



SURVEY OF HAEMOPARASITES OF CATTLE RAISED UNDER PASTORAL AND SEDENTARY MANAGEMENT SYSTEMS IN SOBA LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA

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ABSTRACT

A cross sectional study of 100 cattle each selected from pastoralist and sedentary herds was carried out in Soba Local Government Area of Kaduna State in order to carry out a survey of haemoparasites in pastoral and sedentary cattle farm management systems using purposeful/judgemental sampling technique. About 5ml of blood was obtained from each of the 200 cattle in both pastoralist and sedentary herds through jugular venopuncture. The blood from the 200 cattle were screened of haemoparasites using thin blood smear and wet mount techniques. Of the 200 blood samples obtained from the pastoralist and sedentary herds that were examined using thin blood smears, 81 blood samples were positive for different haemoparasites of the following genera, *Anaplasma* (*A. centrale* and *A. marginale*), *Babesia* (*B. bovis* and *B. bigemina*) and *Theileria* (*T. mutans*). The overall haemoparasitic infection rate in both pastoralist and sedentary herds was 40.5% of which there was no significant difference ($p > 0.05$) in the burden of the infection in pastoralist herds (55.6%) and that of the sedentary (44.4%). *Theileria species* (*T. mutans*) as a single infection accounted for 19.6% of the positive samples while *T. mutans* with *A. marginale* (2.0%) accounted for most of the mixed infection commonly observed in the pastoralist herds. The major cattle management system in Soba LGA was pastoral husbandry system. The immediate treatment of cattle in the infected herds was recommended as well as vector control measures.

Key words: Survey, Haemoparasites, Pastoralists, Sedentary herds, Soba Local Government Area

INTRODUCTION

About 90% of the cattle population in Nigeria are raised under the pastoral husbandry system by Fulani herders (Lorusso *et al.*, 2013). Under this system, cattle are grazed on established forage land and forests and may be exposed to various arthropod vectors of haemoparasites (Obadiah and Shekaro, 2012). Among parasitic diseases of cattle, haemoparasitism constitutes a disease entity of great economic importance (Salih *et al.*, 2015) and has been recognized as a serious threat to food security in Nigeria. The impact of haemoparasites on cattle productivity is difficult to quantify (Samdi *et al.*, 2010) but losses in traction power, milk and beef production as well as costs of control programmes have been ascribed to infection by haemoparasites (ILR, 1997). On the other hand, sedentary herds are cattle that are kept under semi-intensive management system where shelter, supplementary feeds, veterinary health services are provided. Haemoparasites and their vectors have a global distribution and are important parasites in sub-Saharan Africa (Okorafor and Nzeako, 2014). Their prevalence in cattle in Nigeria is generally considered to be very high due to the preponderance of their arthropod vectors (Biu and Kabono, 2005; Kamani *et al.*, 2010; Musa *et al.*, 2014; Okorafor and Nzeakor, 2014). Therefore, the aim of the study was to carry out a survey of haemoparasites in cattle raised under pastoral and sedentary management systems in Soba LGA, Kaduna State in order to provide data on haemoparasites of cattle raised under two management systems in Soba Local Government Area (LGA) of Kaduna State, Nigeria. The data to be obtained from the study may assist the farmer and other stakeholders to plan for control measures.

MATERIALS AND METHODS

Location and study design: Soba LGA, which is one of the 23 LGAs in Kaduna State was selected for the study. It is located in the northern part of Kaduna State between latitude 10° 58' 52'.79"N and longitude 8° 03' 26'.96". It has an estimated human population of 238,719 comprising predominantly traders, cattle rearers and farmers (Abubakar *et al.*, 2016). The climate is that of the Northern Guinea Savannah relatively favourable for rearing of cattle and other livestock.



A cross-sectional study was carried out on cattle that were greater than 6 months of age and raised under pastoral or sedentary management system. They were selected and sampled for the study using purposive/judgemental sampling technique. The selection of the herds and sample size were determined based on the willingness of the herdsmen in allowing their cattle to be use for the study. Individual cattle were identified by their ear tags and for those that did not have, permanent markers were used by writing numbers on their Rump. The study spanned a period of 6 months from January to June 2018. This coincided with the period of dry season to early raining season when feed was scarce and the animals were under nutritional stress. Those herds that did not leave their base in search of greener pasture in faraway distant lands were sampled. Visits were made to both pastoralist and sedentary herdsmen to seek for their consent prior to venopuncture. Herds with at least 50 cattle were considered. A total of 4 herds comprising of 200 cattle from both pastoralist and sedentary herds were identified for screening based on the consent of the owners. That is, 2 herds of 100 cattle from pastoralists and 100 cattle from 2 sedentary herds.

Blood sample collection and processing: About 5 ml of blood were obtained from the jugular vein using 18G needle and 10 ml syringe after physical restraint. A thin blood smear was made immediately and air dried on a labelled grease free glass slide. The remaining part of the blood was then poured into a labelled ethylene diamine tetra acetic acid (EDTA) tube and placed on ice packs. These were transported to the Parasitology Laboratory of the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria for further analysis. The thin blood smear slides that were air dried in the field were fixed and stained accordingly as described by Kamani *et al.* (2010) while the buffy coat technique was carried out as described by Soulsby (1982). Unprocessed blood samples were stored at 4 °C for 24h. Morphologic features of the haemoparasites as described by Soulsby (1982) were examined and the result was evaluated and expressed as % positivity.

Data Management and Analysis: Descriptive statistics (percentages - %) and Chi square was used to compare the occurrences of haemoparasites in pastoralist and sedentary cattle farm management systems using Statistical Package for Social Sciences (SPSS) version 20.

RESULTS AND DISCUSSION

A total of 81 of the 200 cattle blood samples obtained from 4 pastoralist and sedentary herds in Soba LGA, Kaduna State were positive for haemparasites representing 40.5% infection rate. There was no significant difference ($p>0.05$) in the infection rates in cattle raised under pastoral (55.6%) and sedentary (44.4%) management systems (Table 1). This could mean that haemoparasitism as well as its determinants were common in these herds. The infection rates observed in this study were lower than that reported in cattle by Akande *et al.* (2010) in Abeokuta, Ogun State. Although the sample size was the same with this study, the geographical location may have been responsible for the differences in infection rates. This is because Abeokuta is a riverine area where the climate is favourable for the proliferation of the arthropod vectors (Adejinmi *et al.*, 2004). Three haemoparasites genera (*Anaplasma*, *Babesia* and *Theileria*) were observed in this study (Table 2). This finding was similar with a study reported in an Integrated Dairy Farm in Keffi L.G.A., Nasarawa State, by Abdullahi *et al.* (2014) where the climatic condition is guinea savannah, similar to this study area. The species of haemoparasites belonging to these three genera observed in this study confirms the report of other researchers on the range of haemoparasites found in Nigeria (Akande *et al.*, 2010; Kamani *et al.*, 2010; Abdullahi *et al.*, 2014) an indication that the vectors of the haemoparasites have wider distribution in Nigeria.

The rates of single and mixed infections observed in this study (Table 3) suggest a continuous challenge by the parasites and the existence of carrier state in most of the cattle as were reported by other researchers in Nigeria (Akande *et al.*, 2010, Kamani *et al.*, 2010 and Abdullahi *et al.*, 2014). The observation of *Theileria species (T. mutans)* as a single infection in this study, mostly in cattle raised under the pastoral management system (Table 2), could be attributed to the relative abundance of the ticks and other biting flies' vectors. This finding is in consonance with that of Walker *et al.* (2003) where they



reported that *Theileria species* were commonly been transmitted by *Amblyomma variegatum* and mechanically by biting flies. This study however, reports a contrast between the reports of Abdullahi *et al.* (2014) and Akande *et al.* (2010) who reported that *A. marginale* was the predominant parasite in their study areas, while Kamani *et al.* (2010) reported *Babesia species* (*B. bovis* and *B. bigemina*) to be the most prevalent parasite in the area of their study. Although, *Theileria mutans* is usually of low pathogenicity, fatal infections have been reported in cattle (Abdullahi *et al.*, 2014). There was an insignificant difference ($p>0.05$) in the haemoparasite infections of cattle with both singles and mixed infections in both pastoral and sedentary herds respectively (Table 3). These findings could be attributed to the increasing virulency and pathogenicities of a hither to less virulence haemoparasites and also an increasing host specificity in the presence of abundance range of vectors.

CONCLUSIONS

The overall burden of haemoparasites infection rates in both cattle husbandary management systems was 40.5%. There was no significant difference ($p>0.05$) in the haemoparasite burden in cattle raised under the pastoral (55.6%) and that of the sedentary management systems (44.4%). Three haemoparasite genera – *Anaplasma* (*A. centrale* and *A. marginale*), *Babesia* (*B. bovis* and *B. bigemina*) and *Theileria* (*T. mutans*) were observed in both pastoral and sedentary herds. Pastoral husbandry management system was the major cattle management system in Soba LGA. The immediate treatment of cattle in the infected herds was recommended as well as vector control measures.

Table 1: Percentage burden of Haemoparasitic infections in Cattle Raised under Pastoral and Sedentary Management Systems in Soba Local Government Areas, Kaduna State

Farm management systems	Cattle thin blood smear		<i>p</i> - value (≤ 0.05)
	% Parasite seen	% No parasite found	
Pastoral (n=100)	55.6 (45)	46.6 (55)	0.215
Sedentary (n=100)	44.4 (36)	53.8 (64)	
Total	40.5 (81)	49.6 (119)	
	$\chi^2 = 1.537$	df = 1	

Table 2: Haemoparasites Species Detected and Identified in Cattle Raised under Pastoral and Sedentary Management Systems in Soba Local Government Area, Kaduna State

Haemoparasite species	Farm management systems			<i>p</i> - value (≤ 0.05)
	Pastoral n=100 (%)	Sedentary n=100 (%)	Total (%)	
<i>Anaplasma centrale</i>	13 (13.0)	10 (10.1)	23 (11.6)	0.066
<i>Anaplasma maginale</i>	2 (2.0)	0 (0.0)	2 (1.0)	
<i>Babesia bovis</i>	2 (2.0)	4 (4.0)	6 (3.0)	
<i>Babesia bigemina</i>	0 (0.0)	6 (6.1)	6 (3.0)	
<i>B. bovis</i> and <i>A. centrale</i>	1 (1.0)	1 (1.0)	2 (1.0)	
<i>B. bovis</i> and <i>A. marginale</i>	1 (1.0)	0 (0.0)	1 (0.5)	
<i>Theileria mutans</i>	24 (24.0)	15 (15.2)	39 (19.6)	
<i>T. mutans</i> and <i>A. marginale</i>	2 (2.0)	0 (0.0)	2 (2.0)	



No Parasite Found	55 (55.0)	63 (63.6)	118 (59.3)
Total	100 (100.0)	99 (100.0)	199(100.0)
	$\chi^2 = 1.537$	df = 1	

Table 3: Percentage Occurrence rates of Single and Mixed Haemoparasitic infections in Cattle Raised under Pastoral and Sedentary Management Systems in Soba Local Government Areas, Kaduna State

Farm management systems	Types of infection			p - value (≤ 0.05)
	%Single infection	%Mixed infection	%No parasite found	
Pastoralist (n=100)	41.0 (41)	4.0 (4)	55.0 (55)	0.245
Sedentary (n=100)	35.4 (35)	1.0 (1)	63.6 (63)	
Total	38.2 (76)	2.5 (5)	59.3 (118)	
	$\chi^2 = 2.811$	df = 2		

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