

## Haematology of normal and trypanosome infected Muturu cattle in southeastern Nigeria

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### Abstract

Blood parameters of 23 Muturu cattle in a herd were studied between April and August 1998 by monthly examination of their blood samples. Fourteen of a total of 110 blood samples analysed (5 samples were unsuitable for analysis) were infected with *Trypanosoma vivax*. Data from the trypanosome-infected blood were included to evaluate the role of trypanosome infection. The blood values of infected animals were except for the erythrocyte indices of MCH and MCHC indistinguishable from those of uninfected animals. There were variations due to age and physiological status (open heifer, pregnant and lactating). Mean RBC and WBC count, MCV and monocyte count were lower in calves than older animals. Open heifers had higher mean RBC and monocyte count, and lower WBC count, MCV and MCH than pregnant and suckling cows.

**Keywords:** Haematology, muturu, trypanosomosis, Nigeria

### Introduction

Blood parameters are important indicators of health and disease in animals and have become indispensable in the diagnosis, treatment or prognosis of many diseases. Haematological parameters of many breeds of cattle in many countries of the world have been evaluated. Many of these parameters are known to be affected by such factors as age, sex, breed, season, and physiological status of the animal (Schalm *et al*, 1975; Noonan *et al*, 1978).

Among Nigerian breeds of cattle, the Muturu is the least studied in spite of their increasing importance in recent years (Ezekwe, 1992). Baseline data on the haematology of White Fulani (Zebu) and N'Dama breeds have been given by Oduye and Okunaiya (1971) and Saror and Coles (1973a & b). This study is an attempt to provide some baseline data to aid the

interpretation of haematological values of Muturu cattle in Nigeria.

### Materials and Methods

A herd of 23 Muturu cattle maintained at the University of Nigeria, Nsukka Agriculture Farm was used in this study. The animals consisted of calves, heifers, pregnant cows, lactating cows and few bull calves. They were kept under semi-intensive system of management; grazing twice daily between 8.30 to 12.0 hour and 14.30 to 18.0 hour on natural (*Imperata cylindrica*, *Penissetum spp.*, *Elusine indica* and *Andropogon spp*) and improved (*Panicum maximum* and *Cynodon dactylon*) pastures. No supplementation was offered as the period of study coincided with rainy season when pasture was ubiquitous. All the cattle were routinely sprayed using diazinon (Goldfleece, Bimeda,

Dublin, Ireland) at 2 weekly intervals and dewormed with levamisole (Wormsol, Jonfred (Nig) Ltd) at the start of the rains to control ecto-and endo-parasites respectively. Blood samples were collected monthly between April and August 1998 from all the animals in the herd. About 5ml of blood was collected from each animal into a Bijou bottle containing ethylenediamine tetraacetic acid (EDTA) and analysed for red blood cell (RBC) and Leucocyte (WBC) counts using the improved Neubauer haemocytometer method, differential counts using smears stained with Giemsa, packed cell volume (PCV) by microhaematocrit centrifugation method and haemoglobin (HB) concentration by the cyanomethaemoglobin method (Coles, 1986). Mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were computed from RBC, Hb and PCV values (Coles, 1986).

Buffy coat and Giemsa stained thin blood film was also used to screen for blood parasites. Data from the study were analysed statistically using SPSS for MS window Release 6.0 computer programme.

### **Result**

Of a total of 115 blood samples collected from the animals in the herd, only 110 could be analysed. The balance (5 samples) were discarded due to clots. Of the 110 samples analysed, trypanosomes were detected in 14 samples (one infected sample each in April, June and July respectively, none in May and 11 in August). All infected animals were treated with diminazene aceturate at a dose of 3.5mg/kg body weight intramuscularly before the collection of the next blood sample, thus ensuring that only new cases are detected each month. A categorization of the haematological data into trypanosome infected and non-infected animals are presented in Table 1.

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**Table 1:** Blood values (mean  $\pm$  SE) of trypanosome infected and uninfected Muturu cattle in Nigeria

Parameter	Infected	Uninfected
	N = 14	N = 96
AGE [Month]	25.07 $\pm$ 5.52	36.61 $\pm$ 2.32
RBC	7.23 $\pm$ 0.46	7.69 $\pm$ 0.17
HB	11.64 $\pm$ 0.42	11.22 $\pm$ 0.16
PCV	28.50 $\pm$ 1.11	29.23 $\pm$ 0.42
WBC	18.63 $\pm$ 1.65	18.77 $\pm$ 0.64
NEUTROPHILS	21.71 $\pm$ 2.17	19.96 $\pm$ 0.76
LYMPHOCYTES	68.64 $\pm$ 2.52	69.09 $\pm$ 0.91
EOSINOPHILS	6.50 $\pm$ 0.75	7.35 $\pm$ 0.43
MONOCYTES	3.00 $\pm$ 0.54	3.51 $\pm$ 0.21
BASOPHILS	0.14 $\pm$ 0.10	0.08 $\pm$ 0.03
MCH	16.83 $\pm$ 1.08 <sup>a</sup>	15.03 $\pm$ 0.30 <sup>b</sup>
MCV	40.64 $\pm$ 1.69	38.96 $\pm$ 0.61
MCHC	41.27 $\pm$ 1.73 <sup>c</sup>	38.60 $\pm$ 0.41 <sup>d</sup>

a, b.: significantly different ( $P < 0.05$ ); c, d: highly significantly different ( $P < 0.01$ )  
 N: Number of samples in each category .

Values obtained for infected and non-infected animals were similar except for the erythrocyte indices of MCH and MCHC which differed significantly (at least  $P < 0.05$ ). Also Lymphocytes and MCV showed a significant interactions ( $P < 0.05$ ) between physiological

status of the animals and parasite infection. The haematological data for non-infected animals are shown in Table 2 according to physiological status (Lactating, pregnancy and open heifer) and age.

**Table 2** Influence of age and Physiological Status on the blood values (mean  $\pm$  SE) of uninfected Muturu cattle in Nigeria

Parameter	Lactating N = 23	Pregnant N = 32	Open Heifers N = 20	Calves N = 21
AGE(Months)	57.83 $\pm$ 0.29	52.16 $\pm$ 2.14	18.65 $\pm$ 1.71	3.74 $\pm$ 0.29
RBC x 10 <sup>6</sup> /mm <sup>3</sup>	6.98 $\pm$ 0.25 <sup>a</sup>	7.44 $\pm$ 0.23 <sup>a</sup>	9.14 $\pm$ 0.54 <sup>b</sup>	7.91 $\pm$ 0.34 <sup>a</sup>
HB g/dl	10.60 $\pm$ 0.30	11.24 $\pm$ 0.32	11.38 $\pm$ 0.23	11.74 $\pm$ 0.30
PCV %	27.52 $\pm$ 0.70	29.06 $\pm$ 0.71	30.15 $\pm$ 1.03	30.48 $\pm$ 0.92
WBC x 10 <sup>3</sup> /mm <sup>3</sup>	23.43 $\pm$ 1.28 <sup>c</sup>	20.85 $\pm$ 0.84 <sup>c</sup>	17.38 $\pm$ 1.08 <sup>b</sup>	12.90 $\pm$ 1.18 <sup>a</sup>
NEUTROPHILS %	17.39 $\pm$ 1.49	20.16 $\pm$ 1.19	22.15 $\pm$ 2.31	20.38 $\pm$ 0.96
LYMPHOCYTES %	71.45 $\pm$ 1.71	67.03 $\pm$ 1.80	67.55 $\pm$ 2.14	71.14 $\pm$ 1.30
EOSINOPHILS %	6.96 $\pm$ 0.78	9.91 $\pm$ 0.93	5.70 $\pm$ 0.45	5.48 $\pm$ 0.47
MONOCYTES %	4.13 $\pm$ 0.39 <sup>b</sup>	2.61 $\pm$ 0.22 <sup>a</sup>	5.40 $\pm$ 0.77 <sup>c</sup>	2.84 $\pm$ 0.31 <sup>a</sup>
BASOPHILS %	0.09 $\pm$ 0.06	0.06 $\pm$ 0.04	0.15 $\pm$ 0.08	0.05 $\pm$ 0.05
MCH $\mu$ g	15.35 $\pm$ 0.40 <sup>f</sup>	15.49 $\pm$ 0.46 <sup>f</sup>	13.14 $\pm$ 0.66 <sup>e</sup>	14.93 $\pm$ 0.73 <sup>ef</sup>
MCV $\mu$ m	39.93 $\pm$ 0.94 <sup>ac</sup>	41.40 $\pm$ 1.15 <sup>a</sup>	34.62 $\pm$ 1.33 <sup>b</sup>	38.27 $\pm$ 1.10 <sup>c</sup>
MCHC %	38.52 $\pm$ 0.62	38.49 $\pm$ 0.49	38.63 $\pm$ 1.52	38.57 $\pm$ 0.57

N, number of samples in each category

<sup>a, b, c,</sup> means with different superscript for a parameter are highly significant (P< 0.01);

<sup>e, f,</sup> mean with different superscript for a parameter are significant (P < 0.05).

Physiological status did not have any significant effect (P>0.05) on the red cell values except RBC which was higher in open cows than in pregnant and lactating animals. There was also a significant effect on the erythrocyte indices of MCH and MCV. Open cows had significantly lower WBC counts and a higher monocyte percentage than lactating and pregnant cows.

Mean corpuscular volume (MCV) and RBC counts were significant for age (at least P<0.05). Mean corpuscular volume was higher in pregnant and lower in non-pregnant and non-suckling cows compared to calves; RBC being higher in non-pregnant and non-suckling cows than calves.

The other red cell values did not (P>0.05) vary with age. Calves recorded significantly (P<0.01) lower WBC and monocyte counts than older animals.

### Discussion

Normal blood values of cattle have been reported from many parts of the world including Nigeria. The mean RBC, PCV and Hb values in the Muturu cattle studied are well within the accepted normal values reported in many breeds of cattle (Schalm *et al.*, 1975). These Muturu values compare favourably with those of imported German Brown and Holstein under Nigerian tropical environment (Olusanya, 1979)

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and those of Nigerian Zebu cattle (White Fulani) and their crosses (Oduye and Okunaiya, 1971; Saror and Coles, 1973a). The Muturu, nevertheless displayed a lower PCV values than the White Fulani. In the contrary, Olusanya (1979) obtained higher PCV, Hb values for the Zebu than was recorded in this study for the Muturu. Also the PCV and RBC and Hb values of 29.2% and 11.2 gm% respectively recorded for the Muturu in this study are markedly lower than the values of 37.9% and 12.5 gm% reported for the N'Dama cattle by Oduye and Okunaiya (1971).

The mean total leucocyte count of the Muturu compares well with that of the N'Dama breed but is higher than the normal values for cattle generally including the White Fulani (Oduye and Okunaiya, 1971; Schalm *et al.*, 1975). The differential WBC count of the Muturu is in accordance with what has been reported for the White Fulani and N'Dama in Nigeria (Oduye and Okunaiya, 1971; Saror and Coles, 1973 a&b). Both Muturu and N'Dama cattle are reputed for their longevity and relative resistance to such endemic disease as trypanosomiasis and streptothrichosis to which other breeds such as white Fulani are susceptible. The high leucocyte and Hb levels common to both breeds have been linked to this resistance (Oduye and Okunaiya, 1971). Some workers have reported that PCV and Hb were high at birth but decline with advance in age (Holman, 1956; Coles, 1973a; Noonan *et al.*, 1978). However, in this work, there was no difference in these parameters between calves and older animals. It is to be noted that most of the changes observed in the blood picture of cattle with regard to age occurred within the first few weeks of life (Takahashi, *et al.*, 1982) unlike in this study where the calves aged 1-6 months (averaged 3.7 months). The age effect on the total leucocyte count agrees with the finding of Saror and Coles (1973a), it however, does not accord with that of Oduye and Okunaiya (1971) who did not find any significant difference in the leucocyte count between older and younger animals.

The finding that RBC was higher in open cows than pregnant and lactating cows agrees with other reports (Stürnimann *et al.*, 1974; Noonan *et al.*, 1978).

The presence of trypanosome parasites in the blood of cattle was expected to have a significant effect on the red cell values since anaemia is a cardinal symptom of the disease (ILRAD, 1990, 1990; Anosa, 1988). However, in this present study, similarity in blood values between infected and non-infected animals is a reflection of the trypanotolerant attribute of the Muturu cattle (d'Ieteren, 1994).

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