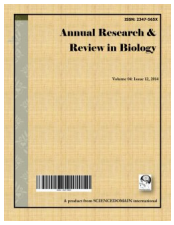

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Survey of Gastrointestinal Parasites among Nomadic Cattle Herds in Eruwa, Oyo State, Southwestern Nigeria

Oluwole Akinola Stephen[1], Adeniran Adebiyi Abdulhakeem[1*], Mogaji Hammed Oladeji[1], Shittu Emmanuel Olanrewaju[1], Alabi Oladimeji Michael[1], Odoemene Simeone[1] and Ekpo Uwem Friday[1]

[1]Spatial Parasitology and Health GIS Unit, Department of Pure and Applied Zoology, Federal University of Agriculture, Abeokuta, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Authors OAS and EUF designed the study and supervised data collection. Authors AAA and SEO wrote the study protocol. Authors SEO, AOM, MHO and OS gathered initial data and laboratory analysis of samples. Authors AAA and SEO did data analysis and managed literature searches. Author AAA prepared the initial draft. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Nomadic farming of cattle is a common practice in rural farming area of Nigeria. This study investigated the prevalence of gastrointestinal parasites among nomadic cattle herds in Eruwa, Oyo State, Southwestern Nigeria.
Study Design: Cross-sectional.
Place of Study: The study was conducted in Eruwa, Oyo State, Southwestern Nigeria.
Methodology: Faecal samples were collected from 177 cattle across 6 randomly selected nomadic cattle herds in Eruwa. Faecal samples were collected and processed using the Sodium-acetate-acetic acid ether concentration method followed by microscopic examination for gastrointestinal parasites ova or larva. Questionnaires were also administered to herd's handlers to obtain

**Corresponding author: E-mail: niranbiyi@gmail.com;*

demographic information and deworming history of animals. Data obtained were analysed using IBM SPSS software version 20.0 and confidence interval was set at $p<0.05$.

Results: A total of 177 cattle were examined, with their age ranging from 2-204 months old, and majority of them 107 (60%) were females. An overall prevalence of 62.7% was recorded for any gastrointestinal helminth infection which include *Ascaris* spp., *Fasciola* spp., *Ostertagia* spp, *Trichostongylus* spp and *Moniezia* spp. *Fasciola* spp was the most prevalent (22.6%) followed by *Ascaris* spp (10.2%) and *Moniezia* spp was the least prevalent with 2.3%. However, there exists no significant difference in prevalence of infection by sex, age and across herds.

Conclusion: This study revealed a high prevalence of gastrointestinal parasites among nomadic cattle which can be controlled through provision of grazing reserved areas and regular deworming of cattle.

Keywords: Gastrointestinal parasites; cattle; nomadic farming; Nigeria.

1. INTRODUCTION

Cattle farming is one of the major sources of animal protein in Sub-Saharan Africa [1]. Cattle provide beef during festivities, flexible income for family units, employment, farm energy and manure for farmlands [2].

In Nigeria and other developing countries of the world, cattle farming is faced with problems limiting productivity, one of which is parasitic infections [3-6]. These infections especially those of the gastrointestinal tract (GIT) causes substantial losses to cattle owners through lowered fertility, reduced work capacity, involuntary culling, reduced food intake, reduced weight gain, lowered milk production, treatment costs and mortality in heavily parasitized animals [7-10].

Favourable soil temperature, moisture and pH considerably influence development of nematodes ova on pastures and grazing land [11]. Infective stages of these gastrointestinal parasites build-up and rise rapidly on farm and pastoral lands when moisture level is optimal [12]. Cattle raised either for consumption or other economic purposes are allowed to graze on open pastures under the typical nomadic farming systems in most developing countries and in Nigeria by the typically nomadic Fulani herdsmen [8]. The increased mobility of these nomadic herds during long searches for greener pasture increases the likelihood of getting infected with the infective stages of these gastrointestinal parasites. This risk of infection is worsened by indiscriminate open defaecation of nomadic farmers and community members living around pastoral lands that majority of these animal graze. In fact, animals grazing freely have been reported to have higher prevalence of infection than those confined [12].

In spite of this, there is still paucity of studies documenting prevalence of gastrointestinal parasitic infections among nomadic cattle herds in Eruwa, Southwestern Nigeria. This information is needed to help guide prevention and control of gastrointestinal parasitic infections among nomadic herds. Therefore, this study investigated the prevalence of gastrointestinal parasites among nomadic cattle herds in Eruwa, Oyo State, Southwestern Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Eruwa Titun, Latitude 7°31'49.47"N and longitude 3°24'43.65"E; an ancient town in Oyo State, Southwestern, Nigeria. The town provides good arable land for animal pasture and agricultural production which is the major occupation of member of the community. The study was conducted among the nomadic Fulani farmers from the northern part of the Nigeria.

2.2 Ethical Considerations

The study was approved by the Ethics Review Committee of the Federal University of Agriculture, Abeokuta, Ogun State. Animals were handled according to standard practices.

2.3 Herd Selection

Six herds with an average size of 30 cattle were randomly selected in the study community. Herds owner were briefed on the purpose of the study and their consent was obtained prior to commencement of study. Herd were tagged in Arabic numeral 1 to 6.

2.4 Questionnaire Administration

Population size of each herd, sex, age of cattle as well as hygiene practices were documented with the aid of questionnaire during the pre-investigation survey.

2.5 Sample Collection

Fresh faecal sample were collected directly from the rectum of individual cattle in each herd with the assistance of the herd owners who recognize each cattle in their herd by specific name. Faecal samples were collected in labelled containers and preserved with sodium-acetate acetic acid-formalin (SAF) before transportation to the laboratory for analysis.

2.6 Faecal Examination

Faecal sample were processed using the sodium-acetate acetic acid-formalin (SAF)-ether concentration method as described by Endriss et al. [13]. Approximately 1 g of collected faecal sample was emulsified with 10ml of already prepared SAF. Emulsified solution was shaken vigourously to effectively suspend stool in solution and the suspension was then strained into centrifuge tube using double gauze of about 13 mm diameter placed in a funnel. The residue was discarded and filtrate centrifuged at 2000 rpm for 1 minute. The supernatant was discarded after centrifuging and 7 ml of normal saline was added to the sediment left to re-suspend. Ether (3 ml) was then also added to the suspension, stopper was placed on the tube and the mixture shaken vigorously to mix before centrifuging for 5 minutes at 2000 rpm. The first three layers of the suspension after centrifugation was pipette out using a Pasteur pipette leaving the last layer of sediment. The sediment was pipetted onto a clean, oil-free microscope slide and examined for ova of intestinal helminths.

2.7 Data Analysis

Questionnaire and laboratory data results were analysed using IBM SPSS version 20.0. Descriptive statistics was used to analyse important variables and chi-square test of significance was used to test significant association between infection and sex, age group and herds Confidence level was set at $p<0.05$.

3. RESULTS

Faecal samples were collected from a total of 177 cattle across the 6 selected herds involved in the study. An average of 30 cattle was sample in each herd. The age range of the cattle was 2-204 months with a mean age of 39.80±2.67 months. Of the 177 cattle examined, 107 (60%), were females and 48% were within the age group 19-48 month. Sixty-seven percent of the cattle were born in the herd with 14.1% brought into the herd in less than six months. Table 1 shows the demography of the cattle involved in the study.

Table 1. Demographic characteristics of cattle examined

	Number (n=177)	Percentage (100%)
Sex		
Male	70	39.5
Female	107	60.5
Age group (Months)		
2-18	53	29.9
19-48	85	48.0
49-84	22	12.4
85-144	13	7.3
>144	4	2.3
Age when brought (Months)		
Born in herd	120	67.8
≤ 6 months	25	14.1
> 6 months	32	18.1
Herd		
Herd 1	36	20.3
Herd 2	19	10.7
Herd 3	32	18.1
Herd 4	17	9.6
Herd 5	56	31.6
Herd 6	17	9.6

A total of 111 (62.7%) cattle were infected with at least one type of gastrointestinal parasites. Five different types of gastrointestinal parasites were identified among the surveyed cattle and these include *Fasciola* spp with a prevalence of 22.6%.followed by *Ascaris* spp (10.2%). Higher prevalence of *Trichostongylus* spp, *Ascaris* spp and *Fasciola* spp were observed in infected females cattle compared to males. However, *Ostertagia* spp and *Moniezia* spp were more prevalent in male cattle, although no significant different was found between infection by sex ($p>0.05$) (Table 3).

Generally, highest prevalence of infection was found among cattle of age group 19-48 months except in infection with *Fasciola* spp that had the highest infection prevalence in age group 2-18 months. There was significant difference in prevalence of *Trichostrongylus* spp infection by age (p≤0.05) (Table 3). There was no significant difference in infection of gastrointestinal parasites by age when cattle were introduced into herd except for *Moniezia* spp infection that 75% of infection were among cattle newly introduced into the herd in less than 6 months before the study (Table 3).

Highest prevalence of *Trichostrongylus* spp and *Fasciola* spp infections were found in Herd 5 while *Ascaris* spp, *Ostertagia* spp and *Moniezia* spp were mostly infections of cattle in Herd 1. Only cattle in Herd 1 were found to have been dewormed and in less than 6 months prior to this investigation (Table 4).

Table 2. Prevalence of gastrointestinal parasites among the survey cattle

Infection	Number of examined	Number infected	Percentage
Trichostrongylus spp	177	10	5.6
Ascaris spp	177	18	10.2
Ostertagia spp	177	15	8.5
Fasciola spp	177	40	22.6
Moniezia spp	177	4	2.3

Table 3. Prevalence of infection among sex, age group, age brought into herd and herd

	Trichostrongylus spp	***Ascaris spp***	***Ostertagia spp***	***Fasciola spp***	***Moniezia spp***
	NI (%)	**NI (%)**	**NI (%)**	**NI (%)**	**NI (%)**
Sex					
Male	4(40.0)	8(44.4)	9(60.0)	16(40.0)	3(75.0)
Female	6(60.0)	10(55.6)	6(40.0)	24(60.0)	1(25.0)
Total	10(100.0)	18(100.0)	15(100.0)	40(100.0)	4(100.0)
p-value	0.98	0.65	0.09	0.95	0.14
Age group					
2-18	0(0.0)	7(38.9)	7(46.7)	18(45.0)	1(25.0)
19-48	8(80.0)	8(44.4)	7(46.7)	15(37.5)	3(75.5)
49-84	0(0.0)	2(11.1)	1(6.7)	4(10.0)	0(0.0)
85-144	2(20.0)	0(0.0)	0(0.0)	2(5.0)	0(0.0)
>144	0(0.0)	1(5.6)	0(0.0)	1(2.5)	0(0.0)
Total	10(100.0)	18(100.0)	15(100.0)	40(100.0)	4(100.0)
p-value	0.05	0.55	0.47	0.22	0.82
Age brought into herd					
Born	5 (50)	14 (77.8)	8 (53.3)	29 (72.5)	1 (25)
≤ 6 months	2 (20)	1 (5.6)	5 (33.3)	4 (10)	3 (75)
> 6 months	3 (30)	3 (16.7)	2 (13.3)	7 (21.9)	0 (0)
Total	10 (100)	18 (100)	15 (100)	40 (100)	4 (100)
p-value	0.45	0.51	0.08	0.67	0.02
Herd					
Herd 1	0(0.0)	5(27.8)	6(40.0)	7(17.5)	4(100.0)
Herd 2	1(10.0)	0(0.0)	0(0.0)	8(20.0)	0(0.0)
Herd 3	1(10.0)	3(16.7)	0(0.0)	6(15.0)	0(0.0)
Herd 4	1(10.0)	2(11.1)	1(6.7)	4(10.0)	0(0.0)
Herd 5	5(50.0)	4(22.2)	4(26.7)	11(27.5)	0(0.0)
Herd 6	2(20.0)	4(22.2)	4(26.7)	4(10.0)	0(0.0)
Total	10(100.0)	18(100.0)	15(100.0)	40(100.0)	4(100.0)
p-value	0.43	0.25	0.23	0.43	0.07

Table 4. Deworming practices among survey cattle

	Number	Percentage
Do you deworm your cattle?		
Yes	36	20.3
No	141	79.7
When last did you deworm your cattle?		
<6 months	36	20.3
Never deworm	141	79.7

4. DISCUSSION

Infections with parasites especially those of gastrointestinal tract (GIT) can cause substantial losses to cattle owners and is one of the major problems affecting the production of animals [5-6,9] Infection causes gradual deterioration in animal performance and has been known to be major causes of economic losses in livestock in the tropics and Nigeria in particular [8,14]. Production losses caused by these helminth infections immensely depend on the sex and age of animals, their management practices and the prevalence of the infections [15].

The high prevalence of infection among nomadic herds observed in the study is a major concern for veterinary health and recognition of the health risk placed by the rising incidence of parasitic infections is very essential [1]. The agricultural practices of rural settlers combined with factors as ecosystem degradation could aid in creating conditions for high transmission and sustenance of these parasitic diseases.

Our findings though in corroboration with report elsewhere [16] are however greater than those of studies in Cameroun and Northern Nigeria respectively [1,12].

The present study reveals *Fasciola* spp as the highest prevalent infection among cattle in the studied herds. This agrees with the findings elsewhere [12]. Previous studies have revealed that *Fasciola* species are by far the most economically important trematodes of ruminants in the tropics [16]. The occurrence of flooding, water pans and swamps are important habitats for propagation of the snail intermediate hosts of these flukes [12].

Prevalence of *Ascaris* spp infection observed in the present study is slightly lower than what was reported among cattle slaughtered in an abbatttoir in Kano [1]. Conversely, prevalence of *Trichostongylus* spp and *Ostertagia* spp reported in the current study is lower than that observed among slaughtered cattle in Benin City, Nigeria [17]. Observed prevalence of *Moniezia* spp reported here is lower than that reported by [17], but relatively agrees with other report [12]. Gastrointestinal parasitic infections observed in nomadic cattle herds might be a direct consequence of the free-range grazing management which allows cattle to graze freely on pasture in nearby farm lands that might have been contaminated with the infective stages of these parasites and increases the chances of picking up cyst, ova, larvae of these gastrointestinal helminth parasites that were attached to the pastures [18]. Continuous visitation of such grazing sites even after deworming will only lead to re-infection. Environmental pollution that includes defecation resulting from grazing activities contributes to sustained transmission, while poor nutrition and other stress factors may be responsible for clinical disease in adult animals [1].

There was no significant difference in prevalence of infection by sex and herd for all observed infection. This is consistent with our earlier findings [19] and study elsewhere where no significant different in parasitic infection by sex and age among studied cattle was also reported [20]. However, there was significant difference in infection by age of *Trichostrongylus* spp. Susceptibility to infection of gastrointestinal parasite is influenced by factor of age [21]; however the current study suggest that age might be an influencer to infection in addition to other factors. The relatively higher prevalence recorded among the females cattle could be as a result of lowered immunity due to reproductive events and insufficient/unbalanced diet against higher needs [22]. *Trichostrongylus spp., Ostertagia spp., Fasciola spp.,* and *Ascaris spp*. were gastrointestinal parasites encountered mostly among the herds while *Moniezia spp*. occurred least and only in one herd which might be probably introduced into the herd through newly acquired animals as a significant proportion of the infected cattle were brought into the herd in less than six months. This couple with the likely presence of the intermediate host (oribatid mites) in the grazing area of the herd might be responsible for the spread of infection [23]. Generally, deworming practice in the herds studied was very poor as only one herd was dewormed in less than 6 months prior to the study. The high prevalence of parasitic infection

recorded can be attributed to these poor practices. Results obtained from this study clearly suggest that parasitic gastrointestinal helminths are prevalent in nomadic cattle and this may have a negative influence on productivity.

5. CONCLUSION

The free ranging system and poor husbandry practices employed might be factors responsible for high prevalence across the herds. Improvement of husbandry management system through provision of grazing reserved areas and rotation of grazing spot coupled with regular routine deworming of cattle will reduce morbidity due to parasitic infections thereby increasing productivity in nomadic cattle.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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