

Haemoparasites of Bovine Species Slaughtered In Port Harcourt Metropololis, Rivers State, Nigeria

ABSTRACT

Background: The haemoparasitemia of cattle slaughtered in three abattoirs in Port Harcourt metropolis, Rivers State, Nigeria were determined in the department of Animal and Environmental Biology parasitology research laboratory in the University of Port Harcourt between the months of July and September, 2016.

Methods: One hundred and five (105) blood samples were obtained from healthy Sokoto Gudali breed of cattle from three abattoirs (Trans-Amadi, Rumuokoro and Eastern-by-Pass) and were processed for microscopic examination. Giemsa Stained thick and thin smear preparations of the samples were examined.

Results: An overall parasitemia of 11.43% accounting for 12 positive cattle out of 105 cattle examined was obtained. Abattoir specific prevalence indicated 5.71%, 3.81% and 1.90% for Trans-Amadi, Rumuokoro and Eastern-by-Pass respectively. The three species of parasites identified showed that *Anaplasma* spp., *Theileria* spp. and *Babesia* spp. recorded a prevalence of 5.71%, 3.81% and 1.90% respectively. Sex related parasitemia showed that females had higher prevalence of 6.67% than males (4.76%) which was statistically significant ($P < 0.05$). Age related prevalence showed that older cattle recorded higher prevalence of 12.72% than the younger ones (10.00%), which was not statistically significant ($p > 0.05$). The study showed a higher prevalence of haemoparasites in slaughtered cattle at Trans-Amadi followed by Rumuokoro and Eastern-by-Pass abattoirs respectively.

Conclusion: The study provides information on the haemoparasites status of cattle slaughtered in Port-Harcourt metropolis. Ectoparasites are known to be the primary vectors to haemoparasites therefore, level of ectoparasites should be controlled and management practices should be improved upon in order to maximize wholesome beef for the general populace.

Keywords: *Haemoparasites*; cattle; abattoirs; Port Harcourt

1. INTRODUCTION

The Nigerian livestock population was estimated at about 50 million apart from pigs, rabbits and guinea pigs [1]. The value of Nigeria livestock resource in monetary terms was estimated to be \$6 billion. Nigeria livestock population; cattle contributed about 10%. This in monetary terms accounted for about 40% of the total livestock revenue of Nigeria [2]. Haemoparasitic infestations 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.

Cattle, sheep and goats in sub-saharan African may be infected with a wide variety of parasites. Most importantly vector-borne haemoparasites such as *Anaplasma*, *Theileria*, *Babesia* and bovine *Trypanosoma* have been observed [3; 4]. The tropical environment is for various reasons suitable for the development of these parasitic diseases [5].

Outbreak of protozoan disease may occur if cattle are moved from humid area to semi-arid region where the vectors are prevalent. Haemoparasites have generally been shown to cause lysis of red blood cells resulting in anaemia, jaundice, anorexia, loss of weight and infertility [6]. This parasitic diseases have weakening effect on human and animal health worldwide especially in developing countries [7]. Babesiosis, an haemoparasitic disease imposes a serious burden on the healthcare infrastructure of both the cattle and their handlers (8)

48 Cattle are very important economically because they are source of animal protein and income. Their by-
49 products such as [hooovesf](#), bones, blood, hides and [skins](#) are also variously used [9]. Beef is the third most
50 widely consumed meat in the world, accounting for about 25% of meat production worldwide, after pork and
51 poultry at 38% and 30% respectively [10 ;11]. Beef is an excellent source of complete protein. Minerals such as
52 zinc, selenium phosphorus and iron and the B vitamins are also present. Haemoparasitic infestations are major
53 public health, veterinary and socio-economic problem in Africa, where they impose a burden on the health care
54 infrastructure of both animals and animal handlers in endemic area.

55 Studies carried out on the haemoparasitic infestations of cattle_ reported a prevalence of 3.9% in Ebonyi
56 State(12). Study conducted among 180 cattle in Oyo state reported a prevalence of 6.67%(13) . Benue state,
57 reported a prevalence rate of 28.9% in a [similar](#) study [investigated among 637 cattle](#) [14]. Infestations in
58 North-central Nigeria recorded 25.7% prevalence(15) .

59 The Sokoto gudali breed is a short-horned and short-legged animal. They are also known as the Zebu in West
60 and Central Africa. Gudali originated from Persia gulf and south Arabia. Arabia invaders spread the Zebu to the
61 South from 669BC [16]. The breed is also known as Yola gudali, Adamawa gudali and Ngaundere gudali. The
62 Sokoto gudali is the [breedstrain](#) mostly found in Nigeria, Northern Benin, Ghana and Mali, They have multiple
63 coat colour although the most common one is black and white which has a deeper body than the white Fulani
64 breed [17].

65 About 90% of the Sokoto gudali cattle are owned and managed by Fulani and Hausa pastoralist and trans
66 human herders [18], who feed their cattle on communally owned grazing lands and browse especially in the
67 dry season [17]. They are known for their hardiness to the Arid Northernly environment. The cattle are known
68 for their meat and milk. Mature weights range from 495-660kg for males and 240-355kg for females. They are
69 also known for their beef quality among indigenous breed.

70 In spite of several studies that have been conducted on the haemoparasitic infestations of cattle in parts of
71 Nigeria; there is little or no information on the haemoparasitic infections in Port Harcourt metropolis.
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73 2. MATERIALS AND METHODS

74 2.1. Study Area

75 The study was carried out at three selected abattoirs in Port Harcourt metropolis, the capital of Rivers State of
76 Nigeria. The study areas include; Trans-Amadi, Eastern-By-Pass Rumuokoro abattoirs respectively. Trans-
77 Amadi abattoir is the biggest abattoir in Rivers State with an average daily slaughter of 50-60 cattle. Trans-
78 Amadi is a thousand hectare (2,500 acre) industrial area, as well as a diverse residential
79 [neighbourhoodneighborhood](#) in the city of Port Harcourt; situated at 4⁰ 48' 53" N latitude and 7⁰ 2¹'14" E
80 longitude. Trans-Amadi lies in the North and is bordered by D/line in the South West, Woji Township to the East
81 and Rumuola to the North West.

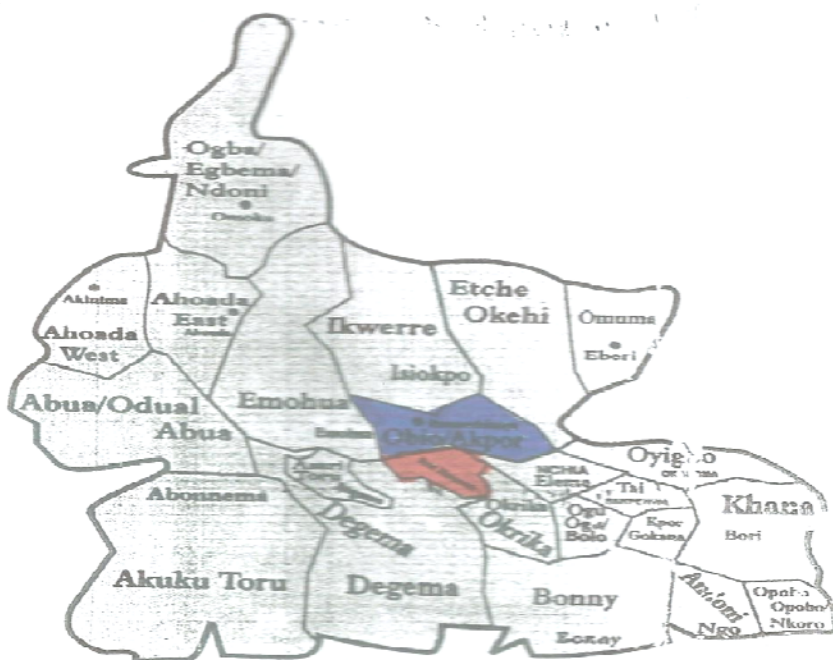
82 Rumuokoro is a town in Obio-Akpor Local Government Area of Rivers State, Nigeria, situated at 4⁰45'N latitude
83 and 6⁰50'E longitude. It is the meeting points of five major roads in Nigeria economy and the gate way to and

84 from the city of Port Harcourt. It consists of five communities; Rukpoakwolusi, Eligbolo, Awalema, Rumuagholu
85 and Elieke.

86 Eastern-by-pass slaughter on the other hand, is located in Port Harcourt city which is the capital of Rivers State
87 and the largest city, made up of the Local Government Area itself and part of Obio-Akpor, situated at 4°32'N
88 latitude and 7°42'E longitude.

89 Port Harcourt Local Government Area covers 109km² and at 2016 census held a population of 3,100,000.

90 Although the majority of the inhabitants live in rural agricultural and riverine areas and engage in peasant
91 agriculture and fishing, the State's reputation as the treasure base of the nation is because of its abundance in
92 oil resources.



107 **Map 1: Map of Rivers State showing the study area (Obio/Akpor and Port Harcourt Local Government**
108 **Areas)**

- 111 Obio/Akpor Local Government Area
- 112 Port Harcourt Local Government Area

116 2.2. **Collection of Blood Samples**

117 **Ethical considerations.**

118 **Ethical clearance was sought from the ethical committee of Rivers state. Consent of each participant**
119 **was sought and obtained without struggle having been briefed on the advantages of the research**
120 **outcome.**

Comment [MA1]: Which Ethical Committee? It must be linked to an institution

121 Blood samples were randomly collected aseptically from 105 apparently healthy cattle of both sexes of Sokoto
122 gudali breed. The blood samples from each animal was put in an Ethy-lene diaminetetracetic acid (EDTA) tube
123 which was appropriately labeled and placed in an ice pack. The blood samples were sent to the department of
124 Animal and Environmental Biology Parasitology research laboratory in the University of Port-Harcourt for
125 analysis within five hours of collection. The blood samples were collected for a period of 10 weeks between 13th
126 July and 28th September, 2016.

127 **2.3 Examination of Blood Samples**

128 **2.3.1 Preparation of Thick Blood Smear(For general observation)**

129 A large drop of blood was taken into a grease free glass slide and was spread on an area of 12mm square with
130 another slide and then allowed to thoroughly air-dry. The thick smear was thereafter stained with 10% Giemsa
131 stain for 25-30 minutes. The stain was washed off from staining rack with clean water by flushing the stain from
132 slides. These were placed in a draining rack to air-dry [18]. When the thick film was completely dried, a drop of
133 immersion oil was applied to an area of the film and the oil was spread to cover the film and examined first at a
134 lower magnification and then with x 100 objective of the microscope.

135 **2.3.2 Preparation of Thin Blood Film**
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137 This technique was prepared by dropping a pin head of blood on a grease free glass slide. The edge of a glass
138 spreader was placed on the drop of blood at an angle of 45⁰ and pushed gently and swiftly forward until a thin
139 film with a staggered tail is produced. This was allowed to air dry at room temperature. The air dried blood
140 smear was fixed in 100% methanol and stained with 10% Giemsa stain. This was immediately rinsed in
141 buffered water and allowed to dry on a staining rack [18]. The stained blood smears were examined using the x
142 100 oil immersion objective. The identification of the parasites is based upon morphological forms and
143 structures within the Giemsa stained blood film.(identification was not done to spp. level)

144 **2.4 DATA ANALYSIS**

145 The prevalence rates among sex and age of the animals were expressed as percentage of the total numbers of
146 animals sampled. Chi-square test was used to evaluate relationships between the prevalence of the disease,
147 sex and age of the cattle studied. A p-value of p= .05 was considered significant.

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151 **3. RESULTS**

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153 The study revealed that out of 105 blood samples examined, a total of 12 (11.43%) samples were positive for
 154 haemoparasites. Abattoir-specific prevalence is as follows; 6(5.71%), 4(3.81%) and 2(1.90%) animals infected
 155 for Trans-Amadi, Rumuokoro, and Eastern-by-pass abattoirs respectively as in table 1 and Fig. 1.

156 The distribution of the parasites based on age indicated were 5(10%) as follows; 3 (6.00%), 1 (2.0%) and 1
 157 (2.00%) of the younger cattle in Trans-Amadi, Rumuokoro and Eastern-by-pass abattoirs respectively. Older
 158 cattle had 7(12.73%) parasites as follows; 4(7.27%), 2(3.64%) and 1 (1.82%) respectively for Trans-
 159 Amadi, Rumuokoro and Eastern-by-pass abattoirs (Table 2 and Fig. 2).

160 During the study, 12 (11.43%) of the cattle were positive for haemoparasites as follows; 5(4.76%), 7(6.67%)
 161 for male and females respectively (Table 3 and Fig.3).

162 Twelve haemoparasites of three genera were identified during the study as follows; 6 (5.71%), 4
 163 (3.81%) and 2 (1.90%) for *Anaplasma* spp., *Theileria* spp., and *Babesia* spp respectively. *Anaplasma* spp.
 164 showed a prevalence of 3 (2.86%), 2 (1.90%) and 1 (0.95%) at Trans-Amadi, Rumuokoro and Eastern-by-pass
 165 abattoirs respectively. *Theileria* spp. showed a prevalence of 2 (1.90%), 1(0.95%) and 1 (0.95) at Trans-Amadi,
 166 Rumuokoro and Eastern-by-pass abattoirs. While *Babesia* spp. showed a prevalence of 1(0.95%) at both
 167 Trans-Amadi and Rumuokoro abattoirs. There was no record of Babesia spp at Eastern-by-pass abattoir (table
 168 4).

169 **Table 1: Prevalence of haemoparasites based on study location (Abattoir specific**
 170 **prevalence)**

Abattoir	No. examined	No. Infected (%)
Trans-Amadi	45	6 (5.71)
Rumuokoro	30	4(3.81)
Eastern-by-pass	30	2(1.90)
Total	105	12(11.43)

171 ($\chi^2 = 5.99, df = 2, p > 0.05$)

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179 **Table 2: Prevalence of haemoparasites based on age**

Location	Younger Cattle		Older Cattle	
	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)
Trans-Amadi	20	3(6.00)	25	4(7.27)
Rumuokoro	15	1(2.00)	15	2(3.64)
Eastern-by-pass	15	1(2.00)	15	1(1.82)
Total	50	5(10.00)	55	7(12.73)

Age ($\chi^2 = 3.84$, $df = 1$, $p > 0.05$)

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181 **Table 3:**

182 **Prevalence of haemoparasites based on sex**

Sex	No. Examined	No. Infected (%)
Males	70	5(4.76)
Females	35	7(6.67)
Total	105	12(11.43)

183 Sex ($\chi^2 = 3.84$, $df = 1$, $p < 0.05$)

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186 **Table 4: Prevalence of haemoparasites infection in the three study locations**

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Parasites	Trans-Amadi Abattoir TVC (%)	Rummokoro Abattoir TVC (%)	Easter-by-pass Abattoir TVC (%)	Total
Anaplasma spp.	3(2.86)	2(1.90)	1(0.95)	6(5.71)
Theileria spp.	2(1.90)	1(0.95)	1(0.95)	4(3.81)
Babesia spp.	1(0.95)	1(0.95)	-	2(1.90)
Total	6(5.71)	4(3.81)	2(1.90)	12(11.43)

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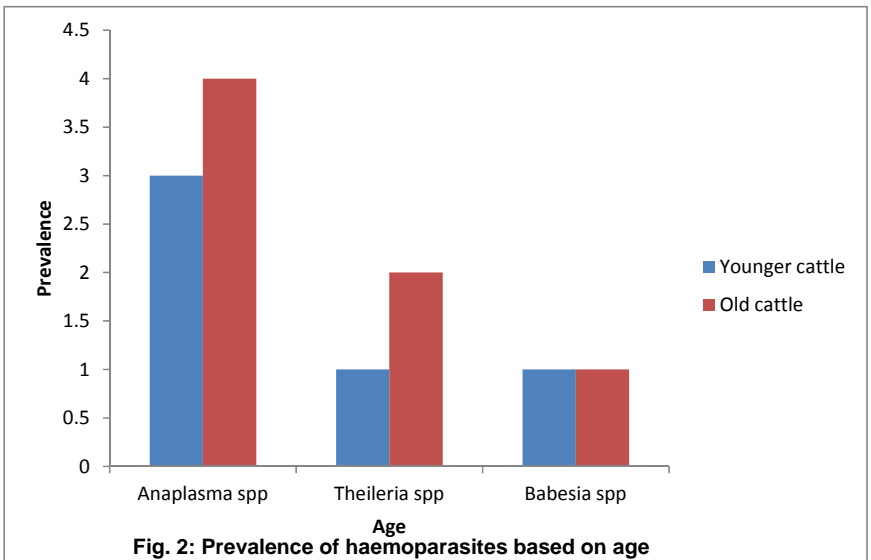
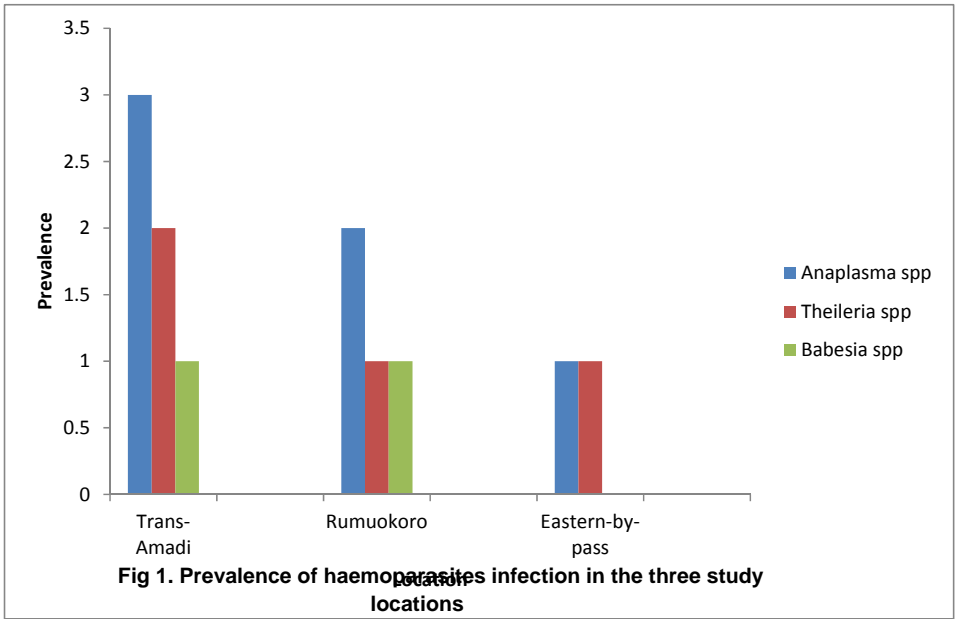
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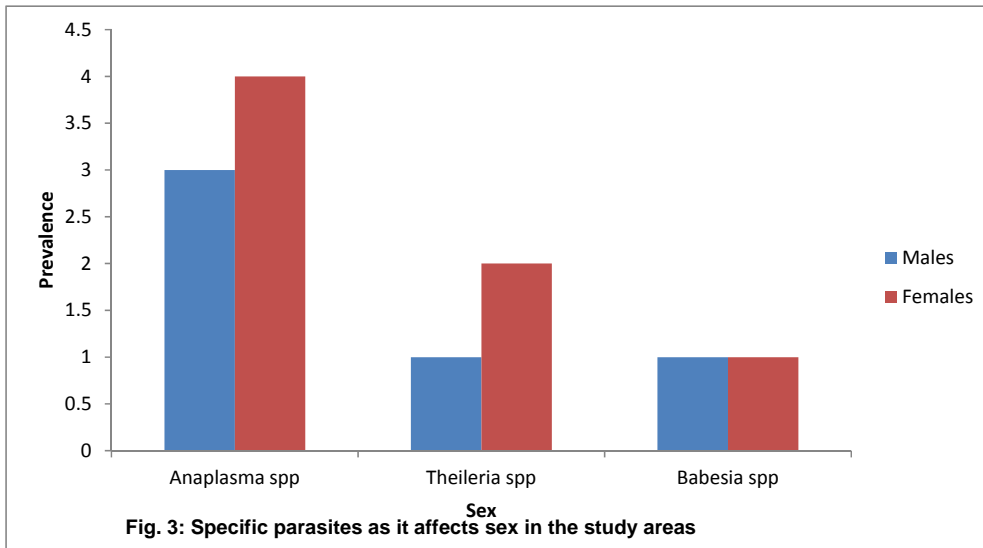
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4. DISCUSSION

246 The present study confirms the reports of previous studies on the range of haemoparasites found in cattle in
247 Nigeria.(20; 21; 22; 23) The infection rate of 11.43% by haemoparasites reported in this study suggests a
248 continuous challenge by parasites and the existence of carrier state in most animals. The haemoparasitemia
249 reported in this study indicated that parasitism is one of the major challenges that hinder cattle production in
250 Port Harcourt metropolis.

251 The high parasitemia reported in this study could probably be as a result of poor sanitary condition, nutritional
252 challenges and lack of routine treatment .*Anaplasma* spp. (5.71%) accounted for most of the parasites seen
253 followed by *Theileria* spp. (3.81) and *Babesia* spp. (1.90%). This is in contrast with the work of Bell-Sakyi *et_*
254 *al.*, 2004 [3] who observed a reverse trend in a survey conducted in livestock in Ghana [3]. The observed
255 5.71% parasitemia for anaplasmosis was lower than the 9.9% reported by by Zawua *et_ al.*, 2015 [14] in
256 Benue State, Nigeria [14]. The low prevalence recorded in the study could be attributed to the improvement in
257 husbandry system, better veterinary care and climate change; contrary to the report of higher prevalence
258 (28.9%) of parasitemia in cattle in Gboko metropolis of Benue State, Nigeria. *Theileria* spp. showed occurrence
259 of 3.81%, which was similar to the earlier work of Kamani *et_ al.*, 2010 [15] in North central Nigeria [15]. The
260 low parasitemia observed in *Babesia* spp. (1.90%) contradicts earlier studies by Kamani *et_ al.*, 2010 [15]
261 where 16% prevalence in cattle in Nigeria was reported [15]. The lower parasitemia observed in *Babesia* spp.
262 and *Anaplasma* spp. may be associated with difference in sample number. However, Agu *et_ al.*, 2001 [12]
263 showed that fatal infection of the parasites could occur in nutritionally challenged breed and poor sanitary
264 condition that promote vector abundance [12].

265 The prevalence of parasitemia was higher in females than male animals possibly due to the fact that females
266 are kept much longer for breeding and milk production purposes [14]. The lower prevalence in young animals
267 compared to adults can be attributed to restricted grazing of young animals which tends to reduce their
268 chances of contact with the vectors of these diseases. [15].

5. CONCLUSION

270 The result of this study clearly shows that 11.43% of the Ccattle slaughtered in the Port-Harcourt
271 metropolisstudy area were infected with haemoparasites. This is one of the challenges that hamper cattle
272 production in this area Port-Harcourt metropolis and elsewhere. The effect is usually manifested in
273 production losses, late maturity, weight loss, still birth and jncreased susceptibility to other diseases.

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275 **COMPETING INTERESTS**
276 *Authors have declared that no competing interests exist.*
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