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*Full Length Research Paper*

# Assessment of breed, age and body condition score on hematology, blood chemistry and fecal parasitic load of indigenous bulls in Adamawa State, Nigeria

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**The blood chemistry of most common bull cattle breeds were randomly collected and assessed. Significant (P<0.01) breed variation on packed cell volume (PCV) was observed. Adamawa Gudali (AG) had highest (55.29±0.77%) PCV value followed by Rahaji (RJ) (46.83±0.80%) then Sokoto Gudali (SG) (46.19±0.78%) while Bunaji had the least (43.59±0.74%). Significant (P< 0.001) breed differences were also depicted on mean corpuscular volume (MCV) and mean corpuscular hemoglobin Concentration (MCHC). Highest (40.35±0.62×$10^{15}$ FL) MCV was observed on AG followed by RJ (36.57±0.65×$10^{15}$ FL) while similar values were recorded on BJ (33.95±0.6×$10^{15}$×FL) and SG (34.27±0.63×$10^{15}$FL). On MCHC, AG had the highest (25.94 ± 0.55g/dl) while similar values were observed on BJ (29.32±0.54g/dl), SG (28.75±0.56) and RJ (27.62±0.58g/dl). Significant (P<0.001) breed difference was pronounced on fecal parasitic egg count (FPEC) indicating SG with highest (18.21±0.68) value followed by RJ (16.35±0.71) while Ag (9.57±0.67) and BJ (10.21±0.66) had similar least values. Significant (P<0.001) age group difference was observed on PCV with similar highest values observed on age groups 1.5 to 2 years (48.45±0.66%),$2^{1}/_{2}$-3years(50.28±0.80%) and 3.5 to 4 years while age group ≥4years had least (45.76±0.66%) value. Significant (P<0.001) age group on FPEC with age group 2.5 to 3 years had highest (15.50±0.70) followed by age group 3.5 to 4 years (14.62±0.58) while similar least values were recorded on age groups 1.5 to 2 years (9.56±1.18) and ≥4 years (10.82±0.58). Significant (P<0.001) BCS difference was observed on PCV with highest (50.78±0.85%) value on $BCS_5$ followed by $BCS_4$ (49.18±0.60%) while similar values were recorded on $BSC_2$ (43.36±1.19%) and $BCS_3$ (45.48±0.72%). Significant (P<0.001) breed effect on FPEC was evident showing $BCS_2$ with highest (21.83±0.05) egg count followed $BCS_3$ (14.95±0.064) then $BCS_4$ (11.60±0.53), $BCS_5$ had the least (9.39±0.75).**

**Key words:** Cattle, breed, bulls, hematology, age, fecal parasitic load.

## INTRODUCTION

Blood cell counts have major clinical and diagnostic significance, indicating loss, destruction or under production of cells (anemia) and metabolic disorders. Hematological changes are routinely used to determine stresses due to environment, nutritional and/or pathological factors (Islam et al., 2004). Hematological values are also influenced by age, sex, and breed (Addass et al., 2010a) besides climate, geographical location, day length, nutritional states; others are physiological status of the animal (Doxy, 1983).

Rokwot, et al. (1997) and Saror and Coloes (1973) reported on White Fulani cattle and Addass et al. (2010b) on sheep reported higher erythrocytes, packed cell volume, hemoglobin concentration and mean cell volume. Addass et al. (2010b) reported age and sex variations on the health status of goats indicating higher infections on older animals than the young and female than male. Significant breed variations (Addass et al., 2010b) recorded on goats was said to be an indication of the extent of adaptation in an area which affect not only the

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**Table 1:** Mean ± SE by breed on some blood parameters of bull cattle.

| Variables | Breeds | | | | |
|---|---|---|---|---|---|
| | AG | BJ | RJ | SG | Sig. level |
| PCV (%) | 55.29 ± 0.77[a] | 43.59 ± 74c | 46.83 ± 0.80b | 46.19 ± 0.78b | *** |
| Hb (g/dl) | 13.48 ± 0.18a | 12.77 ± 0.18a | 12.84 ± 0.19a | 130.2 ± 0.19a | NS |
| RBC (x $10^{12}$) | 13.58 ± 0.19a | 13.13 ± 0.19a | 12.86 ± 0.20 | 13.47 ± 0.19a | NS |
| WBC (x$10^{9}$/L) | 8.64 ± 25a | 8.96 ± 0.024a | 8.49 ± 0.26a | 10.41 ± 0.25a | NS |
| MCV (x$10^{15}$/L) | 40.35 ± 0.62a | 33.95 ± 0.60c | 36.57 ± 065b | 34.27 ± 0.63c | *** |
| MCH (Pg) | 9.86 ± 0.14a | 9.75 ± 0.14a | 10.06 ± 0.15a | 9.69 ± 0.15a | NS |
| MCHC (g/dl) | 25.24 ± 0.55b | 29.32 ± 0.54a | 27.62 ± 0.58a | 28.75 ± 0.56a | *** |
| FPEC (Nos) | 9.57 ± 0.67c | 10.210.66c | 16.35 ± 71b | 18.21 ± 0.68a | *** |

Notes: AG = Adamawa Gudali, BJ = Bunaji, RJ = Rahaji, SG = Sokoto Gudali, PCV = Packed Cell Volume, Hb = Hemoglobin Court, RBC = Red Blood Cell Count, WBC = White Blood Cell Count, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Hemoglobin, MCHC = Mean Corpuscular Hemoglobin Concentration, FPEC = Faecal Parasitic Egg Count, NS =Not Significant. *** = P<0.001.

health status of the animals but also productivity. Significant age group and sex difference were reported (Addass et al., 2010b) on MCV, MCH and MCHC which were suggested to be an indication of physiological activeness of various age groups and males over females among goats breed.

Blood is an important and reliable medium for assessing the health status of individual animals (Oduye, 1976). Similar hematology values (Addass et al., 2010a) found among sheep breeds was reported to indicate similar health status and extent of adaptation among animals (Butswat and Zaharadeen, 1998). Sex differences on PCV and WBC was also reported (Addass et al., 2010a; Barlaw et al., 1987; Ismailor, 2005) among sheep breeds which might be an indication of the inherent superiority of males over females besides the degree of resistance of males to diseases than females.

It has been the intention of this study to come up with base line information on the hematology and the fecal parasitic load of the common bull cattle breeds in the area of study so as to highlight the effects of breed, age and body condition scores on hematology, blood chemistry and fecal parasitic loads. This might assist in selection of breeds, age group and body condition score suitable for reproduction among the bull cattle.

## MATERIALS AND METHODS

Blood samples were collected randomly from bulls of the four most common breeds of cattle as they come for slaughter from different background of husbandry conditions. Jugular vein was used for blood sample collections using 18 ml gauge syringe and two sets of well labeled bijou bottles; one set containing a pinch of ethylene diamine tetra acetic acid (EDTA) as anti-coagulant and the other set without EDTA. Samples with EDTA were used to determine PCV hemoglobin count (Hb), RBC and WBC.

Fecal samples were obtained directly from rectum using gloved hands and put into bijou bottles contain normal saline to maintain viability.

Dentition method as described by Philips (1977); Sastry and Thomas (1980) and Mc Nite (1983) were used for age determination of bulls. Body condition score (BCS) (Scale 0 - 5) as described by Jefferies (1961); Lowman et al. (1976) and Pullan (1978) taken before slaughter was adapted for the study.

### Blood parameter determination

Packed Cell Volume was determined using haematocrit reader. The packed cell volumes were determined using centrifuge machine and were recorded as a percentage of the total blood height. Hemoglobin estimation was carried out using Sahlis method. White and red blood cells counts were carried out using white and red blood cell diluting fluids. White and red blood cells counts were conducted by electronic microscope. The values for PVC, Hb and RBC count were used to calculate the MCV, MCH and MCHC which together are called red blood cell indices. Brumpt's sedimentation method was adapted for fecal microscopy.

### Data analysis

Data collected was subjected to analysis of variance (ANOVA) whereby breed, BCS and age were the major factors (fixed variables) while the other variables were the dependent factors. General Linear Model (GLM) of the Minitab Statistical Analysis System (SAS, 1987) was used to carry out the analysis.

## RESULTS AND DISCUSSION

Table 1 shows mean ± SE by breed on some blood parameters of bulls. Significant (P<0.001) breed differences was observed on PCV showing AG bull breed with highest (55.29±0.77%) value followed by RJ (46.83±0.80%) then SG (46.19±0.78%) while BJ bulls had the least (43.59 ± 0.74%). A non significant breed variation was observed on Hb, RBC, WBC and MCH. Significant (P<0.001) breed difference was depicted on MCV with AG showing highest (40.35±0.63×$10^{15}$ FL) values followed by RJ (36.57±0.65x$19^{15}$FL) while similar

**Table 2:** Mean ± SE by age groups on some blood parameters of bull cattle.

| Variables | Age groups | | | | |
|---|---|---|---|---|---|
| | 1.5 - 2years | 2.5 - 3 years | 3.5 - 4years | ≥4 year | Sig. level |
| PCV (%) | 48.45±1.34a | 50.28±0.80a | 47.51±0.66a | 45.76±0.66a | *** |
| Hb (g/dl) | 12.55±0.32a | 13.22±0.19a | 13.10±0.16a | 12.92±0.16a | NS |
| RBC (x $10^{12}$) | 13.58±0.33a | 13.55±0.20a | 13.17±0.16a | 13.05±0.16a | NS |
| WBC(x$10^9$/L) | 8.66±0.43b | 9.78±0.26a | 8.63±0.21b | 9.30±0.21b | * |
| MCV (x$10^{15}$/L) | 34.84±1.08a | 37.31±0.64a | 36.41±0.54a | 35.27±0.53a | NS |
| MCH (Pg) | 8.97±0.25b | 9.76±0.15a | 10.03±0.12a | 9.94±0.12a | * |
| MCHC (g/dl) | 26.45±0.97b | 26.81±0.58b | 28.08±0.48a | 28.82±0.48a | * |
| FPEC (Nos) | 9.56±1.18c | 15.50±0.70a | 14.62±0.58b | 10.82±0.58c | *** |

Notes: AG = Adamawa Gudali, BJ = Bunaji, RJ = Rahaji, SG = Sokoto Gudali, PCV = Packed Cell Volume, Hb = Hemoglobin Court, RBC = Red Blood Cell Count, WBC = White Blood Cell Count, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Hemoglobin, MCHC = Mean Corpuscular Hemoglobin Concentration, FPEC = Faecal Parasitic Egg Count, NS =Not Significant. *** = P<0.001.

**Table 3:** Means **±** SE by body condition score on some blood parameters of bull cattle

| Variables | Body Condition Score | | | | |
|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | Sig. Level |
| PCV (%) | 43.36 ± 1.19c | 45.48 ± 0.72c | 49.18 ± 0.60b | 50.78 ± 0.85a | *** |
| Hb (g/dl) | 11.29 ± 0..29d | 12.71 ± 0.17c | 13.33 ± 0.14b | 13.93 ± 0.21a | * |
| RBC (x $10^{12}$) | 11.85 ± 0.30c | 12.86 ± 0.18b | 13.65 ± 0.15a | 13.95 ± 0.21a | *** |
| WBC (x$10^9$/L) | 11.50 ± 0.39a | 9.93 ± 0.23b | 8.46 ± 0.19c | 8.00 ± 0.28c | *** |
| MCV (x$10^{15}$/L) | 36.60 ± 0.90a | 35.68 ± 0.49a | 35.96 ± 0.49a | 36.78 ± 0.69a | NS |
| MCH (Pg) | 9.52 ± 0.22a | 9.91 ± 0.14a | 9.74 ± 0.11a | 10.09 ± 0.16 | NS |
| MCHC (g/dl | 26.39 ± 0.86a | 28.54 ± 0.14a | 27.88 ± 0.44a | 27.67 ± 0.62a | NS |
| FPEC (Nos) | 21.83 ± 0.05d | 14.95 ± 0.64c | 11.60 ± 0.53b | 9.39 ± 0.75a | *** |

Notes: AG = Adamawa Gudali, BJ = Bunaji, RJ = Rahaji, SG = Sokoto Gudali, PCV = Packed Cell Volume, Hb = Hemoglobin Court, RBC = Red Blood Cell Count, WBC = White Blood Cell Count, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Hemoglobin, MCHC = Mean Corpuscular Hemoglobin Concentration, FPEC = Faecal Parasitic Egg Count, NS =Not Significant, *** = P<0.001.

least values were observed on BJ (33.95±0.60×$10^{15}$ FL) and SG (34.27±0.63×$10^{15}$ FL). Significant (P<0.001) breed differences were recorded on MCHC and FPEC of bulls. On MCHC, Similar highest values were observed on BJ (29. 32±0.5 g/dl), RJ (27.62±0.58 g/dl) and SG (28.75±0.56 g/dl) followed by least (25.24±0.55 g/dl) value on AG bulls. On FPEC, SG bulls had the highest (18.21±0.68) egg count followed by BJ (16.35±0.71 g/dl) while least similar values were recorded on BJ (10.21±0.66) and AG (9.57±0.67) bulls.

Shown on Table 2 are effects of age group on some blood parameters of bulls. Significant (P<0.001) age group differences was depicted on PVC showing Similar highest values on age groups 1.5 to 2 years (48.45±1.34%), 2.5 to 3 years (50.28±80% and 3.5 to 4 years (47.51±510.66%) while least value was rerecorded on age group ≥4years (45.76±0.666%). Non significant age group differences were observed on Hb, RBC, and MCV. Significant (P<0.05) age group difference was recorded on WBC with highest (9.78±0.26×$10^9$IL) value on bulls of age groups 2.5 to 3 years while similar least values were obtained in age groups 1.5 to 2 years (8.66±0.45×$10^9$/L) 3.5 to 4 years (8.63±0.21×$10^9$/L) and ≥ 4 years (9.30±0.21×$10^9$/L) age group. On MCH, significant (P<0.05) age group variation was pronounced with similar and highest values on age groups 2.5 to 3 years (9.76±0.15 Pg), 3.5 to 4 years (10.03±0.12 Pg) and × 4 years (9.94±0.12 pg) while least value was on age group 1.5 to 2 years (8.97±0.25 Pg). On MCHC, significant (P≤0.05) age group difference was also depicted. Highest and similar values were recorded on bulls of age groups 3.5 to 4years (28.08±0.48g/dl) and ≥4 years (28.82±0.48g/dl) while similar and least values on age groups 1.5 to 2 years 926.45±0.97 pg) and 2.5 to 3 years (26.81±0.58 pg) while similar and least counts were observed on age groups 1.5 to 2 years (9.56±1.18) and ≥ years (10.82 ±0.58).

Shown (Table 3) is the means ± SE by BCS on blood parameters of bulls. Significant (P<0.001) BCS difference was shown on PVC of bulls. Body condition Score of scale 5 had the highest (50.78±0.85%) PCV follow by $BCS_4$ (49.18±0.60%) while similar and least values were

observed on $BCS_3$ (45.48±0.72%) and $BCS_2$ (43.36±1.19%). On Hb, $BCS_5$ had highest (13.93±0.21/dl) followed by $BCS_4$ (13.33±0.14 g/dl) than $BCS_3$ (12.71±0.17gdl) while least value was recorded $BCS_2$ (11.29±0.29 g/dl).

Significant (P<0.001) BCS variations was recorded on RBC with highest similar values were observed on $BCS_5$ ($(13.95 \pm 0.21\times10^{12})$) and $BCS_4$ ($13.65\pm\times10^{12}$) followed by $BCS_3$ ($120.86\pm0.18\times10^{12}$) while least ($11.85\pm0.39\times10^{9}$/L) value on $BCS_2$. Significant BCS differences was also noticed on WBC with $BCS_2$ had highest ($11.50\pm0.30\times10^{9}$/l) followed by $BCS_3$ ($9.93\pm0.23\times10^{9}$/L) while similar and least values were noticed on $BCS_4$ ($8.46\pm0.19x10^{9}$/L) and $BCS_5$ ($8.00\pm0.28x10^{9}$/l). Non significant BCS differences were noted on MCV, MCH and MCHC. On FPEC however, significant (P<0.001) BCS effect was depicted. Highest (21.83±0.05) parasitic load was recorded on $BCS_2$ followed by $BCS_3$ (14.95±0.64) than $BCS_4$ (11.60±0.53) while $BCS_5$ had the least (9.39±0.75) load.

The significant bread differences recorded on PCV in this study agreed with the findings of Olayemi, et al. (2006) on white Fulani and Kuri breed. The non significant breed differences depicted on Hb, RBC, WBC and MCH has not agreed with the report of Olayemi and Oyewale (2002a) who reported significantly higher Hb, MCH and MCHC values on white Fulani than N'dama cattle. Also contrary to the findings of Olayemi et al. (2006) who found significant difference between Sokoto Gudali and white Fulani cattle. The significant breed variation in this study on Hb, RBC and WBC might indicate similar health status of the breed during the period of study. The significant breed differences on MCV, MCHC and FPEC in the study agreed with the findings of Olayemi et al. (2007) between Sokoto Gudali and White Fulani.

Contrary to the report of Vengust and Klinkon (2002) on fallow deer, a significant age group difference was depicted on PCV in the study with younger animals with higher values than the older bulls. The significant BCS variations observed in the study might be indications of animals with higher BCS are healthier than those with lower BCS. The relationship between WBC values and FPEC in the study seems to be reciprocal which might be a good preliminary assessment of health status of animals. Generally breed age group variations on blood parameters was noticed on PCV and FPEC.

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