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HAEMOPARASITIC INFECTIONS AND ASSOCIATED RISK FACTORS AMONG CATTLE SLAUGHTERED AT KATSINA CENTRAL ABATTOIR, KATSINA STATE, NIGERIA

***Usman Zulkifilu Muhammad, Timothy Auta, Ebenezer Tolulope Atalabi**

Department of Biological Sciences, Faculty of Life Sciences, Federal University Dutsin-Ma, Katsina State, Nigeria

*Corresponding authors' email: umuhammadz1994@gmail.com

ABSTRACT

Cattle are essential for the growth and maintenance of a country's economy, but different blood parasites (Haemoparasites) can reduce their production, which causes both direct and indirect financial losses for the livestock industry. The incidence of hemoparasites and risk factors related to them were investigated in cattle butchered at the principal abattoir in Katsina. At the point of slaughter, 500 blood samples were aseptically taken, processed, and checked for hemoparasites by identifying parasites on thin blood smears stained with Giemsa. A prevalence of 8.4% was recorded overall. Anaplasma, Babesia, Microfilaria, and Trypanosoma, four genera of bovine hemoparasites, had prevalence rates of 4.0%, 2.4%, 2.4%, and 0.8%, respectively. The prevalence of hemoparasites was found to be greater in females (8.8%) than in males (7.7%), however there was no statistically significant difference (P 0.05). All breeds evaluated during the study tested positive for haemoparasites; the highest frequency, 16.1%, was found in Adamawa Gudali, followed by Sokoto Gudali (10.3%), White Fulani (7.2), and Red Bororo (6.8%). According to the study's findings, there is no statistically significant difference between breeds in the prevalence of haemoparasites (P 0.05). Young people were more likely to have high prevalence (9.1%) than adults (6.4%) or those who were older (8.7%). The current study has identified the haemoparasite status of cattle put to death at the principal abattoir in Katsina. Consequently, to increase livestock productivity, appropriate preventive and control measures are required.

Keywords: Haemoparasites, abattoir, livestock productivity

INTRODUCTION

The arctic circle to the equator are all regions where haemoparasitic diseases can occur. This is due to the widespread distribution of their vectors, ticks and bloodsucking insects. Global studies on the prevalence of haemoparasitic infections in cattle have been published (Laha *et al*., 1989; Luckins, 1992; Thach *et al*., 1996). About half of the 10-15 million cattle in Nigeria—1.2 million of which are in Ibadan, Southwest Nigeria—belong to communal and commercial farmers, according to (Palmer *et al*., 2006). Farmers with little resources keep their cattle on communal rangelands, where they are given plenty of space to graze (Masika and Mafu, 2004).. Communal grazing is characterized by ineffective cattle management and low yield. As a result, parasites and illnesses are widespread. Communal grazing is characterized by ineffective cattle management and low yield. As a result, parasites and illnesses are rampant and pose serious risks to the production of cattle in community areas (Kaewthamasorn and Wongsamee, 2006, Rajput et al., 2006). According to (Makala *et al.*, 2003; Mtshali et al., 2004; Kamani *et al*., 2010), cattle in Nigeria may be exposed to a diverse range of vector-borne hemoparasites. Trypanosomes (Trypanosoma vivax, *T. congolense*, and *T. brucei*), Babesia (Babesia bigemina, *B.bov*is, Anaplasma, and Ehrlichia (Cowdria), as well as to a lesser extent Theileria (*Theileria parva* and *T.veilifer*) are the genera that are most economically significant (Makala *et al*., The most significant obstacles to the wellbeing and increased productivity of cattle in sub-Saharan Africa are thought to be African animal trypanosomiasis, babesiosis, and cowdriosis Kamani *et al*. (2010) . Farmers with little resources keep their cattle on communal rangelands, where they are given plenty of space to graze Agu and Amadi (2001) and Enogiomwan *et al.,* (2019). Low production and subpar cattle management are hallmarks of communal grazing. As a result, parasites and illnesses are rampant and pose serious risks to the production of cattle in community areas Agu and Amadi (2001) and Enogiomwan *et al.,* (2019). Kamani *et al*. (2010) observed prevalences of 9.4% and 13.5% in Kaduna, Nigeria's northwest, respectively, in various investigations on haemoparasites of cattle there. A prevalence rate of 25.7% was observed by in a research of a similar nature carried out in north-central Zawua *et al*. (2015) reported a prevalence of 28.9% in cattle slaughtered from Gboko, Benue state, while Adua&Idahor (2017) recorded a prevalence of 20.1% in Lafiya. Agu and Amadi (2001) and Enogiomwan *et al.,* (2019) reported prevalence of 3.9% and 7.78% respectively. 6.67% prevalence of haemoparasite in Ibadan, Oyo state, south-western Nigeria was also reported by Okorafor and Nzeako (2014). There is a dearth of knowledge about haemoparasitic disorders in Katsina, despite the fact that numerous studies on haemoparasites of cattle have been conducted in some parts of Nigeria. In order to ascertain the prevalence of haemoparasites in cattle killed in the Katsina abattoir in northwest Nigeria, the current study was carried out.

MATERIALS AND METHODS

At the point of slaughter, 500 ruminants (cows) of both sexes, various breeds, and various age groups had blood samples aseptically taken. Each bovine had around 5 ml of blood drawn into ethylene diamine tetra acetic acid (EDTA) tubes that were clearly labeled with the animal's sex, age, breed, farming system, and vaccination history. The samples were then promptly sent in a chilled box to the biological science department at Al'qalam University for analysis.

Soulsby (1982) and Taylor *et al*. (2016) approach was used in the lab to create thin blood smears. On an Olympus microscope, the smears were magnified 100 times while being submerged in oil. Blood parasites were detected and identified using Ademola&Onyiche (2013) keys and descriptions. Trypanosomes were found in the blood using the Buffy coat concentration approach . Data were analyzed using SPSS version 22 software, and a Chi-square test was conducted to

look for any potential relationships between infection and exposure to various risk variables. Values were deemed statistically significant when they had a 95% confidence interval and a P value of 0.05 or below.

RESULTS AND DISCUSSION

Apparently, 500 healthy cattle of both sexes, representing four breeds (white Fulani, Red bororo, Adamawa Gudali, and Sokoto Gudali), had blood samples aseptically taken at random from them. Only 42 of the 500 blood samples that were examined for the presence of hemoparasites yielded positive results, translating to an 8.4% prevalence. The prevalence of hemoparasites differs significantly between males (7.7%) and females (8.8%). According to statistics, there is no correlation between infection and the sex of the cattle in this study (2 = 0.816, p=0.66). The age groups of cattle with the highest hemoparasite prevalence were young cattle (1–5 years) with a prevalence of 9.1% (6), followed by older cattle (>10 years) with a prevalence of 8.7% (23), and adult cattle (>6–10 years) with a prevalence of 6.4% (13). Age group did not, however, show any statistically significant correlation with hemoparasite infection (2 = 0.626, p = 0.731). In this investigation, a statistical correlation between the prevalence of hemoparasites in the four distinct breeds of cattle used in the study was not found to be significant (2 =5.881, P=0.118), but the prevalence was higher in the Adamawa Gudali breed (16.1%). According to the study's findings, cattle raised in semi-intensive systems had a higher prevalence of hemoparasites (9.5%) than cattle raised in nomadic systems (4.2%). The study's findings also showed no statistically significant correlation between hemoparasite infection and infection (2 =2.114, P=0.549). The incidence of hemoparasite is higher (9.1) in cattle with no history of vaccination, according to the farmers' vaccination records, although there is no statistically significant correlation between the prevalence and vaccination history (2 =0.588, P=0.443).

Table 1: Prevalence of *Trypanosome species* according to the Sex, Age, Breed, Farming System, History of Vaccination of Cattle Slaughtered at Katsina Central Abattoir

Variable	Category	Number Examined	Number Positive	Prevalence (%)	χ^2 and p value
Sex	Male	182	1	0.5%	χ^2 = 0.634; p = 0.226
	Female	318	3	0.9%	
Age (Years)	1 – 5	94	0	0.0%	χ^2=1.161;p =0.560
	6 – 10	143	1	0.7%	
	Above 10	263	3	1.1%	
Breed	White Fulani	335	0	0.0%	χ^2 = 10. 909; p = 0.0121
	Red Bororo	74	2	2.7%	
	Adamawa Gudali	62	2	3.2%	
	Sokoto Gudali	29	0	0.0%	
Farming System	Intensive	136	1	0.7%	χ^2 = 13.12; p = 0.004
	Semi-Intensive	263	1	0.4%	
	Extensive	32	2	6.2%	
	Nomadic	69	0	0.0%	
History of Vaccination	Yes	318	3	0.9%	χ^2 = 0.538; p = 0.226
	No	182		0.5%	

Table 2: Prevalence of *Anaplasma species* according to the Sex, Age, Breed, Farming System, History of Vaccination of Cattle Slaughtered at Katsina Central Abattoir

Variable	Category	Number Examined	Number Positive	Prevalence (%)	χ^2 and p value
Sex	Male	182	4	2.2%	χ^2=2.40; p= 0.120
	Female	318	16	5.0%	
Age (Years)	1 – 5	94	4	4.3%	χ^2=0.936;p=0.133
	6 – 10	143	5	3.5%	
	Above 10	263	11	4.2%	
Breed	White Fulani	335	10	3.0%	χ^2=6.126;p=0.106
	Red Bororo	74	3	4.1%	
	Adamawa Gudali	62	6	9.7%	
	Sokoto Gudali	29	1	3.4%	
Farming System	Intensive	136	6	4.4%	χ^2 = 0.680; p = 1.510
	Semi-intensive	263	12	4.6%	
	Extensive	32	1	3.1%	
	Nomadic	69	1	1.4%	
History of Vaccination	Yes	318	13	3.1%	χ^2=0.894;p=0.018
	No	182	7	3.8%	

Table 3: Prevalence of *Babesia species* according to the Sex, Age, Breed, Farming System, History of Vaccination of Cattle Slaughtered at Katsina Central Abattoir

Variable	Category	Number Examined	Number Positive	Prevalence (%)	χ^2 and p value
Sex	Male	182	6	3.3%	χ^2 = 0.982; p = 0.018
	Female	318	6	1.9%	
Age (Years)	1 – 5	94	3	3.2%	χ^2 = 0.627; p =0.982
	6 – 10	143	4	2.8%	
	Above 10	263	5	1.9%	
Breed	White Fulani	335	8	2.4%	χ^2 =0.664; p = 0.882
	Red Bororo	74	1	1.4%	
	Adamawa Gudali	62	2	3.2%	
	Sokoto Gudali	29	1	3.4%	
Farming System	Intensive	136	3	2.2%	χ^2 = 2.253; p = 0.522
	Semi-Intensive	263	8	3.0%	
	Extensive	32	1	3.1%	
	Nomadic	69	0	0.0%	
Historyof Vaccination	Yes	318	11	0.5%	χ^2=4.184; p=0.041
	No	182	1	3.5%	

Table 4: Prevalence of *Microfilaria species* according to the Sex, Age, Breed, Farming System, History of Vaccination of Cattle Slaughtered at Katsina Central Abattoir

Variable	Category	Number Examined	Number Positive	Prevalence (%)	χ^2 and p value
Sex	Male	182	7	3.8%	χ^2 =2.555; p =0.110
	Female	318	5	1.6%	
Age (Years)	1 – 5	94	0	0.0%	χ^2 = 3.540; p =0.170
	6 – 10	143	3	2.1%	
	Above 10	263	9	3.4%	
Breed	White Fulani	335	7	2.1%	χ^2 = 0.483; p=0.923
	Red Bororo	74	2	2.7%	
	Adamawa Gudali	62	2	3.2%	
	Sokoto Gudali	29	1	3.4%	
Farming System	Intensive	136	2	1.5%	χ^2 =0.723; p =0.868
	Semi-Intensive	263	7	2.7%	
	Extensive	32	1	3.1%	
	Nomadic	69	2	2.9%	
History of Vaccination	Yes	318	5	1.6%	χ^2 = 2.555; p == 0.110
	No	182	7	3.8%	

Discussion

The findings of this investigation have proven that blood parasites are common in cattle butchered at the Katsina Central Abattoir in northwest Nigeria. Haemoparasites which can be a significant barrier to livestock productivity. The 8.4% hemoparasitemia reported in this study is higher than earlier studies on cattle's haemoparasites conducted in Nigeria by Agu *et al*., (1990) in Kaduna; Agu&Amadi (2001) in Ebonyi; Ademola and Onyiche (2013) in Oyo; Okorafor and Nzeako (2014 in Oyo; and Enogiomwan *et al*. (2019) in Calabar who reported prevalence of 9.0% However, higher frequency of 20.1%, 25.7%, 29.9%, and 13.5% across several states in Nigeria was found. The 8.4% hemoparasitemia found in the study indicates that most animals are carriers of parasites and face constant challenges from them. Given that all three parasites are transmitted by ticks, the high prevalence of Anaplasma spp. (4.0%), Babesia spp., and Microfilaria spp. (2.4%) found in this study may be linked to the large number of transmission vectors. The high prevalence of Anaplasma in this study may have been due to the fact that it can spread through a variety of mechanisms, including biologically through tick bites and mechanically by biting flies (Abdullah *et al.*, 2019). Anaplasma prevalence in cattle was observed at 9.9% and 5.8% in research by Enogiomwan *et al*. (2019) in Calabar, respectively. In contrast to the 8.4% reported by Enwezor *et al.* (2009) in Kaduna state, the 8.0% by Kamani *et al.,* (2010) in north-central Nigeria, and the 3.81% by Okorafor and Nzeako (2014) in Oyo state, trypanosoma was observed at a rate of 0.8%. Microfilaria prevalence was found to be 2.4% in this study, which is greater than the 1.4% reported by Kamani *et al*. (2010). According to (Abdullah *et al.*,2019)., discrepancies in the prevalence of haemoparasites in cattle documented in this study could be due to changes in the study's timing, the breeds of the animals sampled, the sample sizes utilized, the diagnostic technique employed, the management of the animals sampled, and their nutritional status. Variations in geography (Velusamy *et al.*,2014) regulate the distribution of arthropod parasite Agbede, 2013), and farmers' frequent use of chemoprophylaxis and acricides may also contribute to regional variations in the prevalence of hemoparasites (Ademola & Onyiche, 2013).. The findings of earlier studies in Nigeria Kamani *et al.* (2010) who attribute the accumulation of parasites by the females due to the extended breeding for economic reasons such as calving and milk production. This is in contrast to the report of Kamani *et al.* (2010) who reported a higher prevalence in in female 8. Reduced immunity brought on by stress from pregnancy and lactation may also contribute to cows' susceptibility (Okorafor

and Nzeako, 2014). Previous studies have documented the impact of age on the occurrence of haemoparasites. This study's findings showed younger and adult calves had lower haemoparasitic infection prevalence than their older counterparts are consistent with (Kamani *et al.*, 2010; Alim *et al*., 2012; Ademola and Onyiche, 2013; Okorafor and Nzeako, 2014; Enogiomwan *et al.*, 2019) observation that the prevalence of haemoparasites in ruminants reduced with age. Older cattle, suggesting that this might be because adults are more likely to have hemoparasite infections than younger animals because they have been exposed to arthropod vectors for longer Ademola and Onyiche (2013). The reduced prevalence compared to adult animals may be due to restricted grazing of young animals, which tends to reduce their possibilities of interactions with the vectors of these diseases (Kamani *et al.,* 2013). In this study, hemoparasite infection was found in every breed that was investigated. This supports the findings of Adua and Idahor (2017), who found no evidence of breed-related resistance in the animal species they tested. According to Okorafor&Nzeako (2014), who showed higher haemoparasite prevalence in Sokoto Gudali and Red Bororo Breeds, the highest prevalence was found among the Adamawa Gudali in this study.

CONCLUSION

The current study demonstrates the existence of populations of carriers of haemoparasite-infected cattle, which act as a reservoir of infection for tick-vectors, susceptible livestock, and people. In this study, four haemoparasite genera—Babesia, Anaplasma, Microfilaria, and Trypanosome—were discovered. One of the most prevalent infectious illnesses affecting the cattle sector and contributing to the decline in the socioeconomic status of developing nations is bovine haemoparasitism. Bovine hemoparasitic diseases have a tendency to self-limit in the blood of other animals, making it challenging to treat this condition with antibiotics. Treatment is not as effective as preventing and controlling epidemics in the future and the transmission of illnesses to ignorant herds. The existing state of affairs is unsatisfactory due to issues with acaridae resistance, chemical residues in food and the environment, and the unsuitability of tick-resistant cattle for any type of production system. This calls for the creation of an effective vaccination for ultimate control. Hemoparasitic infection is often one of the infections of cattle that hinders a nation's development by lowering the number of animals produced and their productivity.

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