



## THE HAEMATOLOGICAL PARAMETERS OF DONKEYS IN SAHEL AGRO-ECOLOGICAL ZONE OF NIGERIA BASED ON SEX AND BREEDS

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### ABSTRACT

Forty-eight (48) apparently healthy adult donkeys comprising of 6 males and 6 females from four breeds of donkeys (White, Red/rust, Black and Grey donkeys) were randomly sampled at some part of the north eastern Nigeria (Borno and Yobe state). Blood samples were collected through the jugular vein and immediately transferred into EDTA bottles. All samples were kept on 4°C until the further laboratory analysis. The (PCV) were determined using micro-hematocrit method. The (RBC) and (WBC) counts were determined using the hemocytometer method. The platelets were also determined by using a peripheral blood smear method. The differentials white cell counts were determined on Leishman's stained slides using a microscope at x 100 magnification using meander method. The Red/rust had the highest PCV values of 41.75% followed by the Grey and White donkeys with the values of (38.75% and 38.41) while the Black donkeys had the lowest values of 33.16%. The black, red/rust and the grey donkeys had highest values of Hb with their values of 10.46g/dl, 10.08 g/dl and 9.40g/dl. The red/rust donkey had the highest values of RBC with the values of  $6.29 \times 10^{12}/L$ . The grey donkey had the highest values of WBC with the values of  $9.05 \times 10^9/L$ . The black donkey had the highest values of MCH with the value of 21.27pg. The grey donkey had the highest values of MCV (7.80fl). The black donkey had the highest values of MCHC 31.35 g/dl. The grey donkey had significant difference of MCV with the values of 7.80fl. The black donkey had the highest values of platelets  $109.83 \times 10^9/l$ . The Grey donkey had the highest values of eosinophils 11.83%. There was significant variation in the values of WBC and platelets for male donkeys as compared with females' donkeys with their values of  $8.77 \pm 0.11 \times 10^9/l$  and  $104.70 \pm 2.64\%$ . The females donkey had significant variation in Hb, RBC, MCH, MCHC and Eosinophils with their corresponding values of  $10.07 \pm 0.51g/dl$ ,  $6.16 \pm 0.12 \times 10^{12}/l$ ,  $17.64 \pm 0.98pg$ ,  $25.80 \pm 1.27g/dl$  and  $11.30 \pm 0.31\%$ . The variation discovered on the haematological parameters of donkeys based on sex and breed may be due to the wide range of variation of either the physiological condition, environmental factors, nutritional status, breeds, blood volume and physical activities.

**Keywords:** Breed, Donkey, Haematology, sex, Parameters

### INTRODUCTION

The Donkey (*Equus asinus*) is an odd-toed ungulate and the smallest species in the Equidae family (Grinder *et al.*, 2006). Donkeys in their nature are very friendly, intelligent, playful, and eager to learn and enjoy the company of humans. It is characteristically short-legged with exceptionally long ears (GOVS, 2005). Donkeys were domesticated in Africa about 5 000 years ago. They were used to satisfy human needs in transport, meat and work. Their numbers decreased with the advent of motor vehicles (Abdulla *et al.*, 2004, Kimuru *et al.*, 2011; Abdulla *et al.*, 2014). Donkeys contribute considerably to the agricultural economy mainly through their transport role; carrying loads, water and other forms of aids to man, and in other places donkey is used for farming and thus has become a necessity without which life would be very difficult to those people especially of the rural areas.

Haematological parameters plays an important role in clinical diagnosis of an animal. The diagnosis and treatments of disease depends on clinical examination and the hematological results, which reflect biological variation of breeds, sex and age of the farm animals. It is important to understand the haematological parameters of healthy donkeys, whose physiological parameters provide valuable information regarding the health status of the animal (Kral, and Suchy, 2000 and Mori *et al.*, 2003, 2004). The haematological profile is important in the determination of physiological changes occurring in the farm animals (Anderson *et al.*, 1999; Kumar and Pachaura, 2000). The objectives of this Study was to evaluate the haematological

parameters of donkeys in Sahel agro- ecological zone of Nigeria based on sex and breeds.

### MATERIALS AND METHODS

Forty-eight (48) apparently healthy adult donkeys comprising of 6 males and 6 females from four breeds of donkeys (White, Red/rust, Black and Grey donkeys) were randomly sampled at some part of the north eastern Nigeria (Borno and Yobe state). Blood samples were collected through the jugular vein and immediately transferred into EDTA bottles. All samples were kept at 4°C until the further laboratory analysis. The percentage pack cell volume (PCV) were determined using micro-hematocrit method (Coles, 1986; Sastry, 1989; Sirois 1995). The red blood cell (RBC) and white blood cells (WBC) counts were determined using the hemocytometer method. (Benjamin, 1961; Coles, 1986; Sastry, 1989; Sirois,1995). The platelets were also determined by using a peripheral blood smear method. The mean corpuscular volume (MCV), the mean corpuscular hemoglobin (MCH) and the mean corpuscular haemoglobin concentration (MCHC) were determined to define the size of red blood cells. The percentage of individual white cells differentials counts were determined (Neutrophils and Eosinophils) on Leishman's stained slides using a microscope at x 100 magnification using meander method (Coles, 1986).

### Data Analysis

The data obtained were subjected to Analysis of variance using SPSS version 20 and Duncan multiple ranged for mean separation.

## RESULTS AND DISCUSSIONS

Effects of breeds on haematological parameters of donkeys in Sahel agro-ecological parameters of donkeys are shown in Table 1. The result shows that the Red/rust (*Auraki*), White (*Fari*) and the Grey (*Idabari*) had significant ( $p < 0.05$ ) variation in pack cell volume (PCV) when compared to the Black (*Duni*) donkeys with their corresponding values of 41.75%, 38.41% and 38.75% respectively. The results obtained are within the ranged of (27 – 42%) as recorded by (Donkey Sanctuary, 2017). Lower values were recorded by Garba *et al.* (2015) these may be as a results of age variation of animal used in the experiments, physiology and environmental variation. The haemoglobin (Hb) values of the black, red/rust and the grey donkeys had highest values as compared with the white donkeys with their corresponding values of 10.46g/dl, 10.08 g/dl and 9.40g/dl respectively. The values recorded in the presents study are within the ranged (8.9- 14.7g/dl) except the white donkey which obtained lower value these may be as a results of its breed variation. The red/rust donkey had significant difference ( $p < 0.05$ ) in RBC as compared to the other breeds with the values of  $6.29 \times 10^{12}$  /L these values are within the range from (4.4 – 7.1) as recorded by (Donkey Sanctuary, 2017). Grey donkeys had the significant difference ( $p < 0.05$ ) of WBC with the values of

$9.05 \times 10^9$ /L followed by the black and white donkeys with the values of  $8.54 \times 10^9$ /l and  $8.25 \times 10^9$ /l respectively, all the values obtained in the present study were within the range as recorded by (6.2 –  $15 \times 10^9$ /l) (Donkey, Sanctuary, 2017). The black donkey had the highest values of MCH, followed by the red /rust donkey with the values of 21.27 pg and 16.01pg respectively. The mean corpuscular volume (MCV) the grey donkey had significant difference of 7.80fl) as compared to the other breeds. The black donkey had the highest values of MCHC (31.35g/dl) as compared with the other breeds, only black donkeys obtained the ranged values the other breeds are below the ranged values as reported by (31- 37 g/dl) (Donkey, Sanctuary, 2017). The platelets the black donkey had the highest values of  $109.83 \times 10^9$ /l followed by the red/rust donkey  $105.25 \times 10^9$ /l. The differential count there was no effects of breed on Neutrophils although, the values obtained in the present study are within the ranged (23- 59 %) as reported by (Donkey Sanctuary, 2017). There was significant variation in the values of eosinophils with Grey donkey which had highest values 11.83%, followed by the red/rust donkeys with the values of 11.25 % respectively. The variation obtained in the present study which may be as a results of their genetic makeup of the breeds, nutrition, and adaptation to the environment

**Table 1: Effects of breeds on hematological parameters of donkeys in Sahel Agro- ecological zone of Nigeria.**

Parameters /Breeds	White donkey	Red donkey	Black donkey	Grey donkey
PVC %	38.41 <sup>a</sup>	41.75 <sup>a</sup>	33.16 <sup>b</sup>	38.75 <sup>a</sup>
Hb 1g/dl	6.67 <sup>b</sup>	10.08 <sup>a</sup>	10.46 <sup>a</sup>	9.40 <sup>a</sup>
RBC $\times 10^{12}$ /L	5.66 <sup>ab</sup>	6.29 <sup>a</sup>	5.42 <sup>b</sup>	6.01 <sup>ab</sup>
WBC $\times 10^9$ /L	8.25 <sup>ab</sup>	7.74 <sup>c</sup>	8.54 <sup>ab</sup>	9.05 <sup>a</sup>
Platelet $\times 10^9$ /L	96.25 <sup>b</sup>	105.25 <sup>ab</sup>	109.83 <sup>a</sup>	96.91 <sup>b</sup>
MCH Pg	12.02 <sup>c</sup>	16.01 <sup>b</sup>	21.27 <sup>a</sup>	15.67 <sup>b</sup>
MCV fl	6.85 <sup>a</sup>	6.73 <sup>a</sup>	6.26 <sup>b</sup>	7.80 <sup>a</sup>
MCHC g/dl	18.53 <sup>b</sup>	24.05 <sup>b</sup>	31.35 <sup>a</sup>	24.01 <sup>b</sup>
Neutrophils %	27.58 <sup>a</sup>	26.24 <sup>a</sup>	27.58 <sup>a</sup>	26.50 <sup>a</sup>
Eosinophils %	8.78 <sup>c</sup>	11.25 <sup>ab</sup>	10.08 <sup>b</sup>	11.83 <sup>a</sup>

Where: Mean along the same row with different superscript were Significantly different ( $p < 0.05$ ), where= PCV= pack cell volume, Hb = haemoglobin value, RBC= red blood cell, WBC= white blood cells, MCH= mean corpuscular haemoglobin, MCV = mean corpuscular volume and MCVC= mean corpuscular volume concentration.

The effects of sex on haematological parameters of donkeys are shown in table 2. The effects of sex on hematological parameters of donkey discovered that there was significant variation ( $p < 0.05$ ) in the values of males and females donkeys. There was significant variation in the values of WBC and platelets for male donkeys as compared with females donkeys with their corresponding values of  $8.77 \pm 0.11$  and  $104.70 \pm 2.64$  as compared with females donkey respectively. The females had significant variation in Hb, RBC, MCH, MCHC and Eosinophils with their corresponding values of  $10.07 \pm 0.51$ g/dl,  $6.16 \pm 0.12 \times 10^{12}$ /l,  $17.64 \pm 0.98$ pg,  $25.80 \pm 1.27$ g/dl and  $11.30 \pm 0.31\%$  respectively. The presents study agreed with the findings of Etana *et al.* (2011) whom discovered variation in the values

of RBC, MCV and Neutrophils between male and females donkeys respectively. This presents findings disagree with the studied of Mori *et al.* (2004), Gul *et al.* (2007) and Zakari *et al.* (2016) on donkeys which reported that there was no sex difference in haematological parameters of donkeys. Zinkl *et al.* (1990) discovered that females donkeys had highest values of MCHC than males adult donkeys this findings agreed with the present study. Yakubu and Chafe (2008) discovered no variation in the percent PCV between males and females donkeys. The effects of sex on the haematological parameters of donkeys may be due to the wide range of variation of either the physiological condition, environmental factors, nutritional status, breeds, blood volume and physical activities.

**Table 2: Effects of sex on haematological and differential count of donkeys**

Parameters	Male $\pm$ SE	Females SE
PCV %	$37.54 \pm 1.17^{ns}$	$38.50 \pm 1.13^{ns}$
Hb g/dl	$8.24 \pm 0.63^b$	$10.07 \pm 0.51^a$
RBC $\times 10^{12}$ /L	$5.53 \pm 0.12^b$	$6.16 \pm 0.12^a$
WBC $\times 10^9$ /L	$8.77 \pm 0.11^a$	$8.02 \pm 0.25^b$
Platelet $\times 10^9$ /L	$104.70 \pm 2.64^a$	$99.41 \pm 2.17^b$
MCV fl	$6.79 \pm 0.89^{ns}$	$6.67 \pm 0.89^{ns}$
MCH pg	$14.84 \pm 1.05^b$	$17.64 \pm 0.98^a$

MCHC g/dl	23.18±1.85 <sup>b</sup>	25.80±1.27 <sup>a</sup>
Neutrophils %	27.37±0.40 <sup>ns</sup>	26.57±3.16 <sup>ns</sup>
Eosinophils %	9.67±0.40 <sup>b</sup>	11.30±0.31 <sup>a</sup>

Where: Mean along the same row with different superscript were Significantly different ( $p < 0.05$ ). where= PCV= pack cell volume, Hb = haemoglobin Value, RBC= red blood cell, WBC= white blood cells, MCH= mean corpuscular haemoglobin, MCV = mean corpuscular volume and MCVC= mean corpuscular volume concentration.

### The mean baseline of the haematological parameters of donkeys are shown in table 3

The descriptive statistics of haematological parameters of donkeys discovered that the Mean  $\pm$  SE of PCV of 38.02 $\pm$ 0.80 the valued recorded was higher than the results obtained by (Garba et al., 2015). The Mean  $\pm$  SE of Haemoglobin value obtained was 9.15  $\pm$ 0.42 g/dl the values obtained in the present study is within the ranged of (8.9-14.7 g/dl). The values of RBC obtained was 5.84  $\pm$ 0.11 which was within the ranged of (4.4-7.1  $\times 10^{12}/l$ ), the white blood cells obtained the values of 8.48 $\pm$ 0.89 $\times 10^9/l$  which was within the ranged of 6.2- 15  $\times 10^9/l$ . The platelet values discovered was 102 $\pm$ 1.73%

which was within the ranged of (95- 384%) as reported by (Donkey Sanctuary, 2017). The MCV, MCHC, Neutrophils and Eosinophils values in the presents study are all within the ranged of healthy donkeys (Donkey Sactuary, 2017 & Yakubu and Chafe, 2008). Highest standard deviation was observed in the percent Platelets while lower SD was obtained in MCV with their corresponding values of 11.98% and 0.61fl respectively. The highest values of standard deviation in platelet may implies that there was wide range of variation in the parameters and lack of organization in the values obtained. lower values of MCV may implies that there was organization and lower variation obtained.

**Table 3: The mean baseline of the hematological and differential count of donkeys in Sahel Agro- ecological zone of Nigeria**

Parameters	Mean $\pm$ Standard Error	Standard deviation SD
PCV %	38.02 $\pm$ 0.80	5.59
Hb g/dl	9.15 $\pm$ 0.42	2.93
RBC $\times 10^{12}/L$	5.84 $\pm$ 0.11	0.83
WBC $\times 10^9/L$	8.48 $\pm$ 0.14	1.01
Platelet $\times 10^9/L$	102 $\pm$ 1.73	0.61
MCV fl	6.73 $\pm$ 0.89	5.15
MCH pg	16.24 $\pm$ 0.74	7.80
MCHC g/dl	24.49 $\pm$ 1.12	11.98
Neutrophils %	26.97 $\pm$ 0.40	2.62
Eosinophils %	10.55 $\pm$ 0.40	1.94

### CONCLUSIONS

There existed significant variation in the effects of breeds on haematological parameters of donkeys. There was significant variation in the effect of sex on haematological parameters of donkeys. Highest standard deviation was observed in the percent Platelets while lower SD was obtained in MCV. Further study should be done in Nigeria for the effect of breeds on haematological parameters of donkeys.

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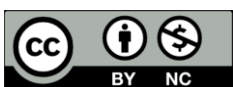
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