was the most predominant followed by nematode and trematode. Furthermore, Uda in the wet season and younger sheep were more prone to gastrointestinal parasite infection. Due to polyparastism in the study area, there should be awareness creation for sheep owners on the best control strategies and management practices of gastrointestinal parasite infection through extension services. More attention should be paid to Uda, young sheep and the wet season in GIT parasite prevention, control and treatment.

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