

Prevalence of Haemo and Gastrointestinal Parasites in Sheep Kept by the Nomadic Fulanis in Some Northern States of Nigeria

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Abstract: The prevalence of ovine haemo and gastrointestinal parasite in the 8 Local Government Areas (LGAs) of Northern Nigeria over a period of 10 months (February -October 2002) was evaluated. Blood and faecal samples were obtained from flocks of sheep herded with cattle. The study involved the random examination of 101 sheep of both sexes irrespective of breed, age between 9 and 36 months. Ninety percent of sheep examined were infected with gastrointestinal parasite while 33% were infected with haemoparasite. Mixed infections of haemo-and gastrointestinal parasite occurred in 34.6% of sheep examined. Seventy seven percent of these occurred as single haemoparasitic infections concurrently with one or two helminth species, 14.3% occurred as double haemoparasitic infections concurrently with one or two helminth species while only 8.6% occurred as triple haemoparasite infection concurrently with one specie of helminth. Gastrointestinal and haemoparasitic infections appear to be widespread in the area of study. Much of the infection seem to be subclinical and could indirectly cause production losses without attracting farmers attention to institute control measures.

Key words: Prevalence, haemoparasite, gastrointestinal parasite, sheep, anaemia, helminths

INTRODUCTION

Haemo and gastrointestinal parasitism continues to be the major constraints to livestock production in Sub-Sahara Africa (Gossen *et al.*, 1999). Like in other developing countries, majority of the farmers in Nigeria raise their livestock under traditional production system as a sideline to the main agricultural activity (Knipscheer *et al.*, 1983), interestingly most of these non nomadic farmers buy their stock from the Fulani nomads who actually keep livestock as the main activity while they do other agricultural activities for sustenance and income generation. With this cycle both endo and ecto parasitism control becomes critical if economic benefits are to be generated from livestock production. In the tropics the warm and humid climatic conditions in the region provide favorable environment for development of worm eggs to infective larvae, thus apart from nutritional problems, helminthosis is a limiting factor in the improvement of livestock due to production losses, increase cost of management and treatment and even mortality in severe cases (Agwuna, 1993; Barger and Cox, 1984; Larsen *et al.*, 1995; Hounzangbe-Adote *et al.*, 2005). According to Magona and Musisi (1999), most of

the production losses and heavy mortality in small ruminants under wet tropical conditions are caused by gastrointestinal parasites primarily *Haemonchus contortus* and *Trichostrongylus colubriformis*.

Trypanosomosis caused by trypanosomes of different species is the most important haemoparasitic disease of ruminants in the tropics. Infected animals have been shown to have high abnormal amounts of immunoglobulins and this lead to the occurrence of immunosuppression in the infected animals thereby exposing them to secondary infections (Brown *et al.*, 1990). Anaemia is a predominant symptom and a reliable indicator for the severity of haemoparasitic infection (Anosa, 1988) and the associated immunosuppression renders animal more susceptible to secondary infections (Nantulya *et al.*, 1982). Sheep are important source of investment in rural areas in Nigeria where wealth is stored in the form of livestock in the absence of banking facilities, as well as serving as an important source of meat, milk, skin, manure and socio-cultural values. The Nomadic herdsmen (pastoralist) also keep sheep and goats, which graze along with cattle. Knowledge of the diseases of sheep can be of value in understanding the epidemiology of some disease conditions in cattle. There

is dearth of documented information on the diseases of sheep kept by the nomadic Fulani especially due to haemo and gastrointestinal parasites. Therefore, this survey was conducted to determine the prevalence of natural occurrence of ovine haemo-and gastrointestinal parasitism in sheep.

MATERIALS AND METHODS

Study location: The study was carried out from February 2002 to October 2002 in 8 local Government Areas (LGAs) Igabi, Kagarko, Birnin Gwari, Kankiya, Doguwa (Sudan Savannah) and Keffi, Lapai and Tafa (Guinea Savannah) in 5 Northern states of Nigeria (Fig. 1).

Sampling: Faecal and Blood samples were collected during the raining season from a total of 101 sheep (from 28 flocks) after examining them for various clinical signs.

About 20 g of faecal materials were collected directly from the rectum, placed in clean polythene bags, labelled and transported to the laboratory in an ice pack. Ten gramm of the collected faecal sample was examined for helminth eggs using the flotation technique as described by Soulsby (1986). The remaining 10 g of faeces was blended together with an equal amount of sterile faeces and incubated in lightly capped jars at room temperature (23-25°C). The 3rd larvae stage (L3) harvested on the 7th day of incubation were differentiated to the generic level using a standard method as described by Annon (1977).

Blood samples were collected via jugular vein puncture into sterile bijoux bottles with EDTA as anticoagulant. Thin blood smears were prepared from each sample, stained with Giemsa and examined under X100 objective lens of a light microscope to determine

levels of parasitaemia. The remaining blood samples were estimated for Packed Cell Volume (PCV), as describe by (Coles, 1980).

RESULTS

The overall prevalence rates for gastrointestinal nematodes and haemoparasitic infection were 90 and 33%, respectively. Of the 8 Local Government Areas (LGAs) sampled, the highest (100%) prevalence of gastrointestinal parasites were observed from Kagarko, Birnin Gwari of Kaduna state, with mean annual rainfall of 900 mm each. Doka-Keffi of Nasarawa state and Tafa of Niger state also had prevalence of gastrointestinal parasite, respectively, with Doka- Keffi having 1500 mm annual rainfall and Tafa 950 mm. The lowest prevalence (50%) was observed from Kankiya Local Government Areas of Katsina state have an annual rainfall of 610 mm. The prevalence of haemoparasitic infection in Kaduna, Katsina, Nasarawa Niger and Kano states are 30, 0, 40,58 and 20%, respectively. In the 8 Local Governmet Areas, the highest prevalence (58%) was observed from Lapai LGAs in Niger state, while the fever, pale mucous membrane, rough hair coat, submandibular oedema, diarrhea and purulent nasal discharges were the major clinical signs observed in sheep that were physically examined.

A total of 35 Sheep (34.6%) had mixed infections. Twenty seven of these (77%) occurred as single haemoparasitic infection concurrently with one or two gastrointestinal parasite, 5 (14.3%) occurred as double haemoparasitic infections concurrently with one or two gastrointestinal parasite while 3 (8.6%) occurred as triple haemoparasitic infection concurrently with one gastrointestinal parasite. Concurrent *Trypanosoma (T) congolense* and *Haemonchus (H) contortus* infections occurred in 13 (37.0%) cases; *Trypanosoma (T) vivax* and *H. contortus* occurred in 5 (14.3%) cases. Mixed infections of *Anaplasma (A) ovis*, *Theileria ovis* and one or two gastrointestinal parasite occurred in 11 (31.4%) cases, while 3 (8.6%) occurred as *A. ovis*, *T. congolense*, *H. contortus* and *Cooperia curtecie* mixed infections.

Triple haemoparasitic infection and one gastrointestinal parasite (*T. congolense*, *A. ovis*, *Theileria ovis* and *H. contortus*) occurred in 3 (8.6%) cases.

There was a decreased in the values of Packed Cell Volume (PCV) as shown in Table 1 in concurrent single and mixed infections of gastrointestinal and haemoparasite. The lowest PCV values (15+3.9%) was observed in *T. congolense*, *H. contortus* and *Cooperia curtecie* mixed infections, while the highest PCV value (25+5%) was seen in *T.vivax*, *H.contortus* and *Cooperia curtecie* concurrent infections.

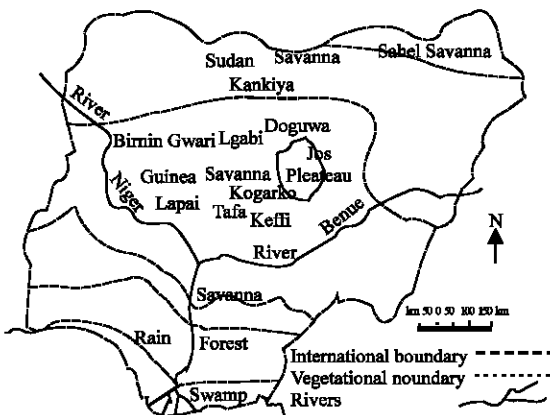


Fig. 1: Map indicating the selected areas were animal were sampled (Field survey, 2004)

Table 1: Prevalence of Ovine haemo-and Gastrointestinal Parasite (GIP) in nomadic sheep herd in eight Local Government Areas (LGAs) in five State of Northern Nigeria

LGAs	States	Annual Rainfall (mm)	No of sheep flocks Visited	No of Sheep in flock	No of Sheep sampled	No(%) +ve for GIP	No% +ve for Haemoparasites
Igabi	Kaduna	900	3	35	16	15(94%)	2 (13%)
Kagarko	Kaduna	900	3	21	9	9(100%)	4 (44%)
Birnin Gwari	Kaduna	900	5	56	15	15(100%)	5 (33%)
Kankiya	Katsina	610	2	24	10	5(50%)	0 (0%)
Doka-Keffi	Nasarawa	1500	4	50	15	15(100%)	6 (40%)
Lapai	Niger	950	4	64	12	10(83%)	7 (58%)
Tafa	Niger	950	3	48	14	14(100%)	7 (58%)
Doguwa	Kano	600	4	30	10	8(80%)	2 (20%)
Total			28	310	101	91(90%)	33 (33%)

DISCUSSION

The results of this study clearly indicates that mixed haemo and gastrointestinal nematode infections commonly occurred in sheep kept by the nomadic fulanis (pastoralists). These pastoralist may not easily notice the effects of internal parasites on the performance of their animals because of the sub-clinical or chronic nature of the diseases they cause which often does not only result in mortality but also in production losses. The observed anaemia and diarrhea as a major presenting clinical signs in this study, agrees with the report of Anosa (1988) where anaemia was reported to be a reliable indicator for the severity of gastrointestinal and haemoparasitic infection. Immunosuppressive effect of the Trypanosome parasite on immune system of infected animal may be responsible for the observed diarrhea. The rough hair coat observed during the course of the study might be as a result of reduced efficiency and utilization of nutrients, loss of appetite, the condition of the animal is made worst in the presence of other haemoparasitic infections that will in addition induce immunosuppression, as supported by Brown *et al.* (1990). Mixed infections constituted a substantial proportion of all gastrointestinal nematode infections in all the climatic zones of the local Government Areas under study. The high prevalence of gastrointestinal strongyle infection observed in this study may be explained by the existence of climatic conditions (rainy season) that support prolonged survival of infective larvae of nematode on pasture. Magona and Musisi (1999) found that districts which had high mean total rainfall (1500 mm) and mean maximum and minimum temperature of not less than 25 and 11 °C, respectively had greater potential to support prolonged survival of infected *H. contortus* larvae on pasture with subsequent transmission to livestock.

In this study, the highest annual rain fall of 1500 mm was recorded in Doka-keffi LGA of Nasarawa state, while the lowest annual rainfall of 600 mm was recorded in Doguwa LGA of Kano state. From the

results all the animals sampled from LGAs with annual rainfall of 900 mm and above were 100% positive for gastrointestinal parasites, except for Igabi LGA of Kaduna state with a prevalence rate of 94%, this is probably due to the fact that Igabi LGA is more northern than the other LGAs in Kaduna state that are included in the study (Kagarko and Birnin Gwari LGAs) which are more towards the middle belt of Nigeria. As shown in Table 2, the annual rainfall decreases from the middle belt northwards, with Nasarawa and Niger which are geographically in the middle belt having an annual rainfall of 1500 and 950 mm, respectively while in the north Katsina and Kano have an annual rainfall of 610 and 600 mm, respectively, this is partly responsible for the observed increase in the prevalence of gastrointestinal parasite. This finding is in consonance with the report of Barger and Cox (1984), Larsen *et al.* (1995) and Hounzangbe-Adote *et al.* (2005).

Haemonchus contortus and *Cooperia curtecie* were the most prevalent nematodes species observed in this survey, this implies that haemonchosis resulting from infection with *haemonchus* sp. remain one of the major causes of economic losses to ruminant production in the area of study. This might not be unconnected to the favorable climatic condition that supported prolonged survival of infective larvae on pasture as observed by Jacquiet *et al.* (1996, 1998) and Gatenby (2002). Similar report were made by Maingi *et al.* (1993) and Wauinu *et al.* (1994) who observed *H. contortus*, *Trichostrongylus* sp. and *Cooperia curtecie* as the most prevalent nematodes in small ruminants in the Masai of Kenya, while Njau (1987) also reported that *Haemonchus*, *Oesophagostomum* and *Trichostrongylus* were the most prevalent nematode of small ruminant in Tanzania.

In this study *Anaplasma ovis* was the most prevalent haemoparasite and it is known to also cause anaemia in infected animals (Horst, 1996). *Trypanosoma vivax* and *T. congolense* was observed in study, this further confirmed the report of Joshua and Ige (1982) that *T. vivax* and *T. congolense* occur naturally in sheep. The

Table 2: Frequency of concurrent single and mixed infection of Gastrointestinal nematodes and Haemoparasites in Sheep from Eight Local Government Areas (LGAs) of five Northern States of Nigeria

Infection Status	State	LGAs	Parasite combination	No of sheep positive	Mean% PCV
Single Haemoparasites/ Helminth	Kaduna	Igabi	<i>A.Ovis/H. contortus</i>	5	23.3± 0.58
			<i>T. ovis/ H. contortus</i>	4	27.8±0.165
			<i>T.vivax/ H. contortus</i>	2	19.1±0.64
	Kagarko	<i>T. ovis/ H. ontortus</i>	1	23.1±2.2	
		<i>T. congolense/ H.contortus</i>	5	15.8±3.9	
		<i>T. vivax/ H. contortus</i>	1	25±5.0	
Single Haemoparasite/ Double Helminth	Katsina	Kankiya	<i>A. ovis/H. contortus/Oesophagostomum sp.</i>	1	21.3±1.0
			<i>A. ovis / H. contortus/ Cooperia curtecie</i>	3	21.7±1.9
	Niger	Tafa	<i>T. vivax/ H. contortus/ Cooperia curtecie</i>	2	20.6±4.5
		Kano	Doguwa	<i>A. ovis/ H. contortus/ Cooperia curtecie</i>	2
			<i>T. ovis/ H.contortus/cooperia</i>	1	20.5±0.5
Total					27 (77%)
Double Haemoparasite	Niger	Lapai	<i>T. congolense/ T. ovis</i>	2	19.6±3.2
			<i>H.contortus/ cooperia</i>	3	18.4±4.2
				<i>T.congolense/ A.ovis</i> <i>T.ovis/ H.contortus</i>	
Total				5	5 (14.3%)
Triple Haemoparasite Single Helminth	Nasarawa	Doka Keffi	<i>T. congolense/ A. ovis</i> <i>T. ovis/ H. contortus</i>	3	17.5±2.4
Total					3 (8.6%)

prevalence rates of 5% for *T.vivax* and 12% for *T.congolense* observed in this study are lower than that observed by Daniel *et al.* (1994), they reported 59.5 and 24.3% prevalence for *T. vivax* and *T. congolense*, respectively. In this study, *T. congolense* was observed to be the dominant specie of trypanosome encountered, this finding is at variance with the report of Daniel *et al.* (1994) and Kalu and Lawani (1996) were they reported *T. vivax* as the dominant specie of trypanosome.

The present study demonstrates that haemoparasitic and gastrointestinal parasitic infection may be the cause of anaemia in sheep kept by the nomads due to the combined effects of the blood sucking activities of the helminthes (*haemonchus species*) and the haemolytic activities of the haemo parasites (trypanosomes). According to Anosa (1977), anaemia is the most important haematological finding of pathologic and diagnostic significance associated with haemonchus and trypanosomosis infection in the field.

CONCLUSION

Observations from this study show the importance of concurrent infection in nomadic sheep especially in endemic areas where strategic parasitic control measures are not being practice.

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