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Haemato-Biochemical Findings of Indigenous Sheep Breeds in Mubi Adamawa State, Nigeria

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Abstract: Haematology of the most common indigenous sheep breeds in Mubi, was conducted for the period of six months. The animals were kept under different husbandry conditions from different farmers in Mubi and environment. The study was focused on the influence of breed, sex and age on the haematology of these common sheep breeds in the area so as to come up with the base line information on these animals. Significant ($P<0.05$) breed variations were observed on haemoglobin concentration (Hbc) indicating highest (45.43±1.34g/dl) values in West African dwarf sheep (WAD) while similar results were observed on Uda (UD) (41.02±1.08g/dl) Yankasa (YK) (41.54± 1.03g/dl) and Balami (BL) (42.12± 1.15g/dl) breeds. Significant ($P<0.05$) breed differences were depicted on mean corpuscular volume (MCV). Highest (2.98± 0.52fl) value was observed in WAD followed and similar values in UD (1.96± 0.34fl) and BM (2.33± 0.40fl) while least (1.81± 0.21fl) value was recorded in YK. Significant ($P<0.001$) age group differences were evident in Hbc, white blood cell count (WBC), blood serum protein (BSP), MCV and mean corpuscular haemoglobin (MCH). The WBC and BSP followed similar pattern of effect, showing highest values in the youngest ($1^1/_2$-2 year's age group) animals (15.06± 0.05x10^9/l and 69.88± 0.43g/l, respectively) while least values were observed in the oldest (≥4 years) (11.69±0.18x10^9/L and 63.81±0.50g/L, respectively). Sex effect was significant ($P<0.001$) for packed cell volume (PCV) and WBC with highest values in males (30.80±0.44% and 13.83±0.15x10^9/L, respectively. In conclusion, it was observed that the younger the animal, the more the resistant or healthier it is to diseases and that the older animals are more susceptible to diseases. Males are more resistant to diseases than the females in the studied sheep breeds.

Key words: Sheep · Haematology · Breed · Sex · Age

INTRODUCTION

Sheep is one of the first food producing animals to be domesticated and its relative preponderance of one space or the other in different part of the world may reflect climate or altitude difference and perhaps human cultural differences. Sheep have a life span of up to 20 years which enables it to pass on many of its traits to many generations and serve as a stock in research works [1]. Sheep is one of the domestic animals of the inhabitants of Mubi and they provide meat, money, hides, skin and farm yard manure. It has been reported that regardless of sex and climate, sheep and goat reared under traditional husbandry system have low haematological values compared to those kept under modern husbandry [2,3]. Low nutrition, stress, parturition and climatic factors greatly alter the blood values of sheep and goats [4]. Blood is an important reliable medium for assessing the health status of animals [5]. Blood helps to regulate body temperature to maintain a constant concentration of water and electrolyte in the cells to regulate the body hydrogen ion concentration and to defend against microorganism. Knowledge of blood indices enables scientists to know the various contributing functions of blood corpuscles, maintain homeostatic activity of blood and/or the whole animal's body physiology. Improvement of high yielding livestock requires an understanding of basic mechanism of homeostasis. Variation in blood indices among sheep and goat breeds in the tropics makes it hard to assess the health status of these animals. It therefore limits the efforts of breeders to come up with a uniform metabolic profile test. It is the intention of this study therefore to come up with discrete and direct haematological base line information for the most common indigenous sheep

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breed in Mubi so as to assist in the evaluation of basic management practices such as nutrition and diagnosis of health condition for increased production.

MATERIALS AND METHODS

The four most material breed of sheep in Mubi; Uda, Yankasa, Balami and the West African dwarf sheep coming from different husbandry backgrounds into Mubi animal central market were identified and randomly picked for the study. Besides these animals other materials include; haemoglobin tube, distilled water, solution of hydrochloric acid 0.1ml, counting chamber, capillary tube, sealant, haematocrit centrifuge, RBC pipette, microscope, burette reagent, test tubes, spectrophotometer, 5mls syringe and needle, sample bottles, RBC and WBC diluting fluid were used for the study.

Data Collection: Five (5mls) of blood was collected from an individual animal from the jugular vein following proper restraining by the owners and attendant with animal excitement. Blood collected was put into a vacutainer tubes containing ethylene diaminetetracetate (EDTA) and transported to the laboratory for onward analysis. Samples collected were randomly spread over sex, age, and breeds. Data collected include red blood cells, white blood cells, packed cell volume, haemoglobin concentration, blood serum protein, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCHb), were determined as described by Schalm, *et al.* [3] and Sarror and Schill [6].

Data Analysis: Data collected were subjected to analysis of variance and mean separation using Duncan's multiple range test [7].

RESULT

Significant breed variation was observed on Hbc ($P<0.01$) and MCV ($P<0.05$) among the sheep breeds under study. West African Dwarf sheep had the highest Hbc values (45.43±1.34g/dl) while similar values were recorded for the other breeds; UD (41.02±1.08g/dl), YK (41.54±1.03g/dl) and BM (42.12±1.15g/dl). For, MCV, WAD sheep had the highest value (2.98±0.52fl) just like its effect on Hbc. Similar and next values to WAD sheep on MCV were the results observed on UD (1.96±0.34fl) and BM (2.33±0.40fl) while least value (1.81±0.21fl) was recorded on YK breed. Non significant breed effect was observed for PCV, WBC, RBC, BSP, MCH and MCHC. Unlike the breed effect, age group effect was significant on most parameters studied. Significant ($P<0.01$) age group differences on WBC and BSP had similar pattern of effect with age group $1^1/_2$ - 2 years had highest values (15.06±0.05x10^9/L and 69.88±0.43g/L, respectively) followed by age group $2^1/_2$ - 3 years (14.18±0.12x10^9/L and

Table 1: Breed effect on some Haematological Parameters of some indigenous sheep in Mubi Adamawa State

Parameters	UD	YK	BM	WAD	
N	92	117	87	62	
PCV(P/S)	28.47±0.03^a	30.25±0.99	28.95±0.96	29.59±1.03	NS
Hb(g/dl)	41.02±1.08^b	41.54±1.03^b	42.12±1.15^b	45.43±1.34^a	**
WBC(x10^{12}/L)	13.51±0.26	13.48±0.29	13.26±0.28	13.61±0.23	NS
RBC(x10^{12}/L)	27.31±5.61	20.56±0.66	22.09±0.80	22.03±0.68	NS
BSP(g/L)	67.09±0.60	66.88±0.61	66.37±0.69	66.70±0.73	NS
MCV(fl)	1.96±0.34^{ab}	1.81±0.21^b	2.33±0.40^{ab}	2.98±0.52^a	*
MCH(pg)	1.97±0.09	2.09±0.08	1.97±0.08	2.20±0.14	NS
MCHC(g/dl)	17.81±2.58	27.88±5.26	20.70±3.74	18.97±2.31	NS

N= Number of observation, NS=Not Significant *= P<0.05, **= P<0.01, UD=Uda, YK=Yankasa, BM=Balami, WAD= West African Dwarf sheep, PCV= Packed Cell Volume, Hb= Haemoglobin concentration, WBC= White Blood Cell, RBC= Red Blood Cell, BSP= Blood Serum Protein, MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration
NOTE: Means in the same row with different super script(s) are significantly different

Table 2: Age effect on some Haematological parameters of some indigenous sheep

Parameters	$1^1/_2$–2 years	$2^1/_2$–3 years	$3^1/_2$–4 years	≥4 years	
N	48	87	104	119	
PCV(%)	20.09±1.06^b	29.17±0.52	30.91±0.61	28.09±1.32	NS
Hb(g/dl)	40.98±0.79^b	39.44±0.97^b	41.17±1.13^b	48.51±0.89	***
WBC(x10^{12}/L)	15.06±0.05^a	14.18±0.12^b	12.92±0.16^c	11.69±0.18^d	***
RBC(x10^{12}/L)	24.84±0.59	20.66±0.55	19.06±0.21	27.44±5.64	NS
BSP(g/L)	69.88±0.43^a	67.62±0.53^b	65.72±0.61^c	63.81±0.50^d	***
MCV(fl)	3.37±0.59^a	1.44±0.03^b	1.61±0.03^b	2.66±0.43^a	***
MCH(pg)	1.70±0.06^a	1.95±0.70^b	2.27±0.13^a	2.30±0.10^a	***
MCHC(g/dl)	26.08±4.93	18.83±3.42	21.19±4.14	19.26±1.52	NS

N= Number of observation, NS=Not Significant *= P<0.05, **= P<0.01, UD=Uda, YK=Yankasa, BM=Balami, WAD= West African Dwarf sheep, PCV= Packed Cell Volume, Hb= Haemoglobin concentration, WBC= White Blood Cell, RBC= Red Blood Cell, BSP= Blood Serum Protein, MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration
NOTE: Means in the same row with different super script(s) are significantly different

Table 3: Sex effect on some Haematological Parameters of some indigenous sheep

Parameters	Male	Female	Sex
N	161	197	
PCV(%)	30.80±0.44[a]	27.78±0.78[b]	***
Hb(g/dl)	42.61±0.90	42.44±0.74	NS
WBC(x10^{12}/L)	13.83±0.15[a]	13.09±0.1	***
RBC(x10^{12}/L)	24.22±2.78	21.75±0.54	NS
BSP(g/L)	66.85±0.45	66.66±0.48	NS
MCV(fl)	1.97±0.24	2.57±0.30	NS
MCH(pg)	2.06±0.60	2.05±0.08	NS
MCHC(g/dl)	19.35±2.53	23.39±2.72	NS

N= Number of observation, NS=Not Significant *= P<0.05, **= P<0.01, UD=Uda, YK=Yankasa, BM=Balami, WAD= West African Dwarf sheep, PCV= Packed Cell Volume, Hb= Haemoglobin concentration, WBC= White Blood Cell, RBC= Red Blood Cell, BSP= Blood Serum Protein, MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration
NOTE: Means in the same row with different super script(s) are significantly different

67.62±0.53g/L, respectively), then age group $3^1/_2$ – 4 years (12.92±0.16x10^9/L and 65.72±0.61g/L, respectively) while least value was on age group ≥4 years (11.69±0.18x10^9/L and 63.81±0.50g/L, respectively). Significant (P<0.001) age group effect on Hbc indicated highest (48.51±0.89g/dl) values on age group ≥4 years while similar values were observed on the other age groups; $1^1/_2$ - 2 years(40.98±0.79g/dl), $2^1/_2$ - 3 years (39.44±0.97g/dl) and $3^1/_2$ - 4 years (41.17±1.13g/dl). forMCV, significant (P<0.01) age group effect was observed highest on age groups $1^1/_2$ - 2 years (3.37±0.59fl) and ≥4 years (2.66±0.43fl) while similar least values was depicted on age groups $2^1/_2$ - 3 years (1.44±0.03fl) and $3^1/_2$ - 4 years (1.61±0.03fl). for MCH, similar and highest values was observed on age groups $3^1/_2$ - 4 and ≥4 years (2.27±0.13 pg and 2.30±0.10pg, respectively) while least and similar values also was recorded on age groups $1^1/_2$ - 2 and $2^1/_2$ - 3 years (1.70±0.06pg and 1.95±0.07pg in the same order). Sex effect just like the breed effect was significant (P<0.001) only on PCV and WBC with highest values recorded on males (30.80±0.44% and 13.83±0.15x10^9/L accordingly).

DISCISSION

The non significant breed effect for most studied parameters in this study might be attributed to similar health status of these breeds under investigation which agreed with the findings of Hawkey *et al.* [8] and Butswat and Zaharaddeen [9] who reported that variations in haematological parameters are pointers to various disease conditions even at subclinical level.

The significant age effect on WBC and BSP which followed similar pattern might have revealed the fact that younger animals had a better resistance to diseases than the aged animals among sheep breeds, which agreed with the report of Daramola *et al.* [10] and Tambuwal *et al.* [11] in sheep and goats. The report of Islam *et al.* [12] also substantiates same when working on local chicken in Bangladesh. The variations on the other parameters (Hbc, MCV and MCH) as affected by age might be assign or reference to the fact that age in sheep is an attributes to many factors like nutrition and predisposing factors to diseases. It is therefore becomes necessary to consider age in sheep husbandry to be a guide for handling sheep for a better productivity Barlaw, *et al.* [13].

The significant sex effect on PCV and WBC in this investigation between males and females of various sheep breeds in Mubi might be an indication of the inherent superiority of males over females among sheep breeds with regards to the degree of resistance to disease conditions Ismailov *et al.* [14].

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