# Prevalence and Significance of Haemoparasitic Infections of Cattle in North- Central, Nigeria

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Abstract

The prevalence and significance of hemoparasites of cattle from north-central Nigeria was determined using diagnostic records from Parasitology Division, National Veterinary Research Institute (NVRI) Vom, from May 2006 to April 2008. A total of 637 blood samples from cattle from four states (Plateau, Bauchi, Nasarawa and Kaduna) of Nigeria in anticoagulant were submitted to the laboratory for parasitological diagnosis. Giemsa stained thin blood smears were examined for hemoparasites. Packed cell volume (PCV) for each sample was determined and Hematocrit centrifuge technique (HCT) was used to determine the presence of motile parasites. An overall prevalence of 25.7% was recorded for all samples examined. Babesia bigemina and B.bovis accounted for 16.0%, followed by Theileria mutans (3.1%), Trypanosoma spp (*T.vivax* and T. congolense) (2.8%), Anaplasma marginale (1.9%), Microfilaria (1.4%). The hemoparasites identified alone or in combination with others had a significant ($P<0.05$) effect on the mean PCV of infected animals. Similarly, hemoparasites infection in young animals as well as during the dry season resulted in significant ($P<0.05$) reduction of PCV values. The result of this study shows these hemoparasites are endemic in cattle in the study area which may result in serious disease conditions when such animals are subjected to stressful condition.

**Keywords**: Prevalence, Significance, hemoparasites, cattle, Nigeria.

## Introduction

Cattle in Nigeria may be infected with a wide variety of vector-borne hemoparasites (Callow, 1978, Swallow, 2000). The most economically important genera are the trypanosomes (Trypanosoma vivax, congolense and brucei), Babesia (Babesia bigemina, B.bovis) Anaplasma and Ehrlichia (Cowdria), and to a less extent Theileria (*Theileria parva* and *T.veilifera*) (Leeflang and Ileomabade 1977). Some hemoparasites species are only evident when the host is undergoing a clinical response to infection, while other members of the same genera may be easily seen in blood smears from apparently healthy animals (Luckins, 1992). 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 (Ajayi et.al 1983; FAO, 1984; Young et al., 1988, Bell-sakyi et al, 2004).Blood samples submitted to the diagnostic laboratory Parasitology Department, National Veterinary Research Institute Vom were screened for hemoparasites. The aim of this report is to provide information on the prevalence and significance of hemoparasites of cattle in Guinea Savanna region of Nigeria.

## Material and Methods

**Blood samples**: Anticoagulated blood samples from cattle were submitted to the Parasitology laboratory for diagnosis. Six hundred and thirty-seven blood samples submitted from May 2006 to April 2007 were processed and examined for different hemoparasites. The samples submitted were from cattle raised under extensive and semi-intensive management system from parts of Plateau, Bauchi, Kaduna and Nasarawa states of Nigeria.

A thin blood smear was prepared from each blood sample, air-dried, fixed in methanol for 2–3 min, stained in 5% Giemsa stain with added Azur II (2 g/l of undiluted stain) and rinsed in buffered water.

The smears were examined at ×1000 magnification (oil immersion) on a Nikon microscope; at least 50 fields were searched per slide. Presence of hemoparasites was recorded; identification was carried out to genus and, where possible, species level. Blood from each sample was introduced into a plain glass microhaematocrit tube, one end of the tube was sealed using molten candle wax or plasticin, and the tubes were spun for 5 min at 13000×g in a Microhaematocrit centrifuge (Hawksley, England). Packed Cell Volume (PCV) was measured using a

haematocrit reader (Hawksley, England) and the buffy coat examined for motile blood parasites.

## Results

### Prevalence of haemoparasites.

A total of 164 samples of the 637 blood samples examined were positive for different hemoparasites, representing 25.7% prevalence. Haemoparasites of five genera were observed in this study – Anaplasma, Babesia, Trypanosomes, Microfilariae and Theileria. Based on morphological characteristics and epidemiological considerations, the Babesia in bovine blood smears were identified as *B. bigemina* (large, pleomorphic piroplasms) and *B.bovis* (small piroplasms aligned at obtuse angle) (Purnel 1981; Soulsby 1982) and the Theileria species were identified as *T. mutans* (large, pleomorphic, mainly oval piroplasms) (Norval et al., 1992). The trypanosoma species were identified as *T.vivax, T.congolense* and *T.theileri* according to morphology and movement in wet mount or HCT (Soulsby 1982). Anaplasma species was identified as A. marginale (Uilenberg 1982).

Babesia species (*B.bigemina and B.bovis*) as a single infection accounted for 63.0% of the positive samples. Others are *Theileria mutans* (12%); Trypanosoma spp (8%); *Anaplasma marginale* (9%); Microfilaria (3%) while mixed infections accounts for 5.0% .

More samples from female (62.2%) than male (37.8%), adult (57.1%) than young (42.9%) and local (76.1%) than exotic (23.9%) animals were submitted to the laboratory during the period under review. The infection rate shows a decreasing trend of 38.1%; 36.3%; 29.6%; 26.2%; 14.5% and 8.7% in female; adult; exotic; local; young and male animals respectively .

### PCV Values

The mean PCV values of 28 ±7 (range from 14-50 %) and 33 ± 7 (range 22-55 %) for animals with one or more parasites and non parasitized animals respectively. Samples parasitized by trypanosomes alone or in combination with other parasites had the lowest mean PCV of 25 ± 5, followed by 26 ± 4 in samples with Babesia species alone or in combination with Microfilariae.

The mean PCV of 30±7 and 29± 6 were recorded for parasitized exotic and local animals respectively. The mean PCV of parasitized animals was significantly lower ($P<0.05$) than those of non parasitized animals during dry season. The mean PCV of non parasitized exotic cattle was significantly higher than that of non parasitized local breeds (Table 1).

## Discussion

The present study confirms the reports of previous workers on the range of haemoparasites found in cattle in Nigeria (Obi and Anosa, 1980; Leeflang P and A.A. Ilemobade, 1977; Ajayi,S.A.et.al 1983; Enwezor et.al,2009) . The infection rate of 25.7% by hemoparasites reported in this study suggests a continuous challenge by parasites and the existence of carrier state in most animals.

Babesia species (*B.bigemina* or *B.bovis*) alone or in combination with other parasites accounts for most of the parasites seen, followed by *Theileria mutans*. This is in contrast to the work of Bell-Sakyi et.al (2004) who observed a reverse trend in a survey conducted in livestock in Ghana. The presence of trypanosomes in 8.0% of positive samples was similar to the prevalence of 8.4% by Enwezor et al, (2009) in a grazing reserve in Kaduna state, Nigeria. *Theileria mutans* is usually of low pathogenicity, however, fatal infections have been reported. It appears to be relatively common in cattle examined and can be attributed to relative abundance of the tick vector, Amblyomma variegatum in the study area (Walker et al, 2003). *Anaplasma marginale* was present in 9% of positive samples which is lower than the earlier report of Obi and Anosa (1980). Microfilaria was detected in 3% of animals examined mostly adult Zebu cattle raised under pastoral or semi intensive management system.

The prevalence of hemoparasitism was generally higher in female than male animals possible due to the fact that females are kept much longer for breeding and milk production purposes. The lower prevalence in young animals compared to adults can be attributed to restricted grazing of young animals which tends to reduce their chance of contact with the vectors of these diseases. However, the effect of the parasites on the Mean PCV is more deleterious in younger animals as earlier reported (Enwezor et.al, 2009). This calls for improvement in the management of young animals especially the exotic breeds and their crosses. There was significant difference between the prevalence in local and exotic breeds of cattle in this study, which can be attributed to the difference in management practice where the exotic breeds receives more attention in terms of ectoparasite control and feed supplementation. Most hemoparasites reported in this paper are known to replicate in the erythrocytes leading to hemolysis and anemia. All the hemoparasites mentioned singly or in combination led to significant ($P<0.05$) reduction in the Mean Packed Cell Volume (PCV) in infected animals except for infections due to *Anaplasma marginale* alone or in combination with Theileria mutans. The most deleterious effect on the mean PCV was seen in infection due to *Trypanosoma vivax* or *T.congolense* alone or in combination with Babesia species followed by infection due to Babesia alone or in combination with *Theileria mutans*. This study showed that *Theileria mutans* hitherto considered of low pathogenicity in cattle plays a

Table-1. Hemoparasites status and significance on mean PCV values for cattle.

| Hemoparasites status | No of animals | Mean PCV±SD | T-value | (probability )* |
|---|---|---|---|---|
| 1. No parasite seen | 465 | 33.019 ± 7.228 | ---- | ---- |
| 2. Trypanosoma species (alone or in combination with Babesia species) | 15 | 25.063 ± 5.97 | 4.01 | (P=0.0001) * |
| 3. Babesia species (alone or in combination with Theileria species and or A.marginale) | 107 | 29.22 ± 7.285 | 2.67 | (P=0.0125) * |
| 4. *Theileria mutans* (alone or in Combination with Babesia spp) | 21 | 27.39± 4.68 | 3.89 | (0.0003) * |
| 5. Anaplasma species | 12 | 29.625 ± 6.346 | 1.34 | (P=0.1862) |
| 6. (Microfilaria alone or in combination with Babesia) | 9 | 25.571 ± 4.3916 | 3.70 | (P=0.0038) |

significant role in causing anemia in animals when it occur in combination with other parasites. The ability of trypanosoma species alone or in combination with other parasites to cause a significant reduction of PCV of infected animals lends credence to the fact that animal trypanosomosis is still a serious challenge to profitable livestock production in sub Saharan Africa (Enwezor et al,2009;Swallow, 2000; Uilenberg 1992). The mean PCV of non infected animals was significantly higher (P<0.05) than that of animals with one or more parasite during the dry season, which may be related to compounding factors like scarcity of good quality feeds and stress of trekking experienced by most pastoral animals during the dry season in search of feeds (Obi and Anosa, 1980). The present report confirms the presence of carrier populations of hemoparasite-infected cattle which both serve as a reservoir of infection for tick-vectors and susceptible livestock, and has the potential for clinical relapse under stressful conditions. The pastoral management system of livestock where animals are under continuous challenge of vectors, high cost of acaricides and scarcity of feeds are compounding factors to efforts at controlling the vector-borne diseases. We recommend routine screening of animals for effective control strategies.

**Acknowledgements**

The authors are grateful to the Executive Director and Institute Management Committee, NVRI Vom and the following for technical assistance; Samson E; Pam M and Yusuf P.

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