



Babesiosis and Other Haemoparasitic Disease in a Cattle Slaughtering Abattoir in Abeokuta, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors SOSW and JU did the study design and wrote the protocol. Authors OAS, JU and NOA did the statistical analysis and literature searches while analyses of study were by authors NOA and HOM. All authors read and approved the final manuscript.

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ABSTRACT

Babesiosis, an haemoparasitic disease caused by *Babesia* spp and transmitted by ticks is one of the major public health threat to cattle rearing in most countries, including Nigeria. The disease impose a serious burden on the healthcare infrastructure of both the cattle and their handlers. This study therefore investigated the prevalence of Babesiosis and other haemoparasitic disease in a cattle slaughtering abattoir in Abeokuta, Ogun State, Nigeria. A total of 162 cattle were examined between May and August 2014. Blood samples were collected from the jugular vein of the cattle at point of slaughter in bottles containing ethylene diamine tetraacetic acid (EDTA) and transported to the laboratory for parasitological examination. Using microscopy, prepared Giemsa stained slides were observed under high powered digital Swift™ microscope at 4,500,000 resolution and x100 objective lens. Of the 162 cattle sampled, 83(51.2%) were males and 79(48.8%) were females. An overall prevalence of 27.8% was recorded for haemoparasites such as *Babesia* spp (8.0%), *Trypanosoma* spp (1.9%), *Theileria* spp (9.3%) and *Anaplasma* spp (18.5%). There was no sex and

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age predilection for the haemoparasites observed ($P>0.05$). The findings of this study show that Babesiosis and other haemoparasitic disease are prevalent in the slaughtering abattoir. Proper vector control methods and treatment with drugs in some of the source ranches of the cattle would be necessary to avoid vertical transmission between infected cattle and susceptible ones.

Keywords: Cattle; babesiosis; haemoparasites abattoir; Abeokuta; Nigeria.

1. INTRODUCTION

Livestock systems occupy about 30% of the planet's ice-free terrestrial surface area, employing approximately 1.3 billion people globally and directly supporting the livelihoods of 600 million smallholding farmers in the developing countries [1]. In Nigeria, ruminants comprising sheep, goats and cattle constitute the livestock farm animals and about 22.1 million sheep, 34.5 million goats and 13.9 million cattle are currently been reared by farm families in the country [2]. Of the ruminant livestock, cattle are regarded as the main source of animal protein in most household, and their products such as milk, hoof, bones, blood, hides and skin are also of great economic benefits [3].

Parasitic infections such as gastrointestinal helminth have been implicated as one among the health problems limiting the productivity of Cattle [4]. Besides, other haemoparasites, most importantly *Babesia* spp constitutes a major public health threat to cattle rearing in most countries, including Nigeria [5]. The disease caused by these haemoparasites imposes a serious burden on the healthcare infrastructure of both the cattle and their handlers [6]. Unlike other haemoparasites, babesiosis distresses adult cattle more severely than younger ones, leading to reduced food conversion rates, reduced milk/meat production rates, abortion and death [7,8].

In Nigeria, control measures including spraying cattles with chemicals, destruction of vector breeding sites, and introduction of natural enemies to feed on vectors have been employed in areas where the disease have been reported [9]. However, there is paucity of information on the prevalence of babesiosis and other haemoparasites among cattle slaughtering abattoirs in Abeokuta, southwest Nigeria. This information is needed to help inform best control practices in the area. This study therefore investigated the prevalence of Babesiosis and other haemoparasitic disease in a cattle slaughtering abattoir in Abeokuta, Ogun State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

This research was carried out at Gbonogun Abattoir. The abattoir is located on coordinates 07.1794553N and 03.406107E in Abeokuta, south western Nigeria. Abeokuta, the Ogun State capital has a tropical climate and enjoys double maxima of rainfall from April –July and September - October with dry season from November to March. The research was carried out between May and August, 2014.

2.2 Study Design and Selection of Cattle

This study employed a cross sectional survey design. A total sampling of 162 cattle was carried out during the study. A census was conducted followed by registration of tags on each of the cattle.

2.3 Ethical Considerations

Study protocol was approved by the appropriate ethics committee of Federal University of Agriculture, Abeokuta. Study animals were handled in accordance with the "Guide for the Care and Use of Laboratory Animals" of the NRC.

2.4 Collection of Blood Samples

Blood samples were collected from the jugular vein of the animals at point of kill (slaughter) in EDTA bottles. Each bottle was properly labelled with the breed, sex and age of the cattle immediately after collection. Samples were transported in ice packs to the Parasitology laboratory, Department of Pure and Applied Zoology for laboratory analysis.

2.5 Laboratory Analysis

A drop of blood was collected using a micro pipette from the sample bottles for each cattle and placed on a clean and grease free microscope slide. Thin blood smears were made, air dried, fixed in absolute methanol for 1 minutes and stained with 10% (1:10) giemsa stain

accordingly [10]. Slides were examined for *Babesia* spp. under X100 objective lens.

2.6 Data Analysis

Data obtained were analyzed descriptively using IBM SPSS 20.0 software. Descriptive statistics was employed in the presentation of prevalence estimates, and cross tabulations were made in comparing the demographic variables with prevalence estimates. Associations between variables were ascertained using Pearson chi-square and confidence interval was set at $p \leq 0.05$.

3. RESULTS

3.1 Demographic Information of Cattle Slaughtered at the Abattoir

Of the 162 cattle slaughtered and examined for babesiosis and other haemoparasites, 83(51.2%) were males while 79(48.8%) were females. By age category, majority of the cattle 93(57.4%) were below age 5, while 69(42.6%) were between age 6-8. Distribution of cattle by breed showed that 43(26.5%), 36(22.2%), 36(22.2%), 35(21.6%) and 12(7.4%) and of the cattle were sokoto gudali, fulani breed, Ndama, cross breed and Red bororo respectively (Table 1).

3.2 Prevalence of Babesiosis and other Haemoparasite among Cattle Slaughtered at the Abattoir

Of the 162 cattle examined, 13(8%) were positive for *Babesia* spp. Three other haemoparasites; *Theileria* spp, *Anaplasma* spp and *Trypanosoma brucei* were observed alongside *Babesia* spp, with prevalence rate of 17(10.5%), 30 (18.5%) and 3(1.9%) respectively. An overall prevalence of 27.8% was recorded, with 45 cattle infected with at least one of the four haemoparasite observed (Table 2).

3.3 Prevalence of Babesiosis and other Haemoparasites by Sex, Age and Breed of Cattle Slaughtered at the Abattoir

Majority of the infected cattle were males except for *Trypanosoma brucei* infection. Also, by age category, cattle within age range 36-72 month were with more infection compared to other groups. However, there was no sex and age predilection in terms of infection by the haemoparasites ($P < 0.05$). Infections by *Theileria* and *Trypanosoma* spp. showed a breed predisposition ($P > 0.05$) (Table 3).

Table 1. Demographic information of cattle slaughtered at the Abattoir

	Number examined	Percentage (%)
Sex		
Male	83	51.2
Female	79	48.8
Total	162	100
Age group (months)		
0-36 months	8	4.9
36-48 months	39	24.1
48-60 months	46	28.4
60-72 months	29	17.9
72-84 months	25	15.4
84-96 months	15	9.3
Total	162	100
Breed		
White Fulani	36	22.2
Sokotogudali	43	26.5
Ndama	36	22.2
Red bororo	12	7.4
Cross breed	35	21.6
Total	162	100

Table 2. Prevalence of babesiosis and other haemoparasite among cattle slaughtered at the Abattoir

	Number examined	Number infected (%)
<i>Babesia</i> spp	162	13 (8.0)
<i>Theileria</i> spp.	162	15(9.3)
<i>Anaplasma</i> spp.	162	30(18.5)
<i>Trypanosoma brucei</i>	162	3(1.9)
<i>Any haemoparasite</i>	162	45(27.8)

4. DISCUSSION

Our findings showed that babesiosis is prevalent in the study area, with a prevalence rate of 8.0% among the cattle examined. This result is in accordance with a similar study in Zaria, Northern Nigeria where a prevalence of 9.5% was recorded [8]. However, the prevalence reported in this research is very low compared to that of [11,12] where prevalence of 57.1% and 16.0% were recorded respectively. The differences in geographical location, presence and spread of competent vector could actually have played a significant role in these differences [13].

The presence of other haemoparasites such as *Trypanosoma* spp, *Theileria* spp and *Anaplasma* spp also confirms the availability of other disease vectors in the study area [14]. An overall prevalence of 27.8% recorded for haemoparasitemia calls for concern as this is higher than that reported by [12]. Infected cattle

Table 3. Prevalence of gastrointestinal helminths babesiosis and other haemoparasite by sex, age and breed of cattle slaughtered at the Abattoir

	Number examined	<i>Babesia</i> spp NI (%)	<i>Theileria</i> spp NI (%)	<i>Anaplasma</i> spp NI (%)	<i>Trypanosoma brucei</i> NI (%)
Sex					
Male	83	7(8.4)	9(11.4)	16(20.3)	1(1.3)
Female	79	6(7.6)	6(7.2)	14(16.9)	2(2.4)
Total	162	13(8)	15(9.3)	30(18.5)	3(1.9)
<i>P</i> value		<i>P</i> =0.844	<i>P</i> =0.361	<i>P</i> =0.579	<i>P</i> =0.589
Age (in years)					
0-36 months	8	0(0)	0(0)	2(25.0)	0(0)
36-48 months	39	5(12.8)	2(5.1)	6(15.4)	2(5.1)
48-60 months	46	4(8.7)	5(10.9)	8(17.4)	0(0)
60-72 months	29	4(13.8)	4(13.8)	7(24.1)	0(0)
72-84 months	25	0(0)	3(12.0)	6(24.0)	1(4.0)
84-96 months	15	0(0)	1(6.7)	1(6.7)	0(0)
Total	162	13(8)	15(9.3)	30(18.5)	3(1.9)
<i>P</i> value		<i>P</i> =0.241	<i>P</i> =0.730	<i>P</i> =0.697	<i>P</i> =0.442
Breed					
White Fulani	36	1(2.8)	2(5.6)	6(16.6)	0(0)
Sokotogudali	43	6(13.9)	2(4.7)	7(16.3)	0(0)
Ndama	36	1(2.8)	1(2.8)	4(11.1)	0(0)
Red bororo	12	1(8.3)	4(33.3)	3(25)	3(25)
Cross breed	35	4(11.4)	6(17.1)	10(28.6)	0(0)
Total	162	13(8)	15(9.3)	30(18.5)	3(1.9)
<i>P</i> value		<i>P</i> =0.259	<i>P</i> =0.006	<i>P</i> =0.378	<i>P</i> =0.000

can serve as a reservoir of infection for vectors, susceptible livestock and humans, and this could lead to reduced food conversion rates, reduced milk/meat production rates, abortion and death [7,8].

Although male cattle were more infected than their female counterpart in our study with no significant difference, this is in deviant with the finding of [12] where females had more infections. This shows that both females and males are susceptible to infection with haemoparasites in areas where the disease vectors are endemic. However, it is important to note that extended breeding practices for economic reasons such as calving and milk production in females could lead to accumulation of parasites due to their long time exposures to disease vectors [16]. Females are usually kept longer in the ranch for reproductive purposes, with only the old-weak less productive ones sold to butchers for slaughter at the abattoir. Reports of [12,15,17,18]; have also implicated sex dimorphism in the incidence of haemoparasitism in Nigeria.

This study has revealed that babesiosis and other haemoparasites are endemic in the study area, although the prevalence of babesiosis is low. Nevertheless, proper vector control methods using acaricides and treatment with drugs in

some of the source ranches would be necessary to avoid vertical transmission between infected cattle and susceptible ones. Continuous screening of cattle at source ranches should be encouraged followed by application of appropriate control measures aimed at reducing to the barest minimum the prevalence of babesiosis and other haemoparasites.

5. CONCLUSION

This study has highlighted the need for vector control measures and continuous screening/treatment of cattle at source ranches, with the aim of avoiding vertical transmission between infected and susceptible cattles and ultimately improving their productivity.

CONSENT

We obtained permission from the Veterinary Department of the Ministry of Agriculture, Abeokuta to collect our samples after slaughter of the animals.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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