LIVESTOCK SUSTAINABILITY: HAEMOPARASITIC STATUS OF CATTLE IN ABATTOIR

Umoren, Otoh D.[1,2 *] andAdegbola, Odunola E.[2]

[1]*Pure Sciences, Abeokuta, Ogun State, Nigeria*
[2]*Department of Pure and Applied Sciences,National Open University of Nigeria, Abuja, Nigeria*

*Otohifedayo@gmail.com

Abstract-Beef accounts for nearly half of all meat consumed globally, so cattle play an important role in the meat supply and livestock industry. The reduction in cattle productivity is of a global concern. Therefore, the study aimed to investigate the haemoparasitic statusof cattle in the abattoir of Adodo Ota, Ogun State Nigeria in other to assess and promote food and livestock sustainability.Sixty (60) blood samples were taken at random from the slaughtered and jugular veins of 60 cattle. Thin film was made, air dried then fixed in 100% methanol for 60 seconds, and stained with quality grade 10% Giemsa stain, slides were viewed under ×40 and ×100 power of a binocular microscope atOmega Medical Diagnostics Laboratory. Heamoparasites intensity in cattle indicates 25% (15) infection with *E.wenyoni,* 11.7% (07) infection with *H.bovis,* 16.7% (10)infection with mixed parasites of *Eperythrozoon and Haemobartonella* while8.3% (05)accounting for the lowest percentage infection with *T.congolense.* High haemoparasitic prevalence was seen in Cows 70% than Bull 57.5%.Heamoparaitic status of cattle from the study signifies that haemoparasites remain one the biggest threat to food and livestock sustainability, and a continuous source of veterinary and public health concern.

Keywords-Abattoir, cattle, haemoparasite, infection, parasite intensity, prevalence

I. INTRODUCTION

Cattle are domestic ungulates mammals, a member of the family Bovidae, they are large grass-eating mammals with two-toed or cloven hooves and a four-chambered stomach which are an adaptation to support the digestion of plant materials [1]. Cattle are raised as livestock globally for various purposes which include the source of animal protein, dairy product, and income [2]. Their byproducts such as hoof, bones, blood, hides, and skin are also widely used as raw materials [3].

According to Ugochukwu&Sidney [3],cattle meat widely referred to as Beef is considered to be the third most widely consumed livestock meat globally, accounting for approximately25% of meat production, meat is rich in total protein and essential body minerals (zinc, iron, vitamin B complex, and phosphorus) among others. Hamoparaites(Blood parasites) are one of the major parasites posing substantial economic concern and impact on livestock management, they are estimated to affect 80% of the cattle population globally [4,5].

Haemoparasites are a diverse community of species characterized by the presence of single or multiple developmental stages in the bloodstream of animals and humans[6].They cause economic losses as a result of an elevatedrate of morbidity and mortality;incurred losses have led to the attenuation in the further development of the livestock sector in most countries [7],they are also responsible for immunosuppression, retarded growth, low milk production and weight loss[8].

Haemoparasites affecting livestock has been documented by various researchers [2,6,9-11], some of which includes*Aegyptianella species,Anaplasma species, Babesia species, Ehrlichia species, Haemobartonella species, Haemoproteus species, Hepatozoon species, Leishmania species, Leucocytozoon species, Plasmodium species,Schistosoma species, Theileria species, andTrypanosoma species.*

Hamoparasite in cattle has also been recently reportedin northern Nigeria, Kamani*et al.*[12]in another study reported 25.7% prevalence rate of infection amongstudied cattle in North-Central, Nigeria. Ola-Fadunsin*et al.* [6], reported 26.95% prevalence rate of haemoparasitic infectionsin cattle from a study in Plateau State, Nigeria.Ugochukwu&Sidney [3].reported a prevalence rate of 6.68% in cattle from the abattoir of Oyo state, South west Nigeria. Sam-Woboe*t al.*[2]reported 27.8%haemoprasite prevalence in cattle from the abattoir of Abeokuta, Southwest Nigeria.Although haemoparasitestudies in cattle have been reported in various parts of Nigeria, the continuous need for food and livestock sustainability, and qualitative

livestock production is imperative.Hence the purpose of the study

II. METHODOLOGY

A. Study Area

The study was carried out in an abattoir of Adodo-Ota Local Government Area (LGA)of Ogun State, South-western Nigeria. This LGA is situated in the tropical region, between the equator and the Greenwich Meridian at 60 47N and 20 53E and 30 18E, respectively. It has a total area of 1,010.4 square kilometres of flat land and approximately 252.6 square kilometres of poor terrain, with 10% riverine and 4% hilly regions. The abattoir was chosen for cattle blood sample collection because of the high constant slaughtering activities.The study was carried out in February 2020.

B. Blood Sample Collection and Haemoparasite Examination

Blood samples were collected randomly from both slaughtered and the jugular veins ofsixty (60) cattle sold in the abattoir ofAdodo-Ota, Ogun State Nigeria. Samples from slaughtered cattle were obtained directly at the point of slaughter using a sterile EDTA bottle after allowing a small amount of blood flow in order to prevent contamination. A sterile syringe and needle were used to collect samples from the jugular veins, which were then placed in a sterile EDTA container. The blood samples were transported to Omega Medical Diagnostics Laboratory for examination. Thin film was made, air dried then fixed in 100% methanol for 60 seconds, and stained with quality grade 10% Giemsa stain as described by Sam-Wobo *et al.*[2], slides were viewed under ×40 and ×100 objective lens of a binocular microscope (Olympus Corporation, Hamburg, Germany).

C. Data management and Analysis

To produce frequency and percentages, the obtained data were analyzed using the Statistical Package for Social Sciences version 21 software. Chi-Squared test was used to determine the prevalence of the condition between genders and across ages.

III. RESULTS AND DISCUSSION

A. Statistic of Cattle Used for the Study

The statistics of cattle used for the studies are presented in table 1.The genderrevealed 40 (66.7%) of the cattle were Bulls while 20 (33.3%) were Cows. Age statistics revealed 12 (20%) an equal highest percentage to be 2 and 4 years of age respectively, 14 (23.3%) were 3 years, 15 (25%) were 5 years of age, 3 (5%) were 6 years of age while 4 (6.67%) which is the lowest age percentage were 7.

TABLE 1
STATISTICS OF CATTLE USED FOR THE STUDY

Gender	**Frequency**	**Percentage**	**Cumulative %**
Bull (M)	40	66.7	66.7
Cow (F)	20	33.3	100.0
Total	**60**	**100**	
Age (years)			
Two	12	20.0	20.0
Three	14	23.3	43.3
Four	12	20.0	63.3
Five	15	25.0	88.3
Six	03	5.0	93.3
Seven	04	6.67	100.0
Total	**60**	**100**	

B. Haemoparasitic Intensity in Cattle

The intensity of Haemoparasite in cattle presented in Table 2. revealed 37 (61.7 %) of the cattle were being infected. 15 (25 %) of which were infected with*Eperythrozoonwenyoni*indicating the highest percentage, 07 (11.7%) were infected with*Haemobartonellabovi,* 10 (16.7%)were infected with a mixed parasite of*Eperythrozoon*and *Haemobartonella* while 05 (8.3%) which is the lowest percentage of cattle infected with *T. congolense.*

TABLE 2
HAEMOPARASITE INTENSITY IN CATTLE

Haemoparasite	**Frequency**	**Percentage**	**Cumulative %**
E. wenyoni	15	25.0	25.0
H. bovi	07	11.7	36.7
Eperythrozoon&Haemobartonella	10	16.7	53.3
T. congolense	05	8.3	61.7
Total	37	61.7	

C. HaemoparasiticPrevalence in Cattle

Haemoparasitic prevalence between gender and across ages of cattle are presented in Tables 3 and 4, shows that *E. wenyoni*(27.5%, 20%) and *T. congolenses*(10%, 5%) were prevalent in bull (m) than the cow respectively while *H. bovi*(7.5%, 20%)and*Eperythrozoon*&*Haemobartonella* (12.5, 25%) were less prevalent in bull than the cow respectively. The overall haemoparasitic prevalence shows that the cow, 14 (70%) were more prevalent than the bull 23 (57.5%). Haemoparasiticprevalence across ages of cattle indicate that *E. wenyoni*has the highest prevalence in age 6 (66.7 %) followed by age 3 (28.6%) and equal in age 2 and 4 at 25% respectively, while the lowest haemoparasitic prevalence was recorded in age 5 (20%). *H. bovi*has the highest prevalence in age 3 (28.5%) followed by age 4(16.7%) while the lowest was found in age 5(6.7%).*Eperythrozoon*&*Haemobartonella*prevalence was highly recorded in age 5(40%) followed by age 3 (14.3%) while the lowest with an equal prevalence was recorded in both age 2 (8.3%) and age 4 (8.3 %).Finally, *T. congolense*prevalence was higher in cattle age 4 (25%) and lesser in age 2 (16.7%).Although there was difference in haemoparasitic prevalence between gender, and also across ages but statistically not significant at $p<0.05$.

D. Discussions

The findings presented in the study show that the majority of the cattle population for the study were Bulls. The highest percentages of the cattle were five years of age followed by three years. Ages two, four, six, and seven years accounted for the lowest percentage of the cattle population. This is not in agreement with the work of El-Metenawy[13]whosehighest age percentage was one and two.

Haemoparasitessuch as *Haemobartonella, Eperythrozoon*, and *Trypanosoma*species, which are extracellular parasites of erythrocytes pose detrimental effects on susceptible hosts, this varies from mild effect to death [14]. From the study, 38.3 % of the cattle showed no haemoparasiticinfection, while 61.7 % of the cattle were infected. The report was higher than the report made by Kamani*et al.*[12]in Northern Nigeria (25.7%), Ugochukwu&Sidney [3]in Oyo state (6.68%), Sam-Wobo*et al.*[2]inAbeokuta, South western Nigeria (27.8%) and Ola-Fadunsin*et al.* [6] in Plateau State, North Central, Nigeria. The highest percentage of the cattle were infected with *E. wenyoni*. This is in line with the work of Al-khalifa*et al.* [15]whoalso reported 1-4% infectionwith *E. wenyoni*inan examined cattle in Saudi Arabia. Similarly,Hasan [8]reported 28.3% of infected cattlewith *E. wenyoni* inMosul, Iraq.

16.7% of cattle from the study were observed to be infected with mixed haemoparasite of*Eperythrozoon* and *Haemobartonella*. This is similar to the work ofHasan [8]in Mosul, Iraq. *Eperythrozoon* and *Haemobartonella* observed in the study is traceable to environmental suitability enhancing breeding and survivalof vectors (mosquitoes and tick).According to Kahn & Line [16], ticks (*Rhipicephalus*) are vectors of *Eperythrozoon* for cattle, Transmission may also occur through blood contaminated instruments during vaccination.

*Haemobartonellabovi*is a rod chain in appearance and is usually seenaround the peripheral of Erythrocytes. In the study, the intensity of infection with *H.bovis* in cattle was 11.7% which is higher than the report made byHasan [8] who reported 1.81% of *H.bovi*infection in cattle from Iraq.

*Trypanosomacongolense*is described as the smallest of the African Trypanosomes ranging from approximately 9-18 µ in length. It is considered the most economically important animal Trypanosomiasis[17]. According to Rodistitis*et al.* [18],infectingcattle with trypanosomes is possible even in the absence of Tsetse fly (Glossina), biting flies such as Tabanidas, Stomoxyinae and Hipoboscidae are mechanical vectors transmitting trypanosomes. *T. congolense* is responsible for the least amount of infection in the cattle. They appear in peripheral smears in sizes ranging from 8 to 10 µ with the absence of a free flagellum as defined by Soulsby [19].This is in agreement with the work of Ohaeri [20] who recorded the occurrence of *T. congolense* infection in cattlein Abia State, Nigeria. But not in agreement with the high report of 50% *T. congolense*infection in cattle from the work of Samdi*et al.* [21]in Kaduna, Nigeria.

The overallhaemoparasitic prevalence in cattle from the study was higher in cows (70%) thanbull (57.5%).Highhaemoparasitic prevalence in cows could betraceable to the extensive breeding behaviour adopted for economic purposes (calving and production of milk). The susceptibility of cows might also be attributed to altered immunity from pregnancy and lactation stress [22].This is in good tandemwith the report of Okorafor&Nzeako [22] who recorded greater parasite prevalence in cows (4.44%) than bulls (2.22%) in Oyo State, Nigeria.

The overall haemoparasitic prevalence across ages of cattle in the study was high in the cattle of age 3 and 4 years accounting for 71.5% and 75%.This is in contrast to the work of Geoffrey *et al.*[23]with a record of slightly higher parasite prevalence in cattle less than 2 years tothose above in Uganda. It also confirms another blood parasite study in Uganda by Kenet*h et al.* [7] who documented a prevalence of 60.4% in adult cattle greater than 1.5 years over 4% in juvenile cattle less than 1.5 years.

IV. CONCLUSIONS

Haemoparasitic diseases constitute a disease entity of considerable economic importance globally and this accounts for a major mitigating factor in maintaining exotic cattle production which in turn affect production of beef, dairies etc. Therefore, there is a pressing need to develop and introduce a successful intervention in cattle health management to enhance production.

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TABLE 3

HAEMOPARASITIC PREVALENCE BETWEEN GENDERS OF CATTLE

Haemoparasite		**Bull**	**Cow**	**Total**
	No. Examined	**40**	**20**	**60**
E. wenyoni	No. Positive	11	04	15
	% of infection	27.5	20	25
H. bovi	No. Positive	03	04	07
	% of infection	7.5	20	11.7
Eperythrozoon&Haemobartonella	No. Positive	05	05	10
	% of infection	12.5	25	16.7
T. congolenses	No. Positive	04	01	05
	% of infection	10	05	8.3
	Total infection (%)	**23 (57.5)**	**14 (70)**	**37(61.7)**
χ^2 =3.210; df =3; p>0.05				

TABLE 4

HAEMOPARASITIC PREVALENCE ACROSS AGESOF CATTLE

Haemoparasite		**Age (years)**						**Total**
		Two	**Three**	**Four**	**Five**	**Six**	**Seven**	
	No. Examined	**12**	**14**	**12**	**15**	**03**	**04**	**60**
E. wenyoni	No. Positive	03	04	03	03	02	-	15
	% of infection	25	28.6	25	20	66.7	-	25
H. bovi	No. Positive	-	04	02	01	-	-	07
	% of infection	-	28.6	16.7	6.7	-	-	11.7
Eperythrozoon&Haemobartonella	No. Positive	01	02	01	06	-	-	10
	% of infection	8.3	14.3	8.3	40	-	-	16.7
T. congolense	No. Positive	02	-	03	-	-	-	05
	% of infection	16.7	-	25	-	-	-	8.3
	Total infection (%)	**06 (50)**	**10 (71.5)**	**9 (75)**	**10(66.7)**	**02(66.7)**	-	**37(61.7)**
χ^2 =19.76; df =12; p>0.05								