

A Survey of Gastrointestinal Parasites of Nomadic Sheep in Eight Local Government Areas of Northern Nigeria

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Abstract: A survey of the prevalence of gastrointestinal parasites in nomadic sheep was conducted during the period of February to October 2002. Data were gathered from 28 flocks of sheep with a total of 101 Yankassa sheep in 8 Local Government Areas (LGAs) of Northern Nigeria. High prevalence rate was observed in all the LGAs, Igabi (94.0%), Kagarko (100.0%), Birnin Gwari (100.0%), Doka Keffi (100.0%), Lapai (83.0%) Tafa (100.0%) and Doguwa (80.0%) except Kankiya which had 50%. The mean helminth prevalence rates according to their species were *Haemonchus contortus* 49.9%, *Cooperia curtecie* 39.6%, *Oesophagostomum* sp. 14.9% and *Trichostrongylus* sp. 1.9%. Doka, LGA in Nasarawa State had the highest (66.7%) prevalence rate for *H. contortus* with the lowest (20%) obtained from Kankiya LGA. *Cooperia curtecie* had the highest (100%) mean prevalence rate in Kangarko LGA of Kaduna State while Birnin Gwari LGA of the same State recorded the lowest mean prevalence (13.4%). The mean prevalence for *Oesophagostomum* sp. was low, 30.0% was the highest value observed in Kankiya LGA of Katsina state, the lowest value (10.0%) was observed in Doguwa LGA of Kano state. *Trichostrongylus* sp. has the lowest mean prevalence (6.6%) and was observed only in Birnin Gwari LGA of Kaduna state. Mixed infection constituted substantial (70.3%) proportion of all gastrointestinal nematode infection in all the sampled areas. The frequency of occurrence of single infection is 17.4%, double infections 39.5% triple infections 37.9% and quadruple infections 5.8%. Most of the animals examined had low to moderate infection, suggesting that the infections were probably at sub-clinical level.

Key words: Prevalence, gastrointestinal parasite, sheep, local government area

INTRODUCTION

Gastrointestinal Tract (GIT) parasites are known to be widespread in Nigeria (Fabiya, 1973; Eysker and Ogunsusi, 1980) and limit small ruminant production in many areas and countries (Eysker and Ogunsusi, 1980; Chiejina, 1987; Keyyu *et al.*, 2005). The direct losses caused by these parasites are attributed to hyper-acuteness and death, premature slaughter and rejection of some parts at meat inspection whilst indirect losses include the reduction in productive potential such as decrease growth rate, weight loss, diarrhoea, anorexia and sometimes anaemia (Soulsby, 1986; Nahed *et al.*, 2003; Gonzalez and Gonzalez, 2004) The infections are either clinical or sub-clinical, the latter being the most common and of great economic importance (Allonby and Urguhart, 1972; Chiejina, 1987). Although, clinical parasitism has received considerable attention as a result of obvious severity, the study of parasitism in a flock of sheep without clinical signs of infection has been largely

neglected. There is dearth of information on the prevalence and distribution of various species of gastrointestinal parasites of sheep kept by the nomadic fulanis in Nigeria, such information is important in the formulation of gastrointestinal parasite control strategies for the nomadic sheep herds.

Therefore, the study was undertaken to determine the prevalence of gastrointestinal parasite of yankassa sheep kept by the nomadic fulanis.

MATERIALS AND METHODS

Study location: The study was carried out from February to October 2002 in Eight Local Government Areas (LGAs) (Igabi, Kagarko, Birnin Gwari, Kankiya, Keffi, Lapai, Tafa and Doguwa), in 5 Northern states of Nigeria (Kaduna, Katsina, Niger, Nasarawa and Kano) (Fig. 1). The vegetation in these areas is that of Sudan Savannah and Guinea Savannah zones. The annual rainfall in these areas is presented in Table 1.

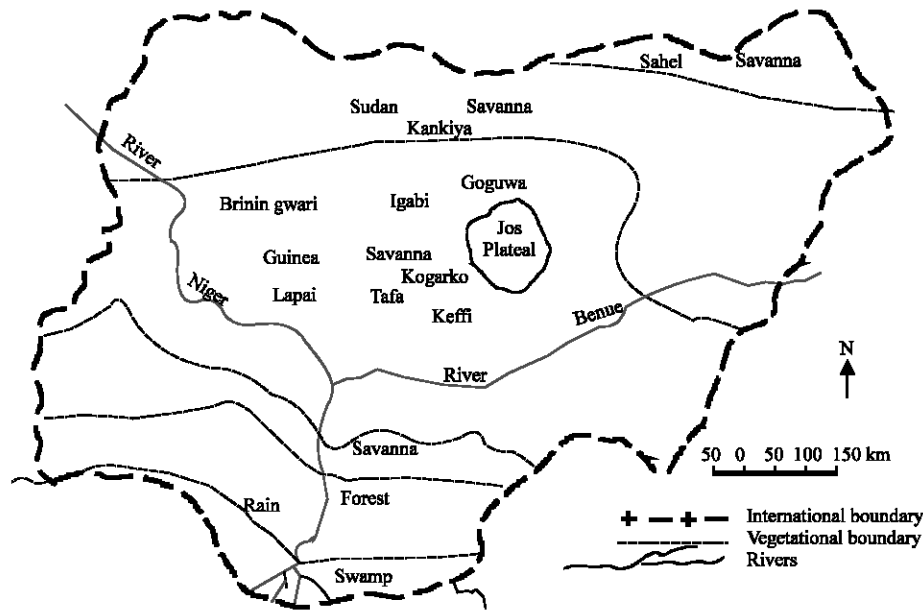


Fig. 1: Map of Nigeria showing the location of the selected areas, Source: - Field survey 2004 (Geography Department Ahmadu Bello University Zaria)

Table 1: Longitude, Latitude and Annual rainfall of the areas under study

States	Longitude	Latitude	Mean annual Rainfall (mm)
Kano	7°40'-9°15' East	10°50'N-12°45'N	600 mm
Katsina	6°45'-9°E	11°15'-13°15'N	610 mm
Kaduna	6°E-9°E	9°N-11°45'N	900 mm
Niger	3°30'-7°15'E	8°20'N-11°15'N	950 mm
Nasarawa	7°E-9°30'E	8°-9°45'N	1500 mm

Source: Meteorological unit, Institute for Agricultural Research. Ahmadu Bello University Zaria

Animals: Animals (sheep) used in this study belonged to pastoral nomadic fulanis, who own about 80% of Nigeria livestock population (Nuru, 1974). A total of 101 sheep mainly of Yankassa breed of all sexes and ages (8-24 months) from 28 flocks were used in the study. The animals according to the owners had no history of previous treatment or deworming.

Faecal sampling and analysis: During each visit to the 28 flocks about 20 g of faecal samples were collected per rectum using gloved hands, from each animal into faecal sample bottles, labeled and kept in cool box prior to transportation to the laboratory for processing.

Ten grame of the sample was later 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 L₃ harvested on the 7th day of incubation were differentiated to the generic level using the method as described by Annon (1977).

RESULTS

Out of the total of 101 sheep sampled 91 (90%) had single or mixed nematode infections. High prevalence rates occurred in all the local governments areas except Kankiya LGA, which recorded a lower prevalence rate of 50% (Table 2).

The overall prevalence of the GIT parasite encountered according to their species were *Haemonchus contortus* (49.9%), *Cooperia curticei* (39.6%), *Oesophagostomum* sp. (14.9%) and *Trichostrongylus* sp. (1.9%), (Table 3). The highest prevalence rate (66.7%) for *H. contortus* was obtained in Doka-Keffi LGA of Nasarawa State followed by 62.5% in Igabi LGA in Kaduna state and the lowest rate was 20.0% from Kankiya LGA in Katsina state. For *Cooperia curticei*, the highest rate (100%) was obtained in Kagarko LGAs of Kaduna state followed by Igabi LGA also in Kaduna state with 56.0% whilst the lowest rate of 13.4% was obtained in Birnin Gwari LGA also in kaduna state. The highest rate of 30.0% due to *Oesophagostomum* sp. was obtained from Kankiya LGA of Katsina State; while sample from Doka LGA Nasarawa of state were negative for *Oesophagostomum* sp. *Trichostrongylus* infection was found only in sheep sampled from Birnin Gwari LGA of Kaduna state with a prevalence rate of 6.6%.

The frequency of single infection was 17.4%; doubled infections 39.5%, triple infection 37.9% and quadruple infection 5.8%. (Table 4). Of the single

Table 2: Prevalence of ovine gastrointestinal parasites in nomadic herds in Eight Local Government Areas (LGA) in Five States of Northern Nigeria

State	Local government areas	Mean annual rainfall (mm)	Mean env. temp°C (min-max)	No. of flocks visited	No. of sheep in flocks	No. of sheep sampled	No. +ve for GIT parasite(s)
Kaduna	Igabi	900	25	3	35	16	15(94.0%)
Kaduna	Kagarko	900	26	3	21	9	9 (100%)
Kaduna	Birnin Gwari	900	25	5	56	15	15 (100%)
Katsina	Kankiya	610	27	2	24	10	5 (50.0%)
Nasarawa	Doka-Keffi	1500	27	4	50	15	15 (100%)
Niger	Lapai	950	24	4	46	12	10(83.0%)
Niger	Tafa	950	24	3	48	14	14 (100%)
Kano	Doguwa	600	27	4	30	10	8 (80.0%)
Total				28	310	101	91(90.0%)

Table 3: Species Specific rates of Ovine gastrointestinal Parasites in Eight Local Government Areas in Five States of Northern Nigeria

state	LGA	No. of Sheep sampled	<i>H. contortus</i>	<i>C. curticei</i>	<i>Oesophagostomum</i> sp.	<i>Trichostrongylus</i> sp.
Kaduna	Igabi	16	10 (62.5%)	9 (56.0%)	3 (18.7%)	0
Kaduna	Kagarko	9	3 (33.4%)	9 (100%)	2 (22.2%)	0
Kaduna	Birnin Gwari	15	7 (46.7%)	2 (13.4%)	2 (13.2%)	2 (6.6%)
Katsina	Kankiya	10	2 (20.0%)	4 (40.0%)	3 (30.0%)	0
Nasarawa	Doka-Keffi	15	10 (66.7%)	4(26.7%)	0	0
Niger	Lapai	14	8 (57.2%)	4 (28%)	2 (14.3%)	0
Niger	Tafa	12	6 (50.0%)	3 (25%)	2 (16.7%)	0
Kano	Doguwa	10	4 (40.0%)	5 (50%)	1 (10%)	0
Total		101	50(49.5%)	40(39.6%)	15(14.9%)	2(1.98%)

Table 4: The prevalence of Single and Mixed Infections of Gastro-intestinal parasite in nomadic raised Sheep from Eight LGAs in five Northern States of Nigeria

Infection type	State	LGAs	Parasite/Parasite combination	No. of sheep +ve	Prevalence(%)
Single infection	Kaduna	Igabi	<i>H. contortus</i>	11	20.0
	Kaduna	Kagarko	<i>H. contortus</i>	1	2.6
	Nasarawa	Doka-Keffi	<i>H. contortus</i>	3	17.6
Total				15	17.4
Double infection	Kaduna	Igabi	<i>H. contortus/Oesophago-stomum</i> sp.	3	16.7
	Kaduna	Kagark-o	<i>H. contortus/Oesophago-stomum</i> sp.	2	5.1
	Kaduna	Birnin Gwari	<i>H. contortus/C. curticei</i>	5	6.4
	Katsina	Kankiy-a	<i>H. contortus/C. curticei</i>	2	2.6
	Nasarawa	Doka-Keffi	<i>H. contortus/C. curticei</i>	3	33.3
	Niger	Tafa	<i>H. contortus/C. curticei</i>	4	23.5
	Kano	Doguw-a	<i>H. contortus/C. curticei</i>	8	25.0
Total				34	39.5
Triple Infection	Kaduna	Igabi	<i>H. contortus/C. curticei/Oesophagostom-um</i> sp.	4	10.2
	Kaduna	Kagarko	<i>H. contortus/C. curticei/Oesophagostomum</i> sp.	3	7.6
	Kaduna	Birnin Gwari	<i>H. contortus/Oesophagostomum.sp/C. curtecei</i>	8	10.25
	Katsina	Kankiya	<i>H. contortus/C. curtecei/Oesophagostomum</i> sp.	6	33.05
	Nasarawa	Doka-Keffi	<i>H. contortus/C. curtecei/Oesophagostomum</i> sp.	6	75.0
	Niger	Tafa	<i>H. contortus/C. curtecei/Oesophagostomum</i> sp.	5	50.0
Total				32	37.9
Quadruple infection	Kaduna	Birnin Gwari	<i>H. contortus/C. curticei/Oesophagostomum</i> sp./ <i>Trichostrongylus</i> sp.	5	12.8
Total				5	5.8

infections, the highest prevalence of 20.0% was observed in Igabi LGA while the lowest 2.6% was from Kagarko LGA of Kaduna State. In the double infection, the highest prevalence of 33.3% was in in Doka-Keffi of Nasarawa State. The triple infection had the highest prevalence (75.0%) in Doka-Keff of Nasarawa State while, 33.05% was the lowest prevalence recorded in Kankiya LGA of Katsina State. Quadruple infections were observed in Birnin Gwari LGA of Kaduna State only with 12.8% prevalence rate.

No apparent clinical signs were observed on most of the animals (sheep) sampled.

DISCUSSION

The result of this study clearly indicates that gastrointestinal nematode infection commonly occurs in sheep kept by the pastoralist(nomadic herdsman) and this the first documented data in this regard in the areas investigated. The study revealed that 90.0% of the sampled animals are infected with various species of nematode. *Haemonchus contortus* was observed to be the most prevalent gastrointestinal parasite in this study, this is partly because of the increase relative humidity due to high rainfall recorded in the study area (Table1). This

report agree with findings of Besier and Dunsmore (1993), they correlate the development of *H. contortus* infective larvae to prevailing weather condition, they reported higher L₃ recovery with increased environmental moisture. Mixed infections constitute 70.3% of the total gastrointestinal nematode infection in the sampled areas and this high prevalence value agrees with report of Magona and Musisi (1999) in Ugandan goats under the pastoralist management system. The high prevalence of gastrointestinal nematode infection encountered in this survey may also be explained by the existence of favourable climatic condition (Rossanigo and Gruner, 1995) that support prolonged survival of infective nematode larvae on pasture. Magona and Musisi (1999), Lauren *et al.* (2007) found that months with a total rainfall not less than 51 mm, mean maximum and minimum temperature of not less than 25 and 11 °C, respectively had a greater potential to support prolonged survival of infective nematode larvae on pasture with subsequent transmission to livestock. All the areas under study had these rainfall and temperature limits. Most of the sampled animals did not show any obvious clinical signs suggesting low to moderate infection that manifest at subclinical level. The effects of these infections on the animals can be aggravated by lack of feeds, stress due to grazing long distance and drought that do occur in some of the areas under study (before the onset of rainy season). This level of infection is described as the most economically important form of the disease since it occurs in most of cases leading to retarded growth, unthriftiness and animals are more susceptible to other infection and are continuously contaminating pastures (Ocaido *et al.*, 1998). Treatment of such animal is therefore indicated to improve productivity and reduce the chances of infecting the more susceptible young animals.

This study was cross sectional in nature; therefore, it could not capture the patterns of helminth burden over seasons. A better and a longer-term monitoring study is proposed in order to address the health and economic impact of these worms in sheep kept by the pastoralist.

CONCLUSION

This survey indicates that gastrointestinal nematode infections of sheep kept by the nomadic fulani are widespread in the area of study. Most of the infections appear to be subclinical and could indirectly cause production losses if proper attention are not giving to the animals.

REFERENCES

- Allonby, E.W. and G.M. Urguhart, 1972. Endemic haemonchosis in Africa. Trans. Royal Soc. Trop. Med. Hygiene, 60: 546.
- Annon, 1977. Manual of Veterinary Parasitological laboratory Technique. Technical bulletin. No. 18 Ministry of Agriculture, Fisheries and Food, London, pp: 129.
- Besier, R.B. and J.D. Dunsmore, 1993. The ecology of *Haemonchus contortus* in a winter rainfall region in Australia-the development of eggs to infective larvae. Vet. Parasitol., 45: 275-292.
- Chiejina, S.N., 1987. Parasitic gastroenteritis in cattle and small ruminants: Pathogenesis diagnosis and treatment. Zariya Vet., 2 (2): 45-64.
- Eysker, M. and R.A. Ogunsusi, 1980. Observations on epidemiological and clinical gastrointestinal helminthiasis of sheep in Northern Nigeria during the rainy season. Res. Vet. Sci., 28: 58-62.
- Fabiyi, J.P., 1973. Seasonal fluctuations of nematode infestations in goats in the savanna belt of Nigeria. Bull. Epizootic Dis. Afr., 21: 277-286.
- Gonzalez, R. and A.C. Gonzalez, 2004. Alternatives for the control of gastrointestinal nematodes in sheep. Conf. EEPF Matanzas, Cuba.
- Keyyu, J.D. J. Monrad, N.C. Kyvsgaard and A.A. Kassuku, 2005. Epidemiology of *Fasciola gigantica* and Amphistomes in cattle on Traditional, Small-scale dairy and large scale dairy farms in south Highlands of Tanzania. Trop. Anim. Health Prod., 37: 303-314.
- Lauren J. O'Connor, Lewis P. Kahn, Stephen W. Walkden-Brown, 2007. Moisture requirements for the free-living development of *Haemonchus contortus*: Quantitative and temporal effects under conditions of low evaporation. Vet. Parasitol., 150: 128-138.
- Magona, J.W. and G. Musisi, 1999. Prevalence and infectious levels of gastro-intestinal nematodes in Ugandan goats in different agro-climatic zones. Bull. Anim. Health Prod. Afr., 47: 49-56.
- Nahed, Q., G. Lopez, A.A. Mendoza and F.J. Trigo, 2003. Epidemiology of parasitosis in the Trotzil sheep production system. Small Rum. Res., 49: 199-206.
- Nuru, S., 1974. Infectious Bovine Abortion in Northern Nigeria, Ph.D Thesis. Ahmadu Bello University, Zaria, Nigeria, pp: 127.
- Ocaido, M., L. Siefert and Baranga, 1996. Disease surveillance in mixed livestock and game area around lake Mburu National Park in Ugandan. South Afr. J. Wildlife Res., 26: 133-135.
- Rossanigo, C.E. and L. Gruner, 1995. Moisture and temperature requirements in faeces for the development of free-living stages of gastrointestinal nematode of sheep and cattle and deer. J. Helminthol., 67: 357-362.
- Soulsby, E.J.L., 1986. Helminths, Arthropods and Protozoa of Domesticated Animals. 7th Edn. Bailliere Tindall, London, Philadelphia and Toronto, pp: 231-257.