

CHANGES IN BLOOD PARAMETERS AND LIVER ANTIOXIDANT ENZYMES IN HAEMOPARASITE INFECTED ABATTOIR CATTLE IN IBADAN METROPOLIS, IBADAN, OYO STATE, SOUTH WEST NIGERIA.

Amuda Tharheer Oluwashola

Parasitology Unit, Department of Zoology, University of Ibadan

ABSTRACT— This study investigate the prevalence of haemoparasite as to its relation with the haematological condition and the liver function of the slaughtered abattoir cattle in Ibadan metropolis Ibadan Oyo State, Nigeria. A total of 227 cattle were examined between August and November 2016. Blood samples were collected from the jugular vein of the cattle at point of slaughter in 2 bottles one containing ethylene diamine tetraacetic acid (EDTA) and another plain. This was immediately transported to the laboratory for parasitological examination. Using microscopy, prepared Giemsa stained slides were observed under high powered digital Swift™ microscope at 4,500,000 resolution and x100 objective lens. Of the 227 cattle sampled, 50(22%) were males and 177(78%) were females. An overall prevalence of 18.1% was recorded for haemoparasites such as *Babesia* spp 12(5.3%), *Trypanosoma* spp 4(1.8%), *Theileria* spp 24(10.6%), *Anaplasma* spp (0.0%), *Microfilaria* spp. 2(0.9%), mix infection of *Babesia* spp and *Theileria* spp 1(0.4%). The age group 61-72 months has the highest prevalence 20.8% and 0-36months with the lowest prevalence (12.5%). White Fulani breed of the cattle is the most sampled breed 139 with the highest prevalence rate 24(17.3). The mean PCV, WBC, and Hb of infected and uninfected slaughtered trade cattle examined in this study were within normal range. Although the infected cattle were low in compared to the uninfected with a statistical significant different ($P < 0.05$). The RBCs indices MCV, MCH and MCHC mean values all fall within normal range(Merck Manual 2012), with no significant statistical difference between the infected and uninfected cattle except in the case of MCHC value ($P < 0.010$) where there is significant difference between the infected and uninfected cattle. The lymphocyte mean value of this study both infected and uninfected cattle were above the normal value expected of a healthy cattle.. AST and ALT mean value were above range of normal value. The findings of this study shows that the prevalence of haemoparasites may be associated with changes in PCV and WBC count, the liver enzymes,ALT and AST are not statistically significant in predicting the liver damage in the slaughtered abattoir cattle and that *Microfilaria* and other haemoparasites except *Anaplasma* are prevalent in the slaughtered abattoir cattle in the study area. Proper vector control and routine check of the animal is highly recommended.

Index Terms— Abattoir Cattle, Haemoparasites, Haematological effect, Liver function, Prevalence, Southwest Nigeria

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1 INTRODUCTION

Haemoparasitic infections have a global distribution, stretching from the polar circle to the equator. This is due to the fact that their vectors; ticks and blood-sucking flies, also have a global distribution. The worldwide incidence of haemoparasitic infections in cattle has been

severally reported by different workers [49],[72] and [83]. In Nigeria

there are about 10-15 million cattle, 1.2 million of these are in Ibadan, South West, Nigeria [73] and approximately half of these belong to the communal and commercial farmers. Cattle owned

by resource-poor farmers are kept on communal rangelands where they are grazed extensively [74]. Communal grazing is characterized by poor management of cattle and low productivity. Consequently, diseases and parasitism are rife and constitute major threats to cattle production in communal areas [81] and [85]. Cattle in Nigeria may be infected with a wide variety of vector-borne haemoparasites [19] and [70]. The most economically important genera are the trypanosomes (*Trypanosoma vivax*, *T. congolense* and *T. brucei*), *Babesia* (*Babesia bigemina*, *B. bovis*) *Anaplasma* and *Ehrlichia* (Cowdria), and to a less extent *Theileria* (*Theileria parva* and *T. velifera*) [76],[75] and [29]. African animal trypanosomosis, Babesiosis and Cowdriosis are considered as the most important constraints to the health and improved productivity of cattle in sub-Saharan Africa [25],[85] and [82]. Haemoparasites have generally shown to cause destruction of red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility [75],[71] and [80].

An establish fact is that Cattle are very important economically because they are sources of animal protein and income. Their by-products such as hoof, bones, blood, hides and skin are also variously used [62]. Beef is the third most widely consumed meat in the world, accounting for about 25% of meat production worldwide, after pork and poultry at 38% and 30% respectively [78].

The Food and Agricultural Organization [24] reported that sub-Saharan Africa, Latin America and the near east are the areas mostly affected by low animal protein supply per capital. This could mostly be seen as a result of high dependence on cattle, sheep and goats. The high cost of these animals or their products (meat and milk) makes it practically impossible for the average citizens to afford the right quantity and quality of meat which will increase or measure up the recommended animal protein requirement of 35g for human being [24].

2. MATERIALS AND METHOD

2.1 Study Design and Study Area:

The study was conducted at the Bodija Municipal Abattoir (the biggest abattoir in Oyo state) and Eleshinloye abattoir both in Ibadan metropolis.

Ibadan is the largest city in West Africa and the second largest in Africa with an estimated population of over 3, 160 200 as at 2015 according to population city, growing rapidly with industries and residential houses. Ibadan city lies on the longitude 3°5' East of Greenwich meridian and latitude 7°23' North of the Equator [86]. Animals slaughtered in Bodija abattoir alone accounts for 65.93% of the total animals slaughtered in Oyo state. The ruminants (Cattle, sheep and goats) and pigs are usually bought by butchers from livestock traders from where they are transported to the abattoir for slaughter. With the enquiry made from

the butchers at the different abattoirs findings shows that they get their cattle from same place which is Akinyele (which is less of an abattoir but more of a depot for cattle)

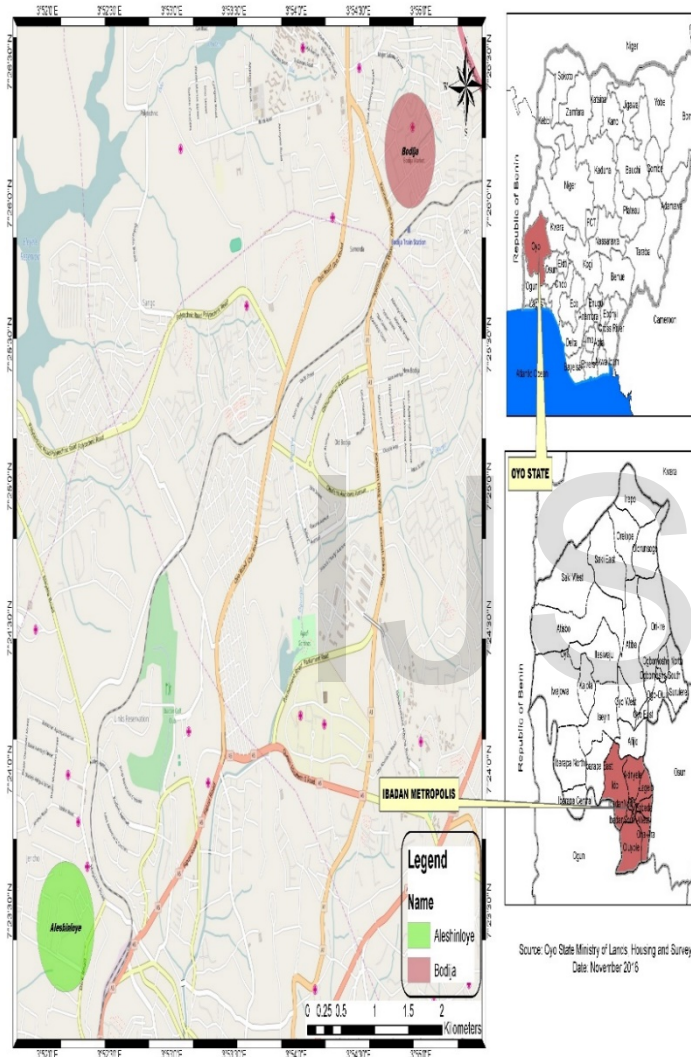


Fig. 2.1: An administrative map of Ibadan Metropolis showing Bodija and Aleshinloye [86]

2.2 METHODOLOGY

2.2.1 Sample Collection

5mls of blood was collected at the slaughter houses from the slit jugular vein of cattle slaughtered, into ethylene tetra-acetic acid (EDTA) bottle and another 5ml into a plain sterile tube from a total of 225 cattle. Each sample was kept cool by placing in a box containing ice packs immediately after collection and transported to the laboratory for immediate examinations. The cattle both male and female were randomly selected records of the breed and the sex of cattle at the point of slaughter were taken through observation.

3.2.2 Sample size

Using the formula:
$$n = \frac{Z^2 P(1-P)}{d^2}$$

n = Minimum Sample size

Z = Confidence level, Z value (Standard Value: 1.962 for 95% confidence level)

p = Percentage of picking a choice falls between 10% and 90%, and for this study, it is set at (50%), as it follows percentage of normal approximation

d = Precision, confidence interval, (Set at 5%, standard value of 0.05)

Therefore, we have
$$n = \frac{1.962^2 (0.5)(1-0.5)}{0.05^2}$$

2.2.3 Collection Method

Series of pre-survey visits was made to the study area during which discussions were held with the

staff of the abattoirs, intimating them of the study. After which, ethical approval was sought from the cattle keepers.

2.3 LABORATORY PROCEDURE

2.3.1 Parasitological Diagnosis

The 5ml of blood collected in the EDTA bottle will be subjected to diagnostic techniques of the Standard parasite detection methods [53] Thin film (TF), and concentration techniques (1) namely, Haematocrit Centrifugation Techniques and Buffy Coat Method[53] and . For complete parasite detection.

2.3.2 Haematological Assay:

In addition to automation the manual quantification was also used to confirm whether the values obtained from auto counter correlate with packed cell volume (PCV). With the exception of trace element analysis, routine haematology is less frequently performed in farm animal practice than small animal practice.

From the 5ml of blood collected in EDTA bottle from the abattoir after parasitological test must have been carried out on them, haematological assay was then follow same day so as to get an accurate result. Packed cell volume was determined by microhaematocrit method [87]. Haemoglobin content was determined [23].

2.4 ENZYME ASSAY

AST and ALT were determined and activities were measured on a Helios gamma UV visible Spectrophotometer, Thermo spectronic UK, using kits produced by Randox Laboratories Limited United Kingdom [60].

2.5 STATISTICAL ANALYSIS

Descriptive and inferential statistics was employed in analyzing the data in this study. The prevalence rates among breeds and sex of the animals was 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 breed, age and sex of the cattle studied. A P-value of $P < 0.05$ was considered significant. Student t-test was used to find significant difference in intensity of infection between male and female cattle. ANOVA was used to test for differences between different hematologic parameters and infection statuses and same was done for liver enzymes and infection statuses. Inferential statistics and data entry was done using Microsoft excel, SPSS version 21.0 for window.

3. RESULTS

3.1. DEMOGRAPHIC INFORMATION OF CATTLE SLAUGHTERED AT THE ABATTOIR

From the 227 slaughtered abattoir cattle examined for haemoparasites, 50(22%) were males while 177(78%) were females. By age category, majority of the cattle 101(44.5%) were within age group of 61-72 months, followed by 39(17.2%) of age

group 37-48months, then by 37(16.3%) of age group 49-60months and finally by 34(15.0%) and 16(7.0%) of various age group 73-84months and 0-36 months respectively. Distribution of cattle by breed showed that 19(8.4%), 21(9.3%), 29(12.8%), 19(8.4%) and 139(61.2%) and of the cattle were all Box horn, Mixed breed, Red Bororo, Sokoto gudali, and white fulani respectively (Table 3.1)

3.2 PREVALENCE OF HAEMOPARASITE AMONG SLAUGHTERED ABATTOIR CATTLE

Of the total of 227 cattle examined across the two abattoirs i.e. Aleshinloye and Bodija, 4(1.8%), 2(0.9%), 24(10.6%) and 12(5.3%) were positive for *Trypanosome spp.*, *Microfilaria Thelera spp* and *Babesia spp* respectively. The cattle were also screen for *Anaplasma* of which none was positive and there was record of mix infection (*Babesia* and *Thelera*) which is 1(0.4%) of the infected catle. An overall total prevalence of 18.1% was recorded, with 41 cattle infected. This is presented in (Table 4.2). Prevalence of Haemoparasites by Sex, Age and Breed of Cattle Slaughtered at the Abattoir Majority of the infected cattle were females except for mixed infection where the cattle infected was male. Also, by age category, cattle within age range 61-72 month were with highest infection compared to other groups. However, there was no sex and age predilection in terms of infection by the haemoparasites ($P < 0.05$). Though the white Fulani had the highest infection 24(17.3%)

Infections by haemoparasite in general shows no breed predisposition ($P > 0.05$). These are shown in tables 4.3, 4.4 and 4.5 respectively.

3.3: EFFECT OF HAEMOPARASITE ON THE HAEMATOLOGY OF THE SLAUGHTERED ABATTOIR CATTLE

Haematological parameters of infected and uninfected slaughtered trade cattle is shown in Table 4.6 Mean values of packed cell volume (PCV), total white blood cell counts (WBC) and red blood cell count (RBC) of infected and uninfected cattle examined in this study were within normal range. However, there was a significant difference ($p < 0.05$) in mean packed cell volume (PCV), Haemoglobin Hb count between infected and uninfected slaughtered trade cattle. On the other hand, no significant difference ($p > 0.05$) was observed in mean WBC, RBC indices MCV and MCH except MCHC which was statistically significant ($p < 0.05$) between infected and uninfected cattle. From this study platelets is lower than normal range value with no statistical significant different ($P < 0.05$) between infected and uninfected cattle.

The eosinophil value in both the infected and uninfected slaughtered abattoir cattle is higher than the normal value. The lymphocyte mean value of this study both infected and uninfected cattle is clearly over the normal value expected of a healthy cattle neutrophil and monocyte for both infected

and uninfected slaughtered abattoir cattle were within the range of normal monocyte value These data are presented in Table 4.7

3.4 CHANGES IN LIVER ANTIOXIDANT ENZYMES OF THE SLAUGHTERED ABATTOIR CATTLE

Table 4.1: Demographic information of cattle slaughtered at the abattoir

Variable	Frequency	Percentage
Sex		
Male	177	78.0
Female	50	22.0
Age groups (months)		
0-36	16	7.0
37-48	39	17.2
49-60	37	16.3
61-72	101	44.5
73-84	34	15.0
Breed		
BoxBolt	19	8.4
Horn		
Mixed Breed	21	9.3
Red Bororo	29	12.8
Sokoto	19	8.4
Gudali		
White Fulani	139	61.2

AST and ALT mean value 82.55 ± 23.16 and 29.52 ± 9.72 for infected and 81.31 ± 19.61 and 30.18 ± 9.62 were above range of normal value and in addition there was no significant difference between the infected cattle the uninfected cattle (Table 3.8)

Table 4.2: Prevalence of haemoparasite among cattle slaughtered at the abattoir

Haemoparasites	Number affected	
	Frequency	Percentage
<i>Trypanosome spp</i>	4	1.8
<i>Microfilaria spp</i>	2	0.9
<i>Theileria spp</i>	24	10.6
<i>Babesia spp</i>	12	5.3
<i>Anaplasma spp</i>	0	0
<i>Babesia spp and Theileria spp</i>	1	0.4
Total	41	18.1

Table 4.3: Prevalence of haemoparasites by sex of cattle slaughtered at the abattoir

	<i>Number examined</i>	<i>Trypanosome spp N (%)</i>	<i>Microfilaria spp N (%)</i>	<i>Theileria spp N(%)</i>	<i>Babesia spp N(%)</i>	<i>Babesia spp and Theileria spp N (%)</i>	Total haemo parasite
Sex							
Female	177	4 (2.3)	2 (1.1)	19(10.7)	11 (6.2)	0 (0.0)	36 (20.3)
Male	50	0 (0.0)	0 (0.0)	5(10.0)	1 (2.0)	1 (2.0)	5 (10.0)
P value		0.284	0.450	0.881	0.240	0.059	0.093

Table 4.4: Prevalence of haemoparasites by age of cattle slaughtered at the abattoir

	<i>Number examined</i>	<i>Trypanosome spp N (%)</i>	<i>Microfilaria spp N (%)</i>	<i>Theileria spp N(%)</i>	<i>Babesia spp N(%)</i>	<i>Babesia spp and Theileria spp N (%)</i>	Total haemo parasite
Age (months)							
0-36	16	0 (0.0)	1 (6.2)	1 (6.2)	0 (0.0)	0 (0.0)	2 (12.5)
37-48	38	1 (2.6)	0 (0.0)	6 (15.4)	0 (0.0)	0 (0.0)	7 (17.9)
49-60	36	1 (2.7)	1 (2.7)	1 (2.7)	2 (5.4)	0 (0.0)	5 (13.5)
61-72	99	2 (2.0)	0 (0.0)	14(13.9)	6 (5.9)	1 (1.0)	21 (20.8)
73-84	34	0 (0.0)	0 (0.0)	2 (5.9)	4 (11.8)	0 (0.0)	6 (17.6)
P value		0.868	0.083	0.228	0.199	0.869	0.850

Table 4.5: Prevalence of haemoparasites by breed of cattle slaughtered at the abattoir

	<i>Number examined</i>	<i>Trypanosome spp N (%)</i>	<i>Microfilaria spp N(%)</i>	<i>Theileria spp N(%)</i>	<i>Babesia spp N(%)</i>	<i>Babesia spp and Theileria spp N (%)</i>	Total haemo parasite
Breed							
Box Bolt Horn	19	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	1 (5.3)
Mixed Breed	21	1 (4.8)	0 (0.0)	2 (9.5)	3 (14.3)	0 (0.0)	6 (28.6)
Red Bororo	29	0 (0.0)	0 (0.0)	5 (17.2)	1 (3.4)	0 (0.0)	6 (20.7)
Sokoto Gudali	19	1 (5.3)	0 (0.0)	3 (15.8)	0 (0.0)	0 (0.0)	4 (21.1)
White Fulani	139	2 (1.4)	2 (1.4)	14(10.1)	7 (5.0)	1 (0.7)	24 (17.3)
P value		0.496	0.865	0.377	0.323	0.959	0.409

Table 4.6: Effect of haemoparasite on the hematology of Slaughtered abattoir cattle

Haematological					
parameters	Infected		Uninfected		P value
	Mean (\pmSD)	Range	Mean (\pmSD)	Range	
PCV	24.76(8.20)	10-41	30.13(6.37)	1-51	0.000*
Hb	7.95(2.80)	2.40-13.60	9.95(2.03)	4.70-16.80	0.000*
RBC	4.16(1.41)	1.68-6.74	5.01(0.99)	2.91-8.62	0.001*
WBC	5123.17(5801.23)	2200-40550	4835.54(3067.34)	1040-40500	0.654
Platelet	98.05(63.81)	38-380	96.24(45.88)	6-324	0.833
MCV	58.52(11.68)	11-93	60.41(3.46)	50-68	0.062
MCH	19.42(3.89)	9-33	19.85(1.15)	16-23	0.196
MCHC	31.94(2.11)	24-35	32.85(1.17)	28-35	0.010*

* Significantly different between infected and uninfected cattle

Table 4.7: Effect of haemoparasite on the leucocyte Differential counts of the slaughtered abattoir cattle

Differential counts					
(%)	Infected		Uninfected		P value
	Mean (\pmSD)	Range	Mean (\pmSD)	Range	
Lymphocyte	64.34(6.46)	52-77	65.49(5.41)	53-76	0.237
Monocyte	1.88(0.87)	1-4	1.96(0.79)	1-4	0.546
Eusino phil	2.34(1.30)	0-5	2.33-1.10	0-5	0.967
Neutrophil	31.51(6.48)	20-46	29.68(6.31)	3-43	0.095

Table 4.8: The mean values of the liver antioxidant enzymes (LAE) parameters of infected and the uninfected cattle

LAE parameters	Infected		Uninfected		P value
	Mean (\pmSD)	Range	Mean (\pmSD)	Range	
AST	82.55(23.16)	34-133	81.31(19.61)	40-134	0.762
ALT	29.52(9.72)	14-46	30.18(9.62)	11-50	0.785



Fig 4.1: A slaughter house showing the cattle laid

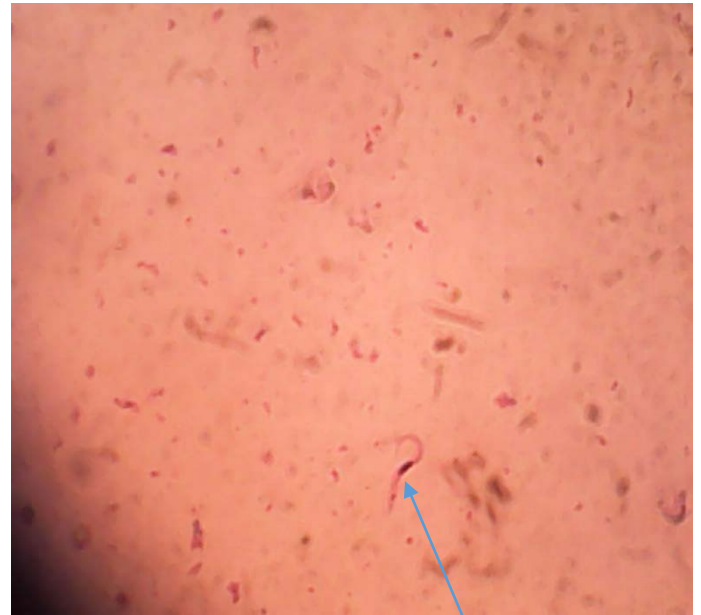


Fig. 4.2: *Microfilaria spp* in a buffy coat viewed at x40 10µm

1 DISCUSSION

This study affirm the reports of previous studies on the range of haemoparasites found in cattle in Nigeria [4],[23],[29][2] and [43]. In specific to the

down and ready for slaughtering



research location for this study i.e. Ibadan

Fig 4.3: A slide showing *Trypanosome brucei* x40

of 5% while in 2014 Okorafor and Nzeakor reported a prevalence of 6.67% and for this study a total prevalence of haemoparasite in cattle was reported as 18.1% which is clearly over twice the prevalence rate of the previous work done. The high prevalence recorded in this work is similar to the work done by Sam-Wobo *et al.* 2016 in Abeokuta who reported a higher prevalence rate of 27.8% which was not too far from what Kamani *et al.* 2010 reported; prevalence of 25.7%. The haemoparasitemia reported in this study suggests a continuous challenge by parasites and the existence of carrier state in most animals. The sudden increase in the prevalence rate of haemoparasite in the study could be attributed to the withdrawal of treatment of the animals by the farmers either due to the cost of treatment or due to no obvious physical symptoms displayed by the animal which

made the farmer relaxed in the routinely check of their animal.

The observed 1.8% for trypanosome was lower than 1.9% reported by Sam-Wobo *et al* 2016, 3.81%, Okorafor and Nzeakor (2014) in Ibadan, 8.0% as reported by Kimani *et al.* (2010) in North-Central Nigeria and 8.4% reported by Enwezor *et al* (2009) in Kaduna state. This could be associated with the unfavorable climatic condition that made the environment less suitable for an insect vector of trypanosome to thrive.

Theileria parva showed a high occurrence of 10.6% when compared to the occurrence of other haemoparasite in the study. This observation is close to earlier study by Kimani *et al.* (2010) where 12% prevalence in cattle in Nigeria was reported. The parasitemia observed in *T.parva* may be associated with difference of sampling strategy and sample numbers. However, Agu *et al.* (1990) showed that fatal infections of *T. parva* could occur in nutritionally challenged breeds and poor sanitary conditions that promote the abundance of *Amblyomma variegata*; the tick vector.

The higher haemoparasitemia recorded in female cattle (20.3%) than male cattle (5%) could be attributed to accumulation of parasites by the females due to the extended breeding for economic reasons such as calving and milk production [43]. This confirms previous reports of sex dimorphism in the incidence of haemoparasitism in Nigeria

[4],[23] and [29]. 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.

In this study the prevalence for *Babesia spp* was 5.3% as compared with other similar report; Sam-Nwobo *et al.* 2016 reported 8.0% in Abeokuta, Pam *et al.* 2015 reported 3.5% in Jos Onoja *et al.* (2013) reported an overall prevalence of 9.5% for bovine Babesiosis in slaughtered cattle from Zaria, Nigeria, Okorafor and Nzeako (2014) in Ibadan reported 2.22%, Akande *et. al.* 2010 in Ogun reported 8.5%. With keen observation the Northern part of Nigeria has the highest prevalence rate this simply could be associated with the suitability of the environment for the insect vector that is known to transmit the parasite to thrive [10]. This obviously is the reverse in the case of South West Nigeria. However there is need to note the increase in prevalence rate conducted in Ibadan from 2.22% in the last study conducted by Okorafor and Nzeako (2014) to 5.30% for this study this call for concern and further investigation as to why it is so.

Anaplasma spp for this study had a prevalence rate of 0(0.0%). This is contrary to the report of Sam-Wobo *et al* 2016 who reported a prevalence rate of 18.5% in Abeokuta, Pukumu *et al* 2011 in Yola reported 15% prevalence rate, and Akande *et al.* 2010 in Abeokuta reported prevalence rate of 12%.

However in the last half decade incidence of *Anaplasma spp* occurrence in cattle has not been recorded in Oyo State which is in line with the report of this study. This could be attributed to the availability of suitable environmental conditions which favors multiplication and survival of their tick vectors [63] and [65].

Microfilaria is another parasite screened for in this study with a low occurrence of 2(0.9%) prevalence rate. In a similar study by Kamani *et al.* 2010 in Plateau a prevalence rate of 1.9% was reported Ademola and Onyiche 2016 Ibadan also recorded the presence of microfilaria. The low occurrence of this parasite does not erase the presence of the parasite hence further investigation and attention recommended for further research

The effect of factors such as age, sex and breed on prevalence of haemoparasites has been previously reported [43],[51],[8] and [2]. The higher prevalence in females 177(78.0%) than males 50(22.0%) agrees with Kamani *et al.* (2010) who observed a similar trend and attributed their finding to the fact that female animals were generally herded much longer for the purpose of breeding and milk production, thereby prolonging their exposure to challenges of disease.

Cattle between the ages of 61-72 months (101) has the highest number of animal sampled with highest prevalence rate of haemoparasite infection. This is contrary to the report of Ademola and Onyiche

2013 that the prevalence of haemoparasite in ruminants decreases with increasing age. The high prevalence in this age group may be as a result of the long exposure of the cattle to tick vector

Also, younger cattle less than 36months old had the least prevalence compared to their adult counterparts. This finding disagrees with Ademola and Onyiche (2013) and could be due to the less exposure of the cattle to the tick vector. The higher prevalence of haemoparasites recorded in White fulani breed could be attributed to the fact that it is the most numerous breed in Oyo State because of their adaptation to arid and semiarid conditions [14]. Moreover, they are usually herded by pastoralists under trans-human conditions which exposes them to the vectors of haemoparasites thereby increasing the risk of infection.

The mean PCV, WBC, and Hb of infected and uninfected slaughtered trade cattle examined in this study were within normal range [44] as referenced by Paul *et al* 2016 [89]. However, there was a significant difference ($p<0.05$) in PCV, WBC and Hb between infected and uninfected cattle, and this could be attributed to the effects of haemoparasites on blood cells. This finding is in accordance with Kamani *et al.* (2010) who reported that infection with *Babesia*, *Anaplasma*, *Theileria* and *Trypanosoma* species, either singly or in combination caused a significant reduction in mean PCV of cattle. It also is known

that infection with most haemoparasites leads to destruction of erythrocytes and anemia [2] and [65]. The higher mean total white blood cell counts recorded in infected cattle could be explained on the basis of immune response to presence of haemoparasites. The RBCs indices MCV, MCH and MCHC mean values all fall within normal range [44], with no significant statistical difference between the infected and uninfected cattle except in the case of MCHC value ($P < 0.010$) where there is significant difference between the infected and uninfected cattle. This simply might be as a result of the early infection of the cattle or inability of these parasite to be able to establish themselves in the host as at the time of examination of the animal.

Platelet count in this study both from the infected and uninfected slaughtered abattoir cattle were generally very low with those infected lower than the normal range value [44]. A condition known as thrombocytopenia i.e. the inability of the blood to clot. This aligned with other research findings [18]. However there was no significant statistical different between the infected and uninfected abattoir cattle.

Differential leukocyte count was observed with variable trend. The eosinophil value in both the infected and uninfected slaughtered abattoir cattle is higher than the normal value [44]. This is a case of eosinophilia which is an increase in the number

of eosinophils in the blood, occurring in response to some allergens, drugs, and parasites, and in some types of leukemia [44]. This may have contributed to the observed differences in WBC count between infected and uninfected cattle in this study. This was previously reported in haemoparasitic infections of ruminants [2]. However there is no statistical significant difference in mean values of infected to uninfected slaughtered abattoir cattle. This may be accredited to other health reason but not the parasitic infection.

The lymphocyte mean value of this study both infected and uninfected cattle is clearly over the normal value expected of a healthy cattle. A condition known as lymphocytosis [87] the results of present study were in somewhat agreement with the findings of [18]. These findings are possible result of migration of leukocytes towards the site of infection resulting in their decrease in peripheral circulation [88].

In this study, the neutrophil and monocyte for both infected and uninfected slaughtered abattoir cattle were within the range of normal monocyte value [44]. Findings from this study shows that monocyte mean value of infected cattle is less than the uninfected cattle while neutrophil mean value of infected cattle is more than the uninfected cattle. This could probably be associated with the early stage of the parasite and the cattle is just

responding to it. However there is no significant statistical difference (P value <0.05) between the infected and uninfected neutrophil and monocyte mean value of the slaughtered abattoir cattle.

In this study, AST and ALT mean value were above range of normal value [69] and [44] both for infected and the uninfected slaughtered abattoir cattle. Aminotransferases act as a catalyst in connecting the metabolism of aminoacids and carbohydrates. Accordingly, changes in their activity in the blood can be a consequence of their increased activity in cells (primarily liver), but also a reflection of cell structure damage [89]. In addition to the high value, there is no statistical significant difference between the value of the infected and uninfected cattle. In other words the role of ALT and AST in predicting the liver damage in the slaughtered abattoir cattle is statistically insignificant. This result is similar to the findings of Zvonko, *et al.*, (2005) that attributed the high value of ALT and AST in dairy cattle as a result of post lactation period.

CONCLUSION AND RECCOMENDATION

The result of this study apparently show that 18.1% of the slaughtered abattoir cattle were infected with haemoparasite as compared with the

previous study by Ademola and Onyechi (2014) and Okorafor and Nzeakor 2014 who reported 5% and 6.67% respectively of haemoparasite infection. The effect of this infections usually manifest in production losses in the form of dimunition of productive potential such as decreased in growth rate, weight loss still birth and increase susceptibility to other diseases. Hence there is need for vector control measures which aids in the transmission of the various haemoparasite screening and treatment of cattle at source ranches, with the aim of avoiding vertical transmission between infected and susceptible cattle and ultimately improving their productivity. For this study prevalence of *Microfilaria* spp. Is also recorded which has not been in the last half decade in the study. Therefore is need more measures such as aggressive chemotherapy, chemoprophylaxis, acaricides and finally proper management of the environment of the cattle.

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