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Full Length Research Paper

Haemoparasites and Haematological Parameters of Slaughtered Ruminants and Pigs at Bodija Abattoir, Ibadan, Nigeria

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ABSTRACT

Haemoparasites of animals reduce livestock productivity and could lead to high mortality. This study aims at determining the prevalence of haemoparasites and blood parameters of ruminants and pigs slaughtered at Bodija abattoir, Ibadan. A total of three hundred and eighty two blood samples were collected from cattle, sheep, goats and pigs at the abattoir between the months of May and October, 2012. The blood samples were examined for haemoparasites by making thin blood smear and staining with Giemsa's stain. An overall prevalence of 5.0 and 4.92% was observed in ruminants and pigs respectively. Three (3) genera of haemoparasites (*Trypanosoma spp*, *Anaplasma spp* and *Onchocera spp*) were observed in ruminants, while only *Trypanosoma spp* was observed in pigs. The prevalence showed a decreasing trend with age in ruminants, while infection was higher in adult pigs (2.81%) than in the growers (1.41%) and weaners (0.7%). The infection was higher in females than in males in all the animal species. There was no significant difference ($P > 0.05$) in the mean packed cell volume (PCV) of animals with mixed or single infection. The total white blood cell count (TWBC) of the infected and uninfected sheep/goat was significantly difference ($P < 0.05$), while that of pigs was not. This study showed a low prevalence of haemoparasites in slaughtered animals at Bodija abattoir, however strategic measures should be taken to control the vectors involve in their transmission.

Keywords: Haemoparasites, food animal, epidemiology, haematology

INTRODUCTION

The benefits derived from cattle, sheep, goats and pigs in the tropics are far below the expected due mainly to low productivity linked to numerous factors, of which disease is the most important (Akerejola *et al.*, 1979). These animals serve as sources of income, protein and also provide farm yard manure.

Cattle, sheep and goats in sub-Saharan Africa may be infected with a wide variety of parasites most importantly vector-borne prokaryotic and eukaryotic

haemoparasites such as the Rickettsiae: *Anaplasma* and *Ehrlichia (Cowdria)*, and the protozoan parasites: *Theileria*, *Babesia* and *Trypanosoma* (Bell-Sakyi *et al.*, 2004; Okaiyeto *et al.*, 2008). The tropical environment is for various reasons suitable for the development of these parasitic diseases (Payne, 1990).

Haemoparasites have generally been shown to cause destruction of red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility (Akande *et al.*, 2010). Parasitic diseases have debilitating impact on human and animal health worldwide particularly in

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developing countries (Ellis *et al.*, 2003). The direct losses caused by the parasites are attributed to acute illness and death, premature slaughter and rejection of some body parts at meat inspection. Indirect losses include the reduction of productive potential such as decreased growth rate, weight loss in young growing animal and late maturity of slaughter stock (Hansen and Perry, 1994). Farmers may not appreciate the effects of these haemoparasites on their animals, perhaps due to the subclinical nature of presentation and chronic nature on the affected animals (Jatau *et al.*, 2011).

Porcine trypanosomosis is not only of economic importance in pig rearing but also has important public health repercussions. Pigs can be carriers of *Trypanosoma brucei gambiense* and *T. brucei rhodesiense* and thus be the reservoir of trypanosome species that can infect man (Gibson *et al.* 1978). Pigs like other domestic livestock are infected with several species of trypanosomes. The trypanosomes that cause infections in pigs are *Trypanosoma simiae*, *Trypanosoma brucei*, *Trypanosoma congolense* and *Trypanosoma suis* (Losos, 1986; Sekoni, 1994; Seifert, 1996). *T. brucei* is a major cause of subclinical and chronic trypanosomosis (Omeke, 1989) causing the following clinical signs: pyrexia, ataxia, anaemia and anoestrus. Similarly, during an outbreak of *T. b. brucei* in pigs in Nigeria (Onah & Uzoukwu, 1991) pigs show pyrexia, anorexia, severe emaciation, weight loss, anaemia and low PCV values.

The high incidence of haemoparasites in the tropics could be as a result of the favourable environmental conditions that promote the survival and proliferation of the arthropod vectors responsible for the transmission of these parasites (Adejinmi *et al.*, 2004). Adejinmi *et al.* (2004) reported anaemia as a reliable indicator for the severity of haemoparasitic infections. However, the effect of haemoparasites on the mean PCV is more deleterious in younger animals (Enwezor *et al.*, 2009). The ability of trypanosome species alone or in combination with other parasites to cause a significant reduction of PCV of infected animals lend credence to the fact that animal Trypanosomosis is still a serious challenge to profitable production in sub Saharan Africa (Enwezor *et al.*, 2009).

Proper understanding of the epidemiology of disease causing agents is a prerequisite for the rational design of effective preventive and control programme against the disease. Although studies have been carried out with respect to epidemiology of blood parasitism in ruminants in Nigeria, most of the studies are confined to cattle hence the need for extension of such studies to small ruminants and pigs. Therefore this study was carried out to elucidate the prevalence and significance

of haemoparasites in cattle, sheep, goats and pigs slaughtered at the Bodija abattoir Ibadan.

MATERIALS AND METHODS

Study area

The study was conducted at the Bodija Municipal Abattoir, Ibadan (the biggest abattoir in Oyo state). Animals slaughtered in Bodija abattoir alone accounts for 65.93% of the total animals slaughtered in Oyo state (Abiola, 1995). Ibadan is the largest city in West Africa and the second largest in Africa with an estimated population of over 2,550,593 million, 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 (Filani *et al.*, 1994). 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.

Sample collection

Blood were collected from 240 ruminants (Cattle, Sheep and Goats) and 142 pigs of both sexes and different ages between May and October 2012. About 5ml of blood were collected from the severed jugular vein of each animal into ethylenediaminetetra acetic acid (EDTA) bottle and the samples were transported to the Veterinary Parasitology Laboratory of the Faculty of Veterinary Medicine, University of Ibadan for parasitological and haematological analyses within one hour of collection.

Sample preparation

A drop of blood was placed on a grease free glass slide and a thin blood smear was prepared from each blood sample, air-dried, fixed in methanol for 2-3 minutes, stained in 10% Giemsa's stain and rinsed in buffered water according to Jain (1986). The smears were examined at X100 magnification (oil immersion) on an Olympus Microscope.

Blood sample was introduced into a plain glass microhaematocrit tube, one end of the tube was sealed using plasticine and the tubes were spun for 5 min at 1500 rev in a microhaematocrit centrifuge (Hawksley, England). Packed Cell Volume (PCV) was determined using a haematocrit reader (Hawksley, England) and Total White Blood Cell count (TWBC) was estimated using the Neubauer Counting Chamber (Schalm *et al.*, 1975).

Data analysis

Data was analyzed using simple percentages and student t-test was used to analyze the results of the PCV and

TWBC of the infected and non-infected animals. Significant level was set at (P< 0.05).

RESULTS

Out of 240 ruminant blood samples examined, 12 were positive for different haemoparasites representing an overall prevalence of 5%. Of the 141 cattle tested, 9 (6.38%) were positive while 3 (3.03%) of the sheep and goats were positive. Three genera of Haemoparasites (*Trypanosoma spp*, *Anaplasma spp* and *Onchocerca spp.*) were observed in this study. Two species of *Trypanosome* (*T. brucei* and *T. vivax*) were identified morphologically. Two species of *Anaplasma* (*A. marginale* and *A. central*) were also identified while *Onchocerca armillata* was the only Microfilaria observed (Table 1).

The prevalence of haemoparasite in cattle, sheep and goat is presented in Table 1 and 2. The highest infection rate of 3 (2.13%) was observed in age group < 1 ½ and 2 – 2 ½ years while minimum infection of 1 (0.71%) was observed in cattle > 4years old. However, in sheep and goats, the highest infection of 2 (2.02%) was observed in age group 1- 1 ½ years while there was no infection in age groups of < 1year, 3 – 3 ½ and > 4years. The

prevalence of the infection in cattle was higher in the female 7 (4.96%) than in the male 2 (1.42%). In a similar vein, the prevalence in sheep and goat was higher in female 2 (2.02%) than in male 1 (1.01%).

Out of 142 pig blood samples examined, 7 were positive for haemoparasites principally *Trypanosome spp.* with an overall prevalence of 4.93%. Of the 7 positive samples, 5 were *Trypanosoma simiae* and 2 were *Trypanosoma brucei* (Table 3). A prevalence of 2.81% was observed in the adult while 0.7% was observed in weaner pigs. In the same vein, a prevalence of 1.4% was observed in the grower pigs. *T. simiae* was more prevalent in the adult pigs than *T. brucei* while the prevalence of *T. simiae* and *T. brucei* was the same in the grower pigs. Only *T. simiae* was observed in the weaner pigs. The prevalence was higher in the female than in the male. Of the 96 female examined, 6 were positive while only 1 was positive out of 46 male examined. *Trypanosoma simiae* was more prevalent in the female accounting for 4 out of 6 while 2 pigs were infected with *T. brucei*. The mean PCV values of 26.4±5.77 and 32.411±6.416 was observed infected and uninfected cattle respectively, without a significant difference (P>0.05)

Table 1:
Prevalence of haemoparasites of cattle according to age and sex of animals

Age of cattle	No tested	No positive (%)	<i>T. brucei</i>	<i>T. vivax</i>	<i>A. marginale</i>	<i>A. centrale</i>	<i>O. armillata</i>
< 1 1/2	18	3 (2.13)	2	2	-	-	-
2 - 2 1/2	15	3 (2.13)	2	-	1	1	-
3 - 3 1/2	43	2 (1.42)	1	1	-	-	-
> 4	65	1 (0.71)	-	-	-	-	-
Total	141	9 (6.38)	-	-	-	-	1
Sex of cattle							
Male	49	2 (1.42)	2	-	-	-	-
Female	92	7 (4.96)	3	3	1	1	1
Total	141	9(6.38)	5	3	1	1	1

Table 2:
Prevalence of haemoparasites according to age and sex in sheep and goats

Age of sheep and goat	No tested	No positive (%)	<i>T. brucei</i>	<i>T. vivax</i>
< 1	21	0 (0)	-	-
1 - 1 1/2	5	2 (2.02)	2	-
2 - 2 1/2	10	1 (1.01)	-	1
3 – 3 1/2	18	0 (0)	-	-
> 4	45	0 (0)	-	-
Total	99	3 (3.03)	-	-
Sex of sheep/goats				
Male	Male	48	1 (1.01)	-
Female	female	51	2 (2.02)	-
Total		99	3 (3.03)	-

There was also no significant difference between the mean PCV of infected and uninfected sheep and goats, with mean values of 15.333 ± 7.234 and 32.411 ± 6.416 respectively. The infection generally shows a decreasing trend with age in cattle, sheep and goats. The mean TWBC value (8544.4 ± 2562.3) of the infected cattle was significantly higher ($P < 0.05$) compared to the mean value (9110.2 ± 9118.6) of the uninfected cattle. However in sheep and goats, the mean TWBC value (14533.3 ± 7259.02) of the infected animals was not significantly different ($P > 0.05$) compared to the mean value (9923.3 ± 4890.5) for the uninfected animals.

The PCV of the infected pigs was non-significantly lower (32.143 ± 3.9761) than that of the uninfected pigs (36.514 ± 9.2722), while the TWBC count was non-significantly higher (11634.0 ± 7189.9) in the infected animals than the uninfected animals (8700.0 ± 6137.6),

DISCUSSION

Haemoparasitism is one of the major constraints to livestock productivity in Sub-saharan Africa, hence its prevalence and control is very important. The overall prevalence of (5.0 % in ruminants and 4.93% in pigs) haemoparasites in this study is comparable to earlier reports in other part of Nigeria (Ameen *et al* 2008). The low prevalence of haemoparasites could be due to the regular use of chemoprophylaxis and acaricides by small scale farmer. However the regular use of drugs and acaricides might lead to development of drug resistance as well as presence of drug residue in meat if withdrawal period is not observed before slaughtering. Trypanosomes (*T. brucei*) were the most commonly encountered haemoparasites in ruminants and pigs; contrary to the report of higher prevalence (4.1%) of *T. congolense* in cattle in Ogbomoso area of Oyo State (Ameen *et al.*, 2008). The prevalence of Anaplasma and Microfilaria of *Onchocerca spp.* was low; this also could be due to the improvement in the husbandry system, better veterinary care and climate change.

The prevalence of haemoparasites in ruminants decreased with increasing age; which could be as a result of immunity acquired from previous infection. The prevalence was generally higher in females than male animals in all the species of animal. This could be due to the stress of breeding, milking and cyclical hormonal changes in the female.

Lower prevalence of haemoprotozoan disease in pigs compare to previous studies (Dipeolu *et al.*, 1982) might be due to random sampling rather than selection of clinically susceptible pig. However, climatic condition, breed, exposure of vectors and age of the animals might contribute to this low prevalence. The prevalence was higher in the female than in the male. This could be due to the fact that they were kept longer for breeding. The prevalence was higher in the adult pigs than in the young. This is also similar to the

observation of Kamani *et al.*, (2010) who reported that adult animals are more readily susceptible to trypanosomosis than the younger ones.

The observed anaemia characterized by low mean PCV values in all the categories of infected animals suggest that the parasitic infection could be the cause of anaemia and that Trypanosomes are typically responsible as the most commonly encountered in this study. The anaemia is as a result of haemolysis of the red blood cell which is typical of the trypanosomes. However, it is known that most of blood protozoan parasites cause anemia by inducing erythrophagocytosis (Anosa & Kanelo, 1983b). Adejinmi *et al.*, (2004) reported anaemia as a reliable indicator of severity of haemoparasitic infection. Therefore, all the haemoparasites is associated with significant ($P < 0.05$) reduction in the mean PCV in infected animals. However, the effect of the parasites on the mean PCV was more deleterious in younger animals than adult as earlier observed by Enwezor *et al.* (2009). The TWBC of the infected cattle was lower but higher in infected sheep and goat. The increase in the TWBC in the sheep, goats and pigs is as a result of eosinophilia which is associated with parasitic infection while the decrease in cattle may be as a result of poor nutrition and other concurrent infection that might have led to the exhaustion of the immune system.

Conclusion

The result of this study clearly shows that 5.0% of the ruminants and 4.93% of the pigs slaughtered in the study area were infected with haemoparasites. The effect is usually manifested in production losses in the form of diminution of productive potential such as decreased growth rate in calves, lambs, kids and piglets, late maturity, weight loss, still birth and increased susceptibility to other diseases. There is therefore a need for prevention and control strategy against these parasites of food animal to enhance food security.

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