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Prevalence of Babesiosis among Cattle Slaughtered at Kano Abattoir, Kano State, NigeriaMuhammad, A.B.¹, Ibrahim, A.¹ and *Mustapha, A.K.¹*Department of Medical Laboratory Science, Faculty of Allied Health Sciences Bayero University, Kano P.M.B. 3011, Kano Nigeria¹**Author for Correspondence*: aminu.amustapha14@gmail.com/+234-703-717-7907***Abstract**

Babesiosis, a haemoparasitic disease caused by *Babesia sp.* and transmitted by ticks. The disease imposes a serious burden on the healthcare infrastructure of both the cattle and their handlers. The aim of this study was to investigate the prevalence of Babesiosis among cattle slaughtered at Kano abattoir, Kano State, Nigeria. A total of 132 cattle were examined. Blood samples were collected from the jugular vein of the cattle at point of slaughter into sample tubes containing ethylene diamine tetraacetic acid (EDTA) and transported to the Medical Laboratory Science Department Bayero University, Kano, for parasitological examination. The Giemsa-stained slides were observed under high powered microscope at x100 objective lens. The remaining blood was used to determine the PCV of cattle using microhaematocrit technique. Of the 132 cattle sampled, 91(69.0%) were males while 41(31.0%) were females. By age category, majority of the cattle 82(62.1%) were adults while 50(37.9%) were young. Distribution of cattle by breed showed that 92(69.7%), 31(23.5%) and 9(6.8%) of the cattle were white Fulani, Red Bororo and Sokoto Gudali respectively. The prevalence of 11.4% was recorded for *Babesia spp.* And (4.5%) for *Trypanosoma spp.* There was age, breed and anaemia predilection for the babesiosis observed ($p=0.000$) and there was no gender predilection for Babesiosis ($p=0.840$). The finding of this study shows that Babesiosis and other haemoparasitic disease are prevalent in the studied 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.

Key Words: Babesiosis, haemoparasitic, cattle slaughtered, prevalence

Background of the Study

Babesiosis is caused by intraerythrocytic protozoan parasites of the genus *Babesia* that infect a wide range of domestic and wild animals and occasionally man. The disease is tick-transmitted and distributed worldwide. The major economic impact of babesiosis is on the cattle industry and the two most important species in cattle, *Babesia bovis* and *B. bigemina* (Sam-Wobo *et al.*, 2016). The Nigerian livestock resources was conservatively estimated to the tune of USD 6 billion (Akande *et al.*, 2010; Anon, 2006) and contributes significantly to the agricultural component of the Gross Domestic Product (GDP) of which cattle production contributes up to 40% (McIntyre *et al.*, 1992). Cattle production provides essential source of protein through meat and milk, generates employment, income, farm power and organic manure for arable Agriculture in the Sudano-Sahelian ecological zones of the country (Ikhatua and Asaka, 2000). Among nomadic Fulani and Shuwa-Arab pastoralists, the ownership of cattle also serves as an index of social prestige (Salih *et al.*, 2015). Furthermore, their products such as hide and skins, bones and blood serve as raw materials for industries (Ikhatua and Asaka, 2000).

Moreover, 90% of the cattle population in Nigeria are raised under the pastoral husbandry system of Fulani herders (Lasisi *et al.*, 2002). Under this system cattle are extensively grazed on pastures and forests and may be exposed to various arthropod vectors of haemoparasites (Samdi *et al.*, 2010). The prevalence of various genera of haemoparasites of cattle (*Trypanosomes*, *Babesia*, *Anaplasma*, and *Theileria*) was previously reported in different parts of the country (Qadeer *et al.*, 2015; Okorafor and Nzeako, 2014; Ademola and Onyiche, 2013; Enwezor *et al.*, 2012; Akande *et al.*, 2010; Kamani *et al.*, 2010) and elsewhere in the world (Velusamy *et al.*, 2014). *Trypanosoma*, *Babesia* and *Anaplasma* species are listed among the most economically important genera of haemoparasites in Nigeria (Akande *et al.*, 2010; Kamani *et al.*, 2010; Biu and Kabono 2005), and their impact on cattle production and productivity accounts for heavy economic losses to livestock producers in the tropics and subtropics (Soulsby, 1982).

They are responsible for destruction of erythrocytes leading to anaemia, jaundice, anorexia, weight loss and infertility in livestock (Akande *et al.*, 2010). Haemoparasites have generally been shown to cause destruction of red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility (Justin, 2008; Jonsson, 2006; Kaufman *et al.*, 2006; Mtshali *et al.*, 2004).

Beef is an excellent source of complete protein, minerals such as zinc, selenium, phosphorus and iron and the B vitamins. Red meat is the most significant dietary source of carnitines and, like any other meat (pork, fish, veal, lamb etc.), is a source of creatine (Sam-Wobo *et al.*, 2016).

Haemoparasitic infections are major public health, veterinary and socio-economic problems in Africa, where they impose a burden on the healthcare infrastructure of both animals and animal handlers in endemic areas (Sam-Wobo *et al.*, 2016).

The Study Area

This study was carried out at Kano abattoir which is situated within Kano metropolis. It is

situated in the Sahelian geographic region south of the Sahara. Kano city is the capital of Kano state which is located in the north-western Nigeria. It lies between latitude 11° 30N and longitude 8°30E and lies at about 15,80 feet above sea level. It was created on May 27, 1967 from part of northern region. Kano state border Katsina to the north-west, Jigawa to the north-east, Bauchi state to the south-east and Kaduna state to the south-west. The total land area of Kano state is 20760sq kilometer with a population of 9383682 based on the official 2006 national population and housing census (Ado,2009).

Ethical Approval

The approval to conduct the research was sought from the research ethic committee of Kano state Ministry of agriculture and Natural Resources.

Surrogate Consent

Verbal surrogate consent was obtained from the cattle owners before conducting the research.

Data Collection

Characteristics of population such as age, gender, breed and body condition scores were observed and recorded for each sample throughout the study. Gender differentiation was based on the appearance of external genitals while breed identification was based on morphology as described by Yunusa *et al.* (2013).

Sample Collection

Five (5ml) of blood sample was collected from the jugular vein at the point of slaughter into EDTA containing bottles which was labelled appropriately and placed on ice packs for onward delivery to the laboratory (DEFRA, 2001).

Sample Storage

Samples were stored in the refrigerator, prior to processing at 4°c

Sample Processing

Macroscopy

The blood was observed macroscopically for the presence of heamolysis

Microscopy

Thin film making

A drop of blood was placed at one end of a clean glass slide. A cover slip was used as a spreader to spread the blood by allowing the spreader to touch the blood at an angle of 45°, and was then spread gently but firmly along the surface of the horizontal slide so that the blood was dragged behind the spreader to form the film with a feathered edge. It was air-dried using the slide racks, and fixed in methanol for 5 mins. It was stained in 1:10 Giemsa and Buffer dilution and stain for 30-40 min and was rinsed with distilled water then it was allowed to air dry again using the slide racks. The smears were examined under the light microscope at x100 objective magnification (oil immersion) for the presence of haemoparasites and identification as described by Mosqueda *et al.* (2012).

Packed cell volume determination

The remaining blood samples was used to determine the packed cell volume (PCV). After gently mixing the blood, A non-heparinised capillary tube was filled with blood up to ¾ of its length by capillary action and one end was sealed. Then, all of the blood-filled tubes were centrifuge for 4 min at 16000 rpm using a micro-haematocrit centrifuge. Finally, each tube was placed in a micro-haematocrit reader, and determined the percentage of packed cell volume (PCV) for each animal (Urquhart *et al.*, 1996; Hansen and Perry, 1994).

Statistical Analysis and Interpretation

The data was summarized and enter into excel worksheet. The data was analyzed in statistical package for the social sciences (SPSS) for windows version 20.0 software. The prevalence rates among age categories, breeds and gender of

the animals were expressed as percentage of the total number of animals sampled. Chi square test was used to evaluate relationship between the prevalence of the disease and the age category and gender of the cattle studied. One-way ANOVA was used to evaluate the relationship between different breed of the cattle studied. A P-value of $p < 0.05$ was considered significant.

Results

A total of 132 cattles slaughtered at Kano main Abattoir were examined for babesiosis and other haemoparasitaes. **Table 1** shows the result of babesiosis and other haemoparasites. Out of the 132 cattle examined, 15(11.4%) were positive for *Babesia* sp and one other haemoparasites was observed alongside with prevalence rate of 6(4.5%). **Table 2** shows that the association between the babesiosis and anaemia of the cattle in the Kano abattoir was statistically significant ($p=0.000$). **Table 3** shows the results of babesiosis based on gender and age. Majority of the infected cattle were males compared to their female counterpart. Based on age category, young cattles were more prone to infection compared to the adult one. However, there was no significant relationship between gender of cattle and the babesiosis statistically ($p=0.840$). The age predilection in terms of infection by the *babesia spp* showed a significant association ($p=0.000$). Table 4 shows the result of babesiosis based on breed of the cattle slaughtered and examined at Kano abattoir where by it indicated that majority of the infected breed are Red Bororo followed by Sokoto Gudali and then White Fulani. Also result showed that there is significant relationship between different breed of cattle and the infection cause by *babesia sp* ($p=0.014$).

Table 1: Prevalence of Babesiosis and other Haemoparasites among Cattle Slaughtered at the Abattoir

	Number examined	N (%)	Prevalence (%)
Babesia sp.	132	15(11.4)	(11.4)
Trypanosoma sp.	132	6(4.5)	(4.5)

Key: N=Number of infected %=percentages

Table 2: The Associations between Babesiosis and Anaemia of the cattles in the study Area.

	Anaemic	Non-anaemic	X ²	p-value
Infected cattle	14	1	122.567	0.00
Non-infected cattle	0	117		
Total	14	118		

Key: X²=chi-square value p-value=probability p<0.05 was considered significant statistically

Table 3: Distribution of Babesiosis Based on Gender and Age of Cattle Slaughtered at the Kano Abattoir.

Gender	Number examined	N (%) <i>Babesia sp.</i>	X ²	p-value
Male	91	10(7.6)	0.041	0.840
Female	41	5(3.8)		
Total	132	15(11.4)		
Age category				
Adult	82	3(2.3)	12.760	0.00
Young	52	12(9.1)		
Total	132	15(11.4)		

Key: X²= Chi-square value N=Number of infected p-value=Probability p<0.05 was considered significant statistically

Table 4: Distribution of babesiosis based on breed of the cattle slaughtered at kano abattoir.

Breed	Number examined	<i>Babesia sp.</i> N (%)	F	p-value
White Fulani	92	6(4.5)	4.057	0.046
Red Bororo	31	8(6.1)		
Sokoto Gudali	9	1(0.8)		
Total	132	15(11.4)		

Key: N=Number infected F=ANOVA %=Percentages p<0.05 was considered significant statistically

Discussion

Babesiosis is a dangerous, invasive disease of humans and animals. Probably the first described case of an epidemic caused by the *Babesia* genus was a cattle mortality described in the biblical Book of Exodus (Homer *et al.*, 2000). Our findings showed that babesiosis is prevalent in the study area, (Kano main abattoir) with a prevalence rate of 11.4% among the cattle examined, which was attributed to the proper

screening of cattle before slaughtered by veterinarians. This finding is in keeping with a similar work in Zaria, Northern Nigeria where a prevalence of 9.5% was recorded (Onoja *et al.*, 2013). This finding also is in contrast to the finding of Okwelum *et al.* (2013) in Abeokuta, Ogun State and Kamani *et al.* (2010), North central of Nigeria where a prevalence of 57.1% and 16.0% were recorded respectively. This could be attributed to differences in geographical

location, presence and spread of competent vector could actually have played a significant role in these differences (Ntonifor *et al.*, 2013). While the finding of the study also indicated other haemoparasites such as *Trypanosoma* sp. (4.5%) was recorded. This could be due to the availability of other disease vectors in the study area (Walker *et al.*, 2003).

Similarly, the association between Babesiosis and anaemia in our finding shows there is strong relationship statistically ($p=0.000$). This could be due to the fact that the presence of *babesia* sp causes destruction of Red blood cells leading to anaemia. This finding is in line with finding of Justine, 2008 at Kansas University USA.

The male cattles were more infected 7.6% than their female counterpart 3.8% in our findings with no significant difference statistically ($p=0.05$). This could be attributed to the fact that female cattle are usually kept in the ranch for reproductive purposes, with only the old-weak less productive ones are sold to butchers for slaughter at the abattoir. This finding is in contrary to the finding of Kamani *et al.* (2010), in Ogun state who reported that the females cattles had more infections than males cattles. Also, the finding of this study revealed that young cattles had a higher prevalence 9.6% compared to their adult counterparts. This could be due to development of immunity in adult cattle with previous infection. The findings corroborate with the finding of Ademola and Oyiche (2013) at Bodija abattior Oyo State who reported that younger cattle had more infections than adult cattles.

Similarly, the finding of this study based on cattle breed, shows that, the higher prevalence of 6.1% of Babesiosis was recorded in Red Bororo breed. This could be attributed to the fact that; they are usually herded by pastoralists under transhumant conditions which exposes them to the vectors of haemoparasites there by increasing the risk of infection. The finding of our study was deviated from the work of Sam-Wobo *et al.* (2016) at Abeokuta Ogun state were by Sokoto Gudali are more infected compared to other breeds.

Conclusion

The present report confirms the presence of carrier populations of haemoparasite-infected cattle which both serve as a reservoir of infection for tick-vectors, susceptible livestock and humans. It may be concluded that Babesiosis and some other haemoparasites are endemic in cattle populations within Kano and its neighbouring environment, and their occurrence may be associated with changes in some haematological parameters.

Recommendation

The following recommendations are made based on the finding of the study:

1. Stringent measures of controlling haemoparasites in food animals should be instituted in Kano and its environs where these animals are sourced. Such measures should include more aggressive chemotherapy, chemoprophylaxis and control of arthropod vectors through the use of effective insecticides, acaricides and environmental management.
2. Public enlightenment and awareness about the babesiosis, its effects on cattles and its zoonotic behaviour of transmission diseases to human.
3. The government should impose the routine screening of animals presented to Kano main abattoir to effectively reduce the minimum the prevalence of Babesiosis and other haemoparasites in the study areas.

Competing Interests

Authors have declared that no competing interests exist.

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