Original Research Article

Haemoparasites of Bovine (*Sokoto gudali*) Species Slaughtered In Port Harcourt Metropololis, Rivers State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OJ and IH designed the study and wrote the first draft, OJ managed the analyses and literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: The study was embarked on to evaluate the presence of haemoparasitemia in cattle slaughtered in three abattoirs in Port Harcourt metropolis, Rivers State, Nigeria.

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) between the months of July and September, 2016, were processed for microscopic examination using Giemsa Stained thick and thin smear preparations of the samples.

Results: Twelve (11.43%) of the cattle showed parasitemia. 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; *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(sexually mature) recorded higher prevalence of 12.72% than the younger ones(sexually immature) (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 abbatoirs 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;*Sokoto gudali* 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 Trypamosome 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)

Cattle are very important economically because they are source of animal protein and income. Their by-products such as hooves, bones, blood, hides and skins are also variously used [9]. 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 [10 ;11]. Beef is an excellent source of complete protein. Minerals such as zinc, selenium phosphorus and iron and the B vitamins are also present. Haemoparasitic infestations are major public health, veterinary and socio-economic problem in Africa, where they impose a burden on the health care infrastructure of both animals and animal handlers in endemic area.

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

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

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

Inspite of several studies that have been conducted on the haemoparasitic infestations of cattle in parts of Nigeria; there is little or no information on the haemoparasitic infections in Port Harcourt metropolis.

2. MATERIALS AND METHODS

2.1. Study Area

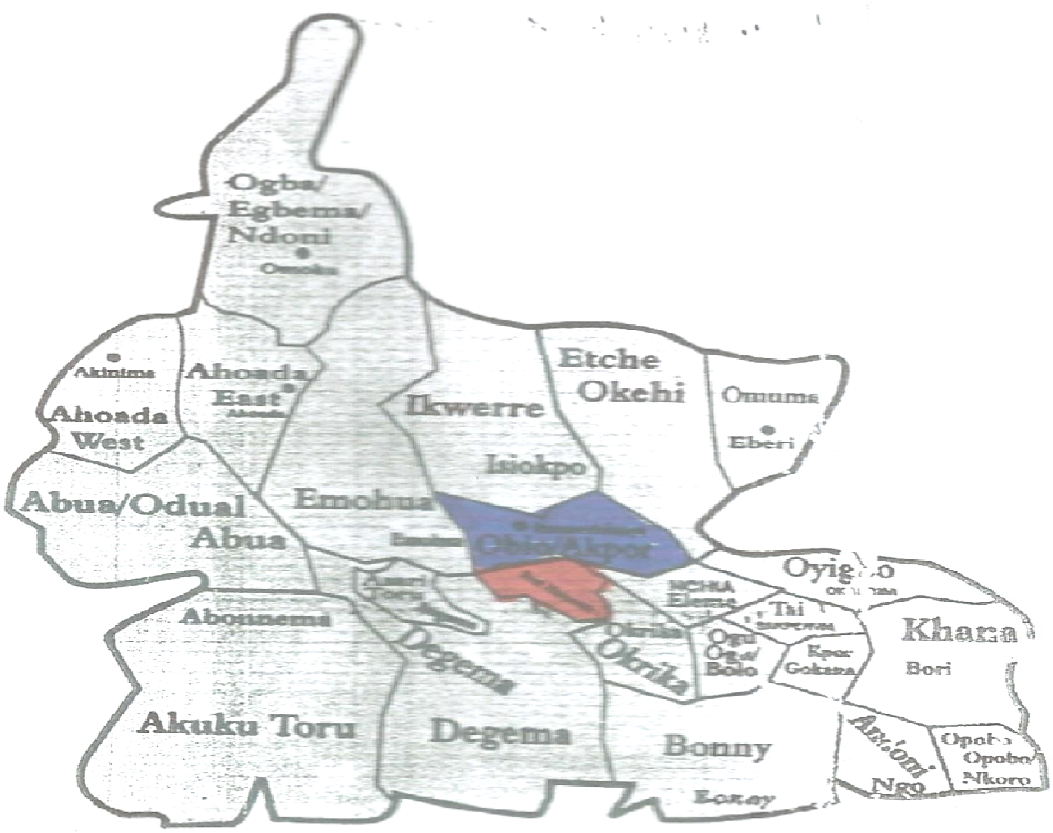
The study was carried out at three selected abattoirs in Port Harcourt metropolis, the capital of Rivers State of Nigeria. The study areas include; Trans-Amadi, Eastern-By-Pass Rumuokoro abattoirs respectively. Trans-

Amadi abattoir is the biggest abattoir in Rivers State with an average daily slaughter of 50-60 cattle. Trans-Amadi is a thousand hectare (2,500 acre) industrial area, as well as a diverse residential neighbourhood in the city of Port Harcourt; situated at 4^0 48' 53" N latitude and 7^0 2^1'14" E longitude. Trans-Amadi lies in the North and is bordered by D/line in the South West, Woji Township to the East and Rumuola to the North West.

Rumuokoro is a town in Obio-Akpor Local Government Area of Rivers State, Nigeria, situated at $4^0$45'N latitude and $6^0$50'E longitude. It is the meeting points of five major roads in Nigeria economy and the gate way to and from the city of Port Harcourt. It consists of five communities; Rukpoakwolusi, Eligbolo, Awalema, Rumuagholu and Elieke.

Eastern-by-pass slaughter on the other hand, is located in Port Harcourt city which is the capital of Rivers State and the largest city, made up of the Local Government Area itself and part of Obio-Akpor, situated at $4^0$32'N latitude and $7^0$42"E longitude.

Port Harcourt Local Government Area covers 109km^2 and at 2016 census held a population of 3,100,000. Although the majority of the inhabitants live in rural agricultural and riverine areas and engage in peasant agriculture and fishing, the State's reputation as the treasure base of the nation is because of its abundance in oil resources.



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

Obio/Akpor Local Government Area

Port Harcourt Local Government Area

2.2. Collection of Blood Samples

Ethical considerations.

Ethical clearance was sought from the ethical committee of the University of Port Harcourt , Rivers State, Nigeria. Consent of each participant was sought and obtained without struggle having been briefed on the advantages of the research outcome.

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

2.3 Examination of Blood Samples

2.3.1 Preparation of Thick Blood Smear (For general observation)

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

2.3.2 Preparation of Thin Blood Film

This technique was prepared by dropping a pin head of blood on a grease free glass slide. The edge of a glass spreader was placed on the drop of blood at an angle of 45^0 and pushed gently and swiftly forward until a thin film with a staggered tail is produced. This was allowed to air dry at room temperature. The air dried blood smear was fixed in 100% methanol and stained with 10% Giemsa stain. This was immediately rinsed in buffered water and allowed to dry on a staining rack [18]. The stained blood smears were examined using the x 100 oil immersion objective. The identification of the parasites (not species level) is based upon morphological forms and structures within the Giemsa stained blood film.(identification was not done to spp. level)

2.4 DATA ANALYSIS

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

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3. RESULTS

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

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

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

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

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

($x^2 = 5.99$, df = 2, $p>0.05$)

Table 2: Prevalence of haemoparasites based on age

	Younger Cattle		Older Cattle	
Location	**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 ($x^2 = 3.84$, df = 1, $p>0.05$)

Table 3:

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)**

Sex ($x^2 = 3.84$, df = 1, $p<0.05$)

Table 4: Prevalence of haemoparasites infestation in the three study locations

Parasites	**Trans-Amadi Abattoir TVC (%)**	**Rummokoro Abattoir TVC (%)**	**Easter-by-pass Abattoir TVC (%)**	**Total**
Anaplasma ssp.	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)**

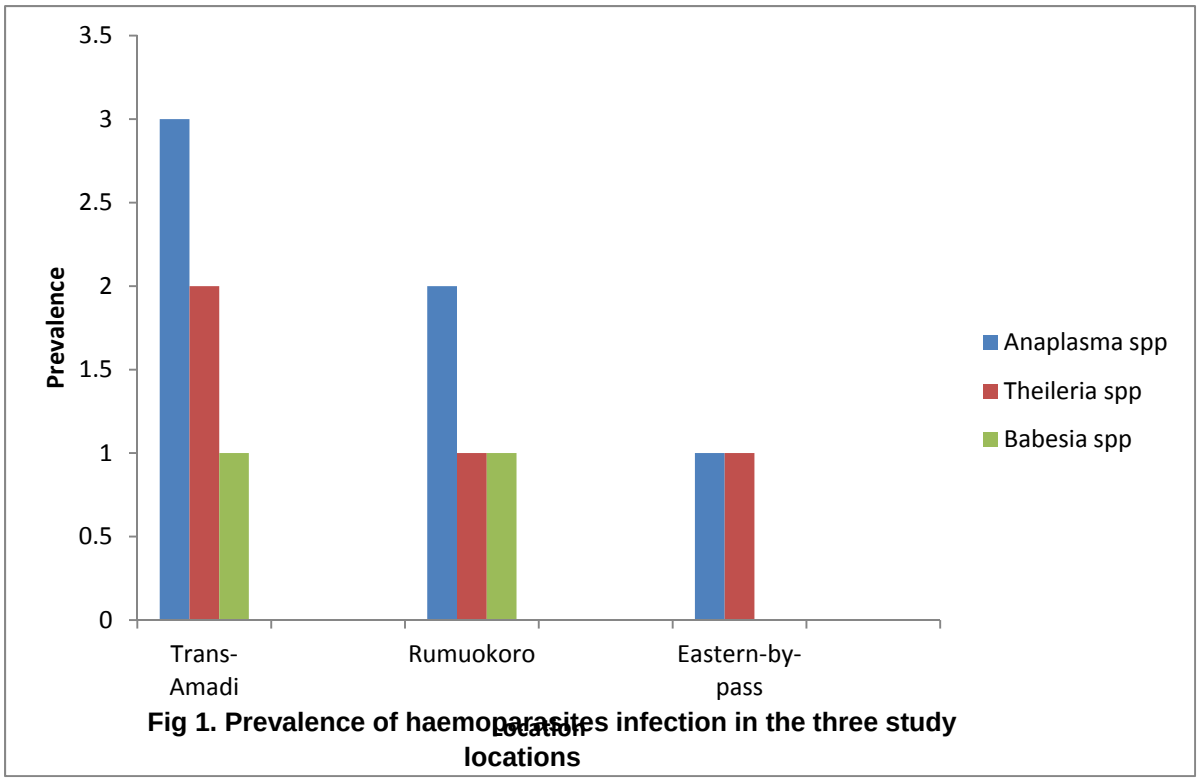

Fig 1. Prevalence of haemoparasites infection in the three study locations

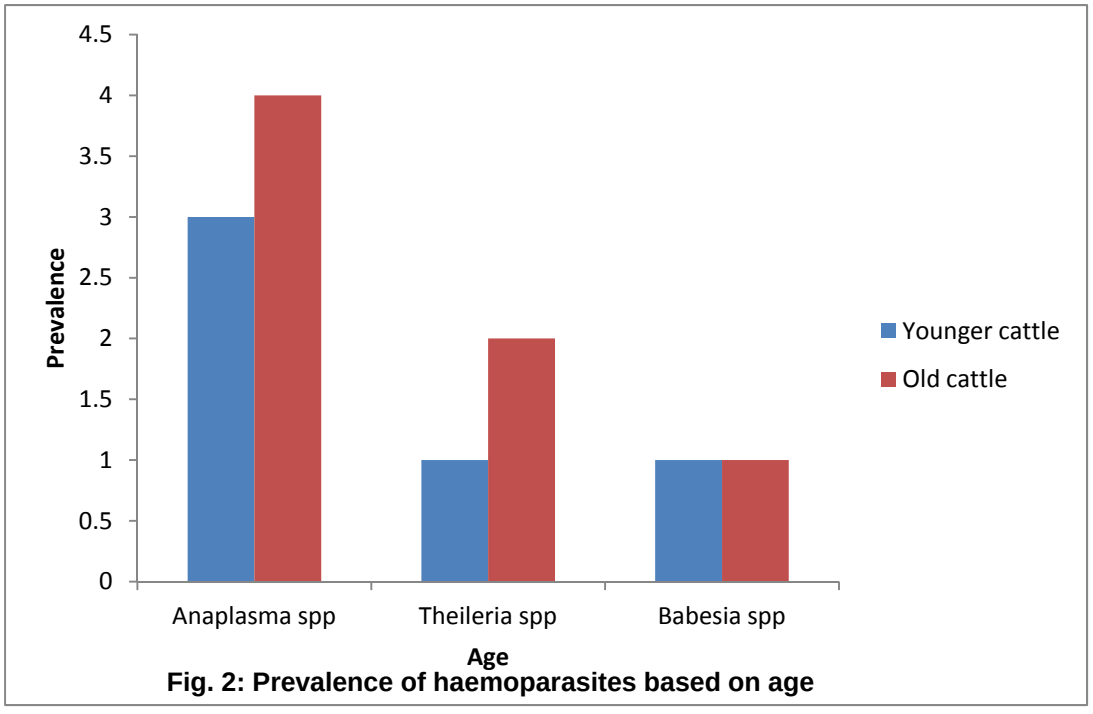

Fig. 2: Prevalence of haemoparasites based on age

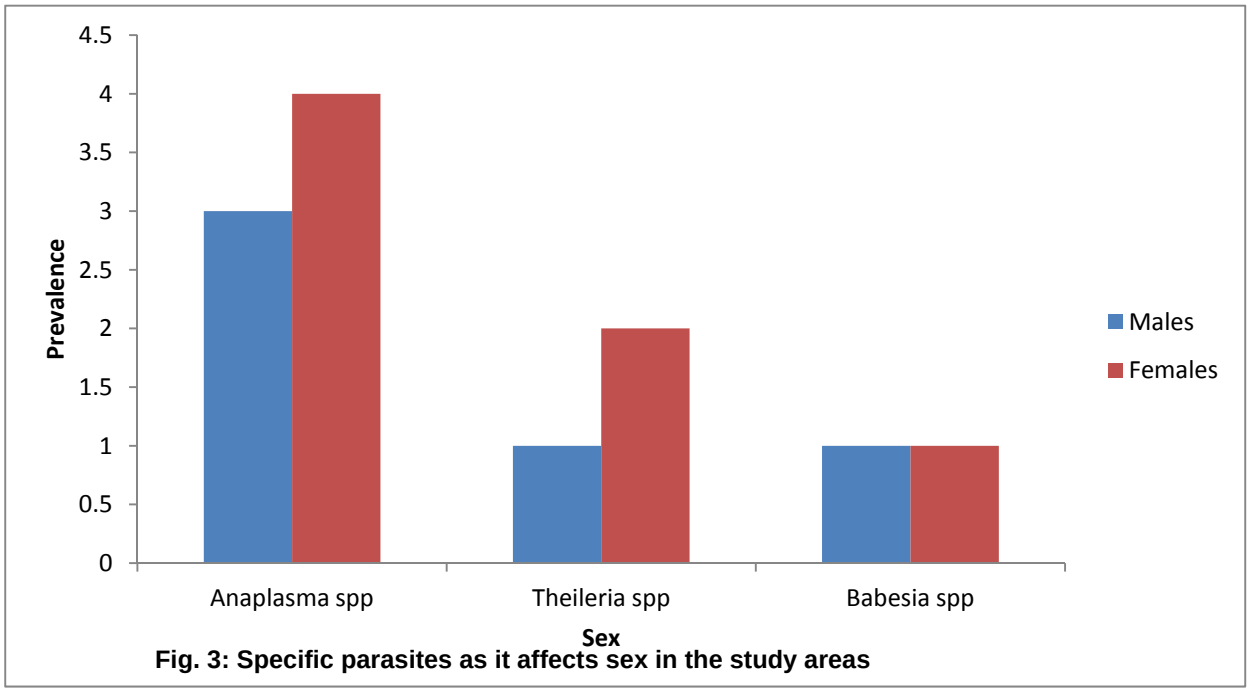

Fig. 3: Specific parasites as it affects sex in the study areas

4. DISCUSSION

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

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

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

5. CONCLUSION

Cattle slaughtered in the Port-Harcourt metropolis were infected with haemoparasites. This is one of the challenges that hamper cattle production in this area and elsewhere. The effect is usually manifested in production losses, late maturity, weight loss, still birth and increased susceptibility to other diseases.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bourn, D. Wint, Blench, R. Woolley, E (2007). Nigerian Livestock resources survey. *World Animal Review. 78 (1): 49-58*

2. Mclntyre, J.D., Bourzat, D, Pingal, P (2013). Crop-livestock interaction in sub-saharan African Regional World Bank, Washington, D.C.

3. Bell- Sakyi L., Koney E.B.M., Dogbey O., Walker A.R. (2004): Incidence and prevalence of tick-borne haemoparasites in domestic ruminants in Ghana. Veterinary Parasitology. 124 (1-2): 25-42.

4. Okaiyeto S.O., Tekdek L.B., Sackey A.K.B., Ajanusi O.J. (2008) Prevalence of Haemo and gastrointestinal parasites in sheep and goats kept by the Normadic Fulanis in some Northern States of Nigeria. *Res .J. Animal Science* 2(2), 31-33.

5. Payne W.J.A. (2014): An introduction to Animal Husbandry in the Tropics (4th edition), ELBS
.

6. Akande F.A, Taket M.I, Makanju O.A (2010): Haemoparasites of cattle in Abeokuta, South West Nigeria. *Sci. World J.* 5(4), 9-21.

7. Ellis J. T, Morrison D. A., Reichel M. P., (2003): geonomics and its impact on parasite control methods. *DNA cell bio. 32, 395- 403*

8. Sam-wobo, S.O, Uyigue, J, Surakat, A.O ;Adekunle, N.O and Mogaji, H.O (2016) Babesiosis and other Heamoparasitic Diseases in a cattle slaughtering Abattoir in Abeokuta, Nigeria *International journal of tropical disease* 18(2) 1-5.

9. Sunsoucy, R. (2000). Livestock: a driving-force for food security and sustainable development. *World animal review, 84/85: 517*

10. Dreyer, K., Fourice, L.J. and Kok, D.J. (2008). Ticks diversity, Abundance and Seasonal Dynamics in a Resource Poor Urban environment in the Free State province. *Onderstepoort Journal of Veterinary Research 65:305-316.*

11. Dold, A.P. and Cocks, M.L. (2001). Traditional Veterinary Medicine in the Alice District of the Eastern Cape Province, South Africa. *South African Journal of Science*, 97 (9-10): 375-379.

12. Agu WE, Amadi IN (2001). Trypanosomosis of small ruminants (sheep and goats) and cattle in Abakeliki of Ebonye state, Nigeria*. Tropical veterinary parasitology, 19(2)1-8*

13. Okorafor, U.P. and Nzcako, S.O. (2014). Prevalence of haemoparasites of cattle from three abattoirs in Ibadan Metropolis, Oyo State Nigeria. *International Journal of Science,* 2(7), pp. 244-2499.

14. Zawua, T.P., Amadi, O., Amuta, E.U. and Sar, T.T. (2015) Haemoparasites of cattle slaughteres for sale within Gboko Metropolis of benue State, Nigeria. *Nigerian Journal of Parasitology*. ISSN 11174145 Volume 36(1) March 2015.

15. Kamani, J. Sanusi, A., Egwu O.K and Dodo G.I. 2010. Prevalence and Significance of Haemoparasitic infections of Cattle in North-Central Nigeria. *Veterinary World*, Vol. 3(10): 445-448.

16. DAGRIS, 2005. Domestic Animal Genetic Resources Information System (DAGRIS). S. Kemp, (Y. Mamo, B. Abstract and T. Dessie). International Livestock Research Institute, Ababa, Ethiopia.

17. Tawah C.L. and Rege J.E.O. 1996. Gudali Cattle of West and Central Africa. *FAO Animal Genetic Resources Information Bulletin.* 17:159-170.

18. Ngere, L.O. 1985. The Gudali OF Nigeria – Review. Animal Genetic Resources In Africa – High potential and endangered livestock. Proceedings of 2nd OAU Expert Committee Meeting, 24-28 November 1983, Bulawayo, Zimbabwe, pp. 77-81.

19. Cheesbrough, M . (2006). Giemsa staining technique district laboratory practice in tropical countries, part I. Cambridge university press. U.K p.p. 248

20. Ajayi, S.A., J.P.fabiyi and I.Umo (1983): clinical Anaplasmosis and Babesiosis in friesian cattle. *World animal review, 36,68.*

21. Enwezor FNC. Umoh JU, Esievo KAN, Halid I. Zaria LT., Anere JI (2009). Survey of Bovine Trypanosomosis in the Kachia Grazing Reserve, Kaduna State, Nigeria. *Veterinary parasitology, 159: 121-125*.

22. Obi T.U and V.O Anosa (2010). Haematological Studies and Domestic animals in Nigeria IV Clinicolohaematological features of Bovine Trypanosomiasis, Theileriasis, anaplasmosis, Eperythrozoonosis and Helminthiasis, Ziblatt *Vet. Med. B27* pp. 789-797

23. Leeflang P. and A.A. Ilemobade, (2010). Tick Borne Diseases of Domestic Animals in Northern Nigeria II. Research Summary. 1966-1976. *Trop. Anim. Hlth. Prod*. 9, pp. 211-218.