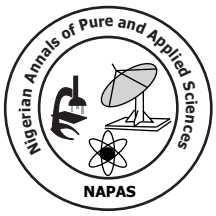

Assessment of Haemoparasites of Cattle slaughtered in Jos South Abattoir, Plateau State, Nigeria

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Abstract
Haemoparasites are considered as the most important constraints to the health and improved productivity of cattle in sub-Saharan Africa. This study was aimed at determining their prevalence among cattle slaughtered at Jos South abattoir, Plateau state, Nigeria. A total of 200 blood samples were collected between April and May, 2018. Thin and thick blood films were made from the samples and stained with Giemsa and examined microscopically using X100 magnification. A total of 128(64%) cattle were positive for *Babesia species*. No other haemoparasite were detected. Blood sample of 190(95%) were collected from cattle that were 3 years and above and 10(5%) were from cattle below 3 years. Female and white Fulani cattle were 2 times (POR = 2.29; $P < 0.01$) and 3 times (POR = 3.19; $p < 0.0001$) respectively at the risk of a positive result of *Babesia species* infection, when compared to male cattle and Red Bororo by bivariate analysis. There was no significant difference in the prevalence of *Babesia species* with respect to age ($p = 0.27$) and source of cattle ($p = 1.00$, $p = 0.96$ and $p = 0.56$) for animals from Plateau, Bauchi and Maiduguri respectively. This study showed a high prevalence of *Babsia species* infection amongst slaughtered cattle at Jos South abattoir. It confirms the presence of carrier populations of *Babesia*-infected cattle which both serve as a reservoir of infection for tick-vectors, susceptible livestock and humans. Routine screening and treatment of animals to effectively reduce to the barest minimum the prevalence of *Babesia species* in the study areas is highly recommended.

Key words: Haemoparasites, *Babesia*, Cattle, Slaughtered, Abattoir, Jos

Introduction

Haemo parasites are parasites that are found in blood. They are considered as the most important constraints to the health and improved productivity of cattle in sub-Saharan Africa. Animals such as cattle, sheep and goats may be infected with a wide variety, most importantly vector-borne prokaryotes and eukaryotic haemo parasites such as the *Rickettsiae*: *Anaplama* and *Ehrlichia* (*Cowdria*), and the protozoan parasites *Theileria, Babesia*and *Trypanosoma* (Bell-Sakyi *et al.,* 2004; Okaiyeto *et al*., 2008).

African animal *trypanosomiasis, Babesiosis* and *Cowdriosis* are considered as the most challenging disease affecting cattle production in Africa (FAO, 1984; Young *et al*., 1988, Bell-sakyi *et al*., 2004). They are generally shown to cause destruction of red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility (Mtshali *et al*., 2004; Kaufman *et al.*, 2006, Jonsson, 2006; Justin, 2008).

These parasites are cosmopolitan due to the fact that their vectors; ticks and flies, also have a global distribution. The high incidence of haemo parasites in the tropics could be as a result of the favourable environmental conditions that promote the survival and proliferation of the arthropod vectors responsible for their transmission (Adejinmi *et al*., 2004 and Payne, 1990).

Livestock sub-sector is an important and strategic agricultural component that generates income for human livelihood in Africa, especially Nigeria (Ahmed, 2002). Livestock provides major sources of protein (meat and milk), hide and skin, bone and bone meal for livestock feeds, raw material for other agro based industries as well as providing employment for both rural and urban dwellers engaging in production and marketing of livestock and its by-product (Maisamari, 2002). They also play significant role in proving manure (Tanko, 2002). There are many techniques for the detection of parasitic infections of livestock. However, slaughter houses provide an excellent opportunity for detecting diseases of both economic and public health importance (Gracey *et. al.*, 1999).

Although epidemiological studies have established haemo protozoans as major constraints in the breeding of domestic cows in Nigeria, (Enwezor *et al*., 2009), there is paucity of information on the prevalence of these parasites among local breed of cows slaughtered in most region of the country. Hence, the need to carry out this study with the aim of determining the prevalence of haemo parasites among different breed of trade cattle slaughtered in Jos South Abattoir, Nigeria.

Materials and Methods

Study area

The study was carried out at Bukuru Abattoir in Jos South Local Government Area, Plateau state, Nigeria. It is located by Gyero Road Bukuru about 1km away from the Jos South Local Government Area secretariat.

Ethical Consideration

The study was conducted after a written permission was obtained from the head of the Jos south abattoir; seeking to use the facility for the study protocol.

Study Population/duration

The study population constituted 200 cattle brought for slaughter at the Jos abattoir between the months of April and May, 2018.

Sample Collection

Five milliliters (5ml) of blood was collected aseptically from each animal slaughter into Ethyelene Diamine Tetra-acetic Acid (EDTA) bottles. Samples were transported to the Parasitology laboratory of the Federal College of Veterinary and Medical Laboratory Technology, Vom, Plateau state within 6 hours of collection for processing. Information such as sex of the cattle, breed, age, source of cattle was also noted.

Parasitological analysis

Haemo parasites were detected using the techniques of stained thin and thick blood smear and was examined using X100 objective lens as prescribed by (Cheesbrough, 1998).

Giemsa Stain Preparation

Giemsa powder (3.8g) was dissolved in 250mls of methanol and then 250mls of glycerol was added. The flask was then closed with a cotton wool and placed in a water bath at 70 degree centigrade for 1hour, and was slightly agitated occasionally. The preparation was then removed from the water bath and kept at room

temperature for 2-3weeks to ripen, labeled and stored in the dark at room temperature.

Thin and Thick Blood Smear Preparation

Staining Procedure

The dried thin film was fixed in methanol for 2minutes. The slide was placed on a staining rack and was flooded with 10% dilution of Giemsa stain for 45minutes. Excess stain was washed with buffer distilled water (pH 7.2) and the back of the slide was cleaned with dry cotton wool. It was allowed to air dry at room temperature and was examined microscopically using oil immersion objective lens (100x).

Data Analysis

The prevalence odds ratio was determined using bivariate analysis to determine whether age, sex, breed or source of the cattle where risk factors.

Results

A total of 200 cattle blood samples were examined. Babesia (64%) was the only haemoparasite that was detected. Most of the cattle, 190(95%) were greater than 3 years of age, 130(65%) were females. Majority, 119(59.5%) were of the white *Fulani* breed and 92 (46%) were from Plateau State of Nigeria.123(64.7%) of the cattle ≥ 3 years of age and 5(50%) of the cattle < 3 years of age were positive for Babesia. 92(70.8%) of the female cattle and 36(54.1%) of the male cattle were infected. 89(74.8%) of the white *fulani* cattle and 39(48.2%) of the red *bororo* cattle were positive. 53(57.6%), 45(59.2%) and 21(65.6%) of the cattle were from Plateau state, Bauchi state, and Maiduguri (Borno state) were positive for Babesia respectively.

The bivariate analysis to determine whether age, sex, breed or source of the cattle where risk factors indicated that female cattle and white *fulani* cattle were 2 times (POR= 2.29; $p<0.01$) and 3 times (POR= 3.19; $p<0.0001$) respectively at the risk of a positive result to Babesia using Giemsa test when compared to male cattle and red *bororo* by bivariate analysis. There was no significant difference in the prevalence of Babesia with respect to age (years) and source of cattle (Table 1).

Table 1: Association between different risk factors and Prevalence of *Babesia species* among cattle slaughtered at Jos South Abattoir, Plateau state, Nigeria

Characteristics	Frequency (%)	No. Positive (%)	*POR	**P value
Age(years)				
< 3 years	10(5.0)	5(50.0)	0.54	0.27
= 3 years	190(95.0)	123(64.7)		
Sex				
Males	70(35)	36(51.4)	2.29	0.01
Females	130(65)	92(70.8)		
Breed				
White Fulani	119(59.5)	89(74.8)	3.19	0.0001
Red Bororo	81(40.5)	39(48.2)		
Source of cattle				
Plateau	92(46)	53(57.6)	Referent	1.00
Bauchi	76(38)	45(59.2)	1.07	0.96
Maiduguri	32(16)	21(65.6)	1.40	0.56

(*POR: Prevalence Odds Ratio, **P: Level of significant was set at $P<0.05$, N=200)

Discussion

This study showed a high prevalence of *Babesia species* infection amongst sampled cattle. It confirms the presence of carrier populations of *Babesia*-infected cattle which both serve as a reservoir of infection for tick-vectors, susceptible livestock and humans. The results obtained from this study showed a higher prevalence (64%) compared to reports from previous studies from Nigeria. In several studies

conducted on haemo parasites of cattle, Agu and Amadi, reported a prevalence of 3.9% in Ebonyi State in 2001. Enwezor and his colleagues in Kaduna State reported a prevalence of 13.5% in 2009, and Agu and his colleagues in a study also in Kaduna State reported a rate of 9.4% in 1990. In a study among 637 cattle by Kamani *et al.* (2010) for haemo parasitic infections in North-Central, Nigeria, 25.7% prevalence was recorded.

Studies in Jos Plateau by Olabode *et al.*(2010), have also shown the presence of *Trypanosome, Babesia* and *Theileria* species in cattle slaughtered in Jos abattoir. The prevalence of 64% reported in this study suggests that the cattle are subject to a continuous challenge by the parasites and that there seems that there is a carrier state in most animals. In contrast, the works by Bell – Sakyi *et al,* (2004), Enwezor *et al.* (2009) and Kamani *et al,* (2010) recorded lower prevalence of 3.18%, 8.4% and 8.0 respectively.

Differences in prevalence may be attributed to the period of sampling and the availability of tick vectors that transmit the parasites. The prevalence obtained in relation to age, sex, breed and source of cattle, shows that the cattle of age three year and above had a higher prevalence than those below three years. Female cattle have higher prevalence than males. The white *fulani* had higher prevalence than red *bororo*. The higher parasitemia observed in females may be attributed to accumulation of parasites by the females due to the extended breeding for economic reason such as calving and milk production. This confirms previous report of sex dimorphism in the incident of haemo parasitism in Nigeria (Agu *et al.,* 1990, Agu and Amadi, 2001; Enwezor *et al.,* 2009, Kamani *et al.,* 2010). The variability in breed specific parasitemia was in line with observations made by Agu and Amadi (2001) that attributed this variability to host specific factors peculiar to individual breeds.

Conclusion

Costs due to babesiosis are incurred not only from mortality, ill-thrift, abortions, loss of milk/meat production and draft power and from control measures (such as acaricide treatments, purchase of vaccines and therapeutics), but also through its impact on international cattle trade. The present study confirms the presence of carrier populations of *Babesia*-infected cattle which both serve as a reservoir of infection for tick-vectors, susceptible livestock and humans. Routine screening and treatment of animals to effectively reduce the barest minimum the prevalence of *Babesia species* infection in the study areas is highly recommended.

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