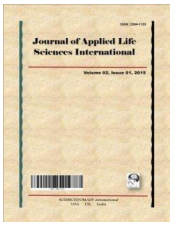

Journal of Applied Life Sciences International

19(4): 1-6, 2018; Article no.JALSI.46280
ISSN: 2394-1103

Comparative Study on Tick-borne Haemoparaites of Cattle and Goats Slaughtered in Some Abattoirs within Makurdi, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JALSI/2018/46280
Editor(s):
(1) Dr. Hakan Inci, Assistant Professor, Department of Animal Science, Faculty of Agriculture, Bingol University, Bingol, Turkey.
Reviewers:
(1) José Manuel Jaramillo Ortiz, Instituto Nacional De Tecnología Agropecuaria, Argentina.
(2) Wafaa Abd El-Ghany Abd El-Ghany, Cairo University, Egypt.
Complete Peer review History: http://www.sdiarticle3.com/review-history/46280

Original Research Article

Received 05 October 2018
Accepted 29 December 2018
Published 17 January 2019

ABSTRACT

This study was conducted to compare the prevalence of tick-borne haemoparasite in cattle and goat in Makurdi using 228 each of cattle and goats. The method of diagnosis used was thin blood film technique. Chi square (X^2) test was used to compare the prevalence rates. Findings revealed that 125 (54.8%) cattle and 110 (48.2%) goats from different locations were infected with haemoparasites at $p < 0.05$. Comparison of infection based on age (0 – 11 years) and sex of the cattle and goats was not significantly different. Haemoparasites of cattle and goats and their prevalence were: *Anaplasma centrale* (22.4%), *A. marginale* (21.1%), *Bebesia bovis* (11.4%); *A. centrale* (16.7%), *A.marginale* (12.3%), *B. ovis* (11.4%) and *Theileria ovis* (7.8%) respectively. The studied cattle and goats were infected with varying haemoparasites that existed as a single species in the studied animal (single infection) or a combination of parasites (multiple or mixed infection) without a significant difference ($p > 0.05$). The study recommended routine screening of animals so as to effectively control tick-borne infections.

Keywords: Tick-borne; Anaplasma centrale; A. marginale cattle; goat abattoirs.

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1. INTRODUCTION

Haemoparasites are parasites that live within their host's (animal) bloodstream. Heamo-parasitic diseases have a global distribution due to the fact that their vectors, ticks and blood sucking flies also have a global distribution [1]. Tick borne diseases (TBDs) are one of the most important constraints to livestock production in developing countries. The most important TBDs of cattle and goats in Africa, especially Nigeria include theileriosis (East Coast fever and Cowdriosis disease) caused by *Theileria parava*, babesiosis (red water) caused by *Babesia bovis* and *Babesia bigemina*, Anaplasmosis (gall sickness) caused by *Anaplasma marginale* and *Analplasma central,* Cowdriosis (Heartwater) caused by *Ethrlichia ruminantium* [2] Among these, Theileriosis is the most important; causing significantly more deaths than the other TBDs combined [3].

In Nigeria, thileriosis poses a major constraint to the livestock industry with losses of about 10,000 cattle per annum [3] while East Coast Fever (ECF) occurs in the Eastern and Northern States; Corridor disease is widespread in the Southern, Central and Northern States [4]. The highest number of ECF cases occurs between January and March in the Northern and Eastern states, and highest number of Corridor disease cases are recorded during the month of January in the Southern States [5]. The disease is spreading at a very fast rate, beyond its original borders. The epidemiology is complicated by among other factors, the wide distribution of the tick vector, *Rhipicephalus appendiclatus,* which is found all over the country [6].

Ticks feed on animals that are either sick from any of these diseases, or animals that are healthy but have the parasite in their blood (Carriers). Cattle and goat become infected with TBDs when the ticks feed on them. Through their saliva, a single infected tick can pass disease in to an animal during the process of feeding [7].

Tick borne disease may be triggered by infection with a variety of pathogens, including rickettsia and other types of bacteria, viruses and Protozoa. Because ticks can harbour more than one disease causing agent, cattle and goats can be infected with more than one pathogen at the same time [8].

Despite their importance, little is known about the prevalence of haemoparasites in cattle and goats in the communal areas of the country. Clinical signs and post mortem lesions are pathognomonic of mixed tick – borne infections especially babesiosis, anaplasmosis [9]. The aim of this study was to undertaken a comparative study of haemoparasites of cattle and goats in Makurdi

2. METHODS

2.1 Study Area

Makurdi is one of the Local Government Area that makes up Benue State of Nigeria, located in the North Central geopolitical zone. It is located in the Middle Belt area of Nigeria and shares boundary with Guma, Gwer, Gwer west and Tarka local government areas. Makurdi is situated along the coast of River Benue and comprising of major places like high level, Wurukum, Wadata, North bank and Modern market. Persistent clearance of the vegetation has led to the development of regrowth vegetation at various levels of serai development, but more importantly, parklands with grasses ideal for animal grazing during their early growth. These succulent grasses can be cut with machinery, dried and baled for dry season livestock feeding. The grasses however grow very tall, coarse and tough on maturity. The scattered trees are mainly those of economic value and include locust bean, shear butter, mango, silk cotton, African iron, Isoberlinia, cashew, oil palm, *Daniellia oliveri*, gmelina. The study area comprise of four abattoirs namely: Wurukum abattoir, Wadata abattoir, Modern Market abattoir, cattle Market in Makurdi, Benue State.

The sanitary conditions of the Makurdi abattoirs are of serious concern to the health statues of the workers and the meat products.

2.2 Age Determination of Animals

The age of animals were determined by examination of the front teeth and by counting the rings in its horns [10].

2.3 Sample Size Determination and Sample Selection

A total of 456 animals comprising of 228 each of cattle and goat slaughtered at abattoir was randomly sampled during the period of study. This size was arrived at using Yaro – Yamane's formulae;

$S = N/1 + N (e)^2$

N = Population studied.
e = Error margin (0.05)

Blood sample was collected at designated areas for the period of three (3) months (July to October 2014) when the animals were slaughtered, 3–5 mls of blood was collected immediately from the jugular vein, into a bijon bottle containing ethylenediaminetertraacetate (EDTA) used as anti-coagulant.

The sample was labelled properly, placed in a cooler and transported immediately to University of Agriculture Veterinary Teaching Hospital laboratory, Makurdi where it was examined using thin blood film method.

2.4 Thin Blood Film Method

A thin blood film technique was employed to detect tick borne haemoparasites of cattle and goats respectively by the following methods. The blood was mix gently with the aid of an applicator stick few drops of blood was placed at the end of the slide at about 2 cm to the edge of the slide. A separator was placed in front of the drops of blood and push backward to allow the separator to touch the drop (blood) and allowed to spray all to the sprayer. A firm push was made forward to make the blood dragged behind the separator slide to form a film, if the blood was push instead of pulled along the slide parasite may be crushed [11]. The procedure was completed as quickly as possible; the smear was allowed to dry and was labelled for proper identification. The smear was fixed in absolute methanol for five minutes and allowed to dry; the smear was covered with Giamsa stain (Romanowslay stain) and allowed for 35 to 40 minutes. The smear was washed with water and allowed to dry. The smear was viewed using the Microscope (using X 100 objectives) oil immersion for identification of tick borne haemoparasite.

2.5 Statistics

Data was analyzed using Chi-square test to determine whether there is a significant different between the expected frequencies and the observed frequencies in one or more categories and to examine differences within categorical variables.

3. RESULTS

A total of 228, each of cattle and goats were examined in Makurdi Metropolis. Out of this number, 125 (54.8%) cattle and 110 (48.2%) goats were infected with haemoparasites. Cattle and Goats from Modern Market Abattoir recorded the highest infection (66% and 64% respectively). Parasitic infection was highest in female Cattle and Goats with significant differences ($p<0.05$; Table 1). Cattle and goats of 2-3 years recorded the highest infection 18(62.1% and 62.9% respectively) with no significant differences ($p>0.05$; Table 2). *A. central* was the dominant haemoparasite in both Cattle and Goats. Infection was higer in females than in the male animals (66.4% in female cattle than 38.3% in males and 56.7 in female goats than 29.8% in male goats), with no significant differences ($p>0.05$; Table 3).

4. DISCUSSION

The study compares the occurrences of tick borne heamoparasitic infections in cattle and goats. Three genera of tick borne heamoparasites were identified namely *Anaplama* Spp, *Babesia* Spp and *Theileria* Spps. *A. central, A. marginale and B. bovis* was present in cattle and *A. Central, A. marginale, B. ovis and T. ovis* was present in goats slaughtered in abattoir within Makurdi. The most prevalent tick borne heamoparasitic diseases present in cattle and goats were *A. central*. The species of heamoparasities reported in this study were similarly observed by Ajayi et al. [12, 13]. The report also shows that *A. central* is the most prevalent tick borne heamoparasite in both cattle and goats, this finding partially agree with the finding of Adu [14]. *T. ovis* showed a low occurrence in the study. This contradicts earlier study by Kamani [15] where high prevalence has been reported in North–central Nigeria. The low parasitemia observed in *T. ovis* may be associated with difference of sampling strategy and sample numbers. The relative low prevalence of B. ovis in cattle observed in this study is in similar to earlier reports by Bell – Sakyi [16]. This could probably be due to the fact that animals that recovered from babesiosis become immmuned to reinfection.

More cattle were infected with TBDs as compared to goats. This has earlier been reported by Bell – Sakyi [16] in Accra, Ghana. The finding was attributed to continuous relocation and migration of cattle to new environments.

Table 1. Comparison of Cattle and Goats with tick borne haemoparasites based on location

Abattoir Location	No. of Cattle examined (%)	No. of Cattle infected (%)	No. of Goats examined (%)	No. of Goats infected (%)
Cattle Market North Bank	66 (28.9)	37 (56.1)	66 (28.9)	29 (43.9)
Modern Market	50 (21.9)	33 (66)	50 (21.9)	32 (64)
Wadata Market	39 (17.3)	21 (53.8)	39 (17.3)	16 (41)
Wurukum	73 (32)	34 (46.6)	73 (32)	33 (45.2)
Total	**228 (100)**	**125 (54.8)**	**228 (100)**	**110**

x^2 = 3.59; df = 9; P < 0.05

Table 2. Comparison of cattle and goats with tick borne haemoparasites in relation to their age

Age (years)	Cattle No. examined (%)	Cattle No. infected (%)	Goats No. examined (%)	Goats No. infected (%)
0 – 1	-	-	-	-
2 – 3	29(12.7)	18(62.1)	62(27.2)	39(62.9)
4 – 5	41(17.9)	23(56.1)	68(29.8)	31(45.8)
6 – 7	49(21.5)	28(57.1)	57(25)	24(42.1)
8 – 9	48(21.1)	27(56.3)	28(12.3)	12(42.9)
10 – 11	61(26.8)	29(44.3)	13(5.7)	4(30.8)
Total	228(100)	125(54.8)	228(100	110(48.2)

X^2 = 91.852; df = 15; P> 0.05

Table 3. Comparison of cattle and goats with tick borne haemoparasites in relation to sex

Sex	Cattle no. examined (%)	Cattle no. infected (%)	Goats no. examined (%)	Goats no. infected (%)
Female	134(58.8)	89(66.4)	129(56.6	76 (56.7)
Male	94(41.2)	36 (38.3)	99 (43.4)	34(29.8)
Total	228(100)	125(54.8)	228(100)	110(48.2)

X^2 = 10.69; df = 3; P> 0.05

Relative high incidence of TBDs of cattle and goats within the ages of 2–3 years has earlier been reported by Fasanmi and Onyma [17]. This could be attributed to the susceptibility of animals and reduced immunity as a result of stress due to pregnancy and location [15,18,19] and favourable environmental conditions for the survival and proliferation of arthropod vectors responsible for their transmission [13]. There was no parasitic infection of cattle and goats under the ages of 0 – 1 year. This is due to dependence on breast feeding and inability to expose themselves for long to the outside environment as compared to older animals [20] attributed this to the degree of immunity rate to colostrum derived antibodies.

Female cattle and goats had high prevalent of parasitic infections (66.4% and 56.7% respectively) is in line with the findings [18,20]. This is possible due to the fact that females are kept much longer for breeding and milk production purposes. However earlier finding [21] reported a higher prevalence of parasitic infection in male than female cattle as 28.68% and 28.67% respectively. This varies with the findings of the present study and could be attributed to different farm practices/ management practices exhibited by farm owners.

5. CONCLUSION

The Nigerian environment and climatic conditions represent multi–tick species vector ecology. In this present study, single and mixed infections of different tick-borne pathogens in host populations are common. The major tick–

borne haemoparasites detected in abattoir in Makurdi, Benue State using thin blood film method were *A. central, A. marginale* and *B. bovis,* in cattle and *A. central, A. marginale, B. ovis* and *T. ovis* in goats.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle3.com/review-history/46280