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Gastrointestinal and haemoparasitism of sheep and goats at slaughter in Kano, northern-Nigeria

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Abstract
This study, aims at determining the prevalence of haemo and gastrointestinal (GI) parasites of small ruminants in Kano as well as the effect of the parasites on the packed cell volume (PCV) and total plasma proteins (TPP) of the infected animals. Blood and faecal samples were collected randomly from 103 Yankassa sheep and 97 Kano brown goats. The faecal samples were examined by simple floatation technique for the presence of helminthes eggs and *Coccidia* oocysts while the blood samples were examined using the thin blood smear, wet mount, haematocrit centrifugation technique (HCT) and mice inoculation test for the presence of both intra and extracellular haemoparasites. The overall parasitic prevalence of 95.51% and 91.75% were observed in the sampled sheep and goats respectively. Also 74.76% of the sheep and 74.23% of the goats had only GI parasitic infection, while 18.45% of the sheep and 17.52% of the goats were concurrently infected with both GI and haemoparasites. However, only 1.94% of the sheep and no goat was habouring only haemoparasite. Strongyles, *Coccidia* and *Moniezia* were the GI parasites identified, with the highest prevalence observed with *Coccidia* and the least with *Moniezia* in both the sheep and goats. The haemoparasites recorded were *Anaplasma ovis*, *Babesia ovis* and *Theileria ovis* with *A. ovis* being the highest and *B. ovis* the least prevalent in both the sheep and goats. Significant decrease ($p<0.05$) in the mean PCV values of all the categories of the infected animals was observed in both animal species. However, the difference in mean TPP values of the infected animals was not significant ($P>0.05$) to that of the uninfected animals.

Keywords: Goat, parasites, prevalence and sheep.

Introduction

The benefits derived from sheep and goats in the tropics are far below the expected due mainly to low productivity. This is due to numerous factors of which disease is the most important (Akerejola *et al*., 1979). Sheep and goats in sub-Saharan Africa may be infected with a wide variety of parasites among which the gastrointestinal parasitic infection are the commonest and these include helminthic infections especially *Haemonchus contortus*, *Trichostrongylus, Cooperia* and protozoan diseases including coccidiosis (Ngole *et al*., 2001; Okaiyeto *et al*., 2008) as well as economically important vector-borne prokaryotic and eukaryotic haemoparasites such as the Rickettsiae: *Anaplasma* and *Ehrlichia* (*Cowdria*), and the protozoan parasites *Theileria*, *Babesia* and *Trypanosoma* (Bell-Sakyi *et al*., 2004; Okaiyeto *et al*., 2008). The tropical environment is for various reasons eminently suitable for the development of these parasitic diseases (Payne, 1990).

The direct losses caused by the parasites are attributed to acute illness and death, premature slaughter and rejection of some body parts at meat inspection. Indirect losses include the reduction of productive potential such as decreased growth rate, weight loss in young growing animal and late maturity of slaughter stock (Hansen & Perry, 1994).

Proper understanding of the epidemiology of disease causing agents is a prerequisite for the rational design of effective preventive and control programme against the disease. Although studies have been carried out with respect to epidemiology of blood and gastrointestinal parasitism in ruminants in Nigeria, most of the studies are confined to cattle hence the need for extension of such studies to small ruminants. This study is therefore targeted at providing relevant information in this regard.

Materials and methods

Study Area

The study was carried out in the central abattoir in Kano metropolis. Kano State is endowed with a land area of 20,760 square kilometers and is located between latitudes 12^{o} 4' and 10^{o} 3' N and longitude 7^{0} 4' and 9^{0} 3' E. It lies in the tropical wet –and- dry climatic zone of Nigeria with average annual rainfall of about 1000mm in the southern part, 800mm around metropolitan Kano and about 600mm in the north-east. The rainy season usually covers the months of April to October. This is followed by harmattan which usually begins in November and ends in March (Kabiru, 2011).

Small ruminants are usually bought by butchers from livestock traders in the nearby villages and town markets to the abattoir for slaughter.

Sample collection

Blood and faecal samples were collected from 103 Yankassa sheep and 97 Kano Brown goats between the months of July and September, 2009. Immediately following slaughter, 5mls of blood were collected from the severed jugular vein into bijou bottle containing Ethylene Diamine Tetra Acetate (EDTA) as anti-coagulant. While about 20g of faecal materials were collected directly from the rectum of the animals and placed in clean polythene bags. The samples were properly labeled and then transported immediately to the laboratory on ice.

Examination of the blood and faecal samples

On arrival to the laboratory the blood samples were immediately examined for the presence of parasites using wet blood film, Giemsa stained thin blood smears (Adam *et al*., 1971) and haematocrit centrifugation technique (HCT) as described by (Woo, 1969). Albino mice one per each blood sample were inoculated intrapertoneally with the buffy-coat materials of the spun capillary tubes following the HCT examination as described by (Reid *et al*., 2001). The mice were monitored for parasitaemia for 3 weeks post inoculations after which were considered negative for trypanosomes. The remaining blood samples were used to determine the packed cell volume (PCV) and total plasma proteins of the sampled animals using the standard microcapillary (Coles, 1974) and refractometer (Kerr, 1989) methods respectively. Ten grams of the faecal sample was examined for helminthes eggs using the floatation technique as described by (Soulsby, 1986).

Data analysis

The data obtained were analyzed using percentages and tabulation while the values of the PCV and total plasma proteins of the non infected animals and that of the different categories of the infected animals were summarized as means ± Standard error. Significant difference between the means were evaluated by analysis of variance (ANOVA); Post test analysis was done using the Dunnett's multiple comparison tests to compare the values of the infected groups to that of the uninfected group of each animal species, using GraphPad prism version 5.0 for windows from GraphPad software, San Diego, California, U.S.A. (www.graphpad.com). Values of $p<0.05$ were considered as statistically significance.

Results

The results obtained indicated that out of the faecal and blood samples collected from the 103 sheep and 97 goats, 98 (95.51%) and 89 (91.75%) were positive for either gastrointestinal and/or blood parasites while 5 (4.85%) and 8 (8.25%) were negative for the sheep and goat respectively (Table 1). The results further showed that, 77 sheep (74.76%) and 72 goats (74.23%) were having only gastrointestinal parasites infection (Table 1). However, only 2 sheep (1.94%) and no goat had single infection with haemoparasite (Table 1). Also 19 (18.45%) sheep and 17 (17.52%) goats had concurrent infection of gastrointestinal and haemo parasites (Table 1).

The gastrointestinal parasites observed in this study included nematodes of the Strongyles group; protozoans of the group *Coccidia* and cestodes of *Moniezia* species. The result shows a prevalence of 65 (63.10%) for strongyles, 92 (89.32%) and 5 (4.85%) each for *Coccidia* and *Moniezia* species in sheep. While in goats prevalence of 67 (69.07%), 86 (88.65%) and 6 (6.18%) were recorded for strongyles, *Coccidia* and *Moniezia* species respectively (Table 2).

Table 1: Prevalence of parasitic infections in sheep and goat at slaughter in Kano central abattoir

	Number Sampled	Number infected with only GI parasites	Number infected with only blood parasites	Number with mixed infection of GI and blood parasites	Total
Sheep	103	77 (74.76%)	2 (1.94%)	19 (18.45%)	98 (95.15%)
Goat	97	72 (74.23%)	0 (0.00%)	17 (17.52%)	89 (91.75%)
Total	200	149 (74.50%)	2 (1.00%)	36 (18.00%)	187 (93.50%)

Table 2: Specific prevalence of parasitic infections in sheep and goats at slaughter in Kano central abattoir

	Gastrointesinal parasites			Blood parasites		
Parasites	Strongyles	*Coccidia*	*Moniezia species*	*Anaplasma ovis*	*Babesia ovis*	*Theileria ovis*
Sheep	65 (63.10%)	92 (89.32%)	5 (4.85%)	13 (12.62%)	1 (0.97%)	7 (6.79%)
Goat	67 (69.07%)	86 (88.66%)	6 (6.18%)	11 (11.34%)	2 (2.06%)	4 (4.12%)

Table 3: Mean PCV and total plasma proteins (±SE) of uninfected and parasites-infected sheep and goats at slaughter in Kano central abattoir.

	Non infected animals		Infected with either gastrointestinal and or blood parasites		Infected with Gastrointestinal parasites only		Infected with both Gastrointestinal and blood parasites	
	Sheep(n=5)	Goat (n=8)	Sheep(n=98)	Goat(n= 89)	Sheep(n=77)	Goat(n=72)	Sheep(n=19)	Goat(n= 17)
PCV (%)	35.00±1.70	33.37±1.38	29.47±0.48*	26.69±0.45*	29.48±0.49*	26.89±0.45*	29.73±1.04*	26.88±0.96*
Total protein (g/dL)	5.28±0.38	6.72±0.22	5.71±0.22	6.18±0.05	5.33±0.07	6.52±0.22	5.12±0.15	5.91±0.15

*p<0.05 compared to mean values of uninfected group of same species of animal

The haemoparasites observed were *Anaplasma ovis, Babesia ovis* and *Theileria ovis*. Of these haemoparasites encountered, *A. ovis* has the highest prevalence of 13 (12.62%) in sheep and 11 (11.34%) in goats followed by *T. ovis* with a prevalence of 7 (6.79%) in sheep and 4 (4.12%) in goats. *Babesia ovis* had the lowest prevalence rate of 0.97% in sheep and 2.06% in goats (Table 2). The results of the wet mount, HCT, mice inoculation test and thin blood smear revealed no trypanosomes in all the blood samples.

Discussion

Among the gastrointestinal parasites observed in this study, *Coccidia* have the highest prevalence in both sheep and goats. This is in conformity with the findings of Obijiaku & Agbede, (2007), who also reported a high prevalence of *Coccidia* in lambs and kids. The high prevalence obtained in this study could be as a result of the management system operated by most small ruminants' owners especially during the rainy season when animals are confined to avoid damage to crops. Consequently, such animals are overstocked with the pens not properly cleaned. These factors with the high humidity of the rainy season predispose them to the parasitic infections.

The observed high prevalence rate of gastrointestinal nematodes agrees with the findings of Okaiyeto *et al*. (2008). It was reported that the prevailing climatic conditions especially rainfall and temperature favour the development and survival of parasitic nematode eggs to infective stages (Chiejina & Emehelu, 1984). This might explain the high prevalence rate observed in this study as it was conducted during the rainy season. The gastrointestinal parasites recovered in the present study have also been reported in earlier investigations (Asanji & Williams, 1987). However, more of the animals in the present investigation have mixed gastrointestinal parasitic infection suggesting they could be suffering from parasitic gastroenteritis (PGE) complex which is more prevalent during the rainy season than other periods of the year (Chejina, 1987).

The species of haemoparasites reported in this study were similarly observed by Takeet *et al*. (2009) in sheep in Abeokuta, Nigeria. Also, our finding that *A. ovis* is the most prevalent haemoparasite in both sheep and goats agrees with the reports of other workers (Okaiyeto *et al*., 2008; Takeet *et al*., 2009). A relatively high incidence of the haemoparasite could be attributed to the favourable environmental conditions for the survival and transmission dynamics of the arthropod vectors. The observed low prevalence of *Babesia ovis* in this study is in accordance to earlier report by Assoku (1979) & Bell-Sakyi *et al*. (2004). It is known that small ruminants are endemically unstable for the parasite and animals that recovered from babesiosis become immuned to re-infection (Soulsby, 1986). The absence of trypanosomes in all the sampled animals in this study might be due to the fact that thesample area falls within the Tsetse free zones of Nigeria as well as small ruminants are not natural hosts for the

mechanically transmitted *Trypanosoma evansi* endemic to the area. The observed anaemia characterised by low mean PCV values of all the categories of the infected animals suggests that the parasitic infection may be the cause of the anaemia. Similar observation has been made by Okaiyeto *et al*. (2008).In the present study the strongyles recorded were not identified to their generic level, however previous reports have shown that *Haemonchus contortus* is the most prevalent strongyle of ruminants in Northern Nigeria (Mbaya & Aliyu, 2007; Okaiyeto *et al*., 2008). The effects of the blood sucking activities of these helminthes and the haemolytic activities of the haemoparasites might be the cause of anaemia in the infected animals.

In conclusion the result of this study clearly shows that most of the small ruminants kept in the area of study are infected with blood and intestinal parasites. Their owners may not have noticed the effects of the parasites on the animals because of the subclinical or chronic nature of the infection, which often do not result in mortality. However, their effects is usually manifested in production losses in the form of diminution of productive potential such as decreased growth rate in lambs and kids, late maturity, weight loss, and increased susceptibility to other diseases.

There is therefore, need for prevention and control programs against these parasites of sheep and goats in endemic areas. This when carried out will improve the production potentials of these animals and the economic well being of the owners.

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