

EFFECT OF SEASON ON HAEMATOLOGICAL PARAMETERS OF LAMBS

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ABSTRACT

This study was aimed at evaluating the effect of season on haematological profiles of lambs in Northern Guinea Savannah Zone of Nigeria. Blood samples (5ml) were collected from 76 lambs from the mixed flock of Balami, Uda, Yankasa sheep and their crosses through the jugular vein. The data obtained were analysed using General Linear Model procedure of SAS (SAS, 2004). Season had no effect ($P>0.05$) on all erythrocyte indices of lambs except mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH). Early dry season recorded higher MCV and MCH value than early wet season. The values for MCV were 28.51 ± 0.50 fl and 27.74 ± 0.40 fl for early dry and wet season, respectively while 9.34 ± 0.21 pg and 8.22 ± 0.16 pg were obtained respectively for MCH during early dry and wet season. Season affected ($P<0.05$) all the leucocyte indices except monocytes. Early wet season recorded higher values ($18.01\pm0.37 \times 10^9/\text{litre}$) for white blood cells (WBC) counts than early dry season ($11.68\pm0.4 \times 10^9/\text{litre}$). Effect of season on haematological profile of lambs from the studied population is more prominent on increased leukocyte counts during early wet season. It is therefore recommended that farmers should practice disease prevention protocols such as anti-helminthic drenching and deworming regularly, especially during raining season.

Keywords: Haematology, Season and Sheep

INTRODUCTION

The formation of blood cells (haemopoiesis) is determined by the interaction of multiple genes and involves cytokines and other protein factors (Munker *et al.*, 2007). Nutrition, age, sex, genetics, stress and transportation are all known to affect haematological and biochemical parameters observed between tropical and temperate animals (Ogunsanmi *et al.*, 1994). Interstitial, plasma and blood volumes are also reported by Mac Farlane (1975) to be influenced by age, sex, temperature, latitude, food quantity and quality, availability of water and salt, lactation and diseases. Fasae *et al.* (2011) demonstrated that environmental factors caused variation in haematological parameters of goats in different regions. Seasonal variations in air temperature are considered to be physiological stressors which affect the animal biological systems (El-Nouty *et al.*, 1990). These stressors were suggested (El-Nouty *et al.*, 1986) to exert significant influence on blood haematological characteristics of domestic animals. High environmental temperature has been identified as a factor which alters physiological parameters of birds (Belay and Teeter, 1993). Pack Cell Volume (PCV), Haemoglobin concentration (Hb), leucocyte counts (WBC) and Total Protein (TP) values are important for evaluation of normal physiological status of animal and for evaluation of the management practice, nutrition and diagnosis of health condition (Opara *et al.*, 2010). They are also good indices of livestock

adaptability to prevailing environmental conditions (Kaushish *et al.*, 1976). Seasonal variations in climatic parameters and its effect on quantity and quality of feeds can affect the dispositions of farm animals to succumb to some disease conditions. This study was therefore aimed at evaluating the effect of season on haematological profiles of lambs in Northern Guinea Savannah Zone of Nigeria.

MATERIALS AND METHODS

This study was conducted at the Sheep Project Unit of Small Ruminant Research Programme (SRRP) of National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika, Zaria. The institute is located in Northern Guinea Savannah zone of Nigeria on latitude $11^{\circ}12'16.78''\text{N}$ and longitude $7^{\circ}33'39.18''\text{E}$ (Figure 3.1) with an elevation of 691 metres above sea level. The climate of Zaria is grouped into late dry (January to March), early wet (April to June), late wet (July to September) and early dry (October to December). The experimental animals were reared using semi intensive system of management. Blood samples (5ml) were collected from 76 lambs from the mixed flock of Balami, Uda, Yankasa sheep (Northern Nigeria sheep) and their crosses through jugular veins. The blood samples were placed in ethylenediamine tetra-acetic acid (EDTA) tubes to prevent coagulation and were transported to laboratory for haematological analysis. Red Blood Cell (RBC) and White Blood Cell (WBC)

were determined using the haemocytometer. Packed cell volume (PCV) was estimated by micro haematocrit method and haemoglobin (Hb) concentration by the cyan methaemoglobin method. Mean corpuscular Volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated from the values of RBC, PCV and Hb (Schalm *et al.*, 1986). Thin bloodsmears were fixed in alcohol and stained with Giemsa stain for differential WBC counts. The data obtained were analysed using General Linear Model procedure of SAS (SAS, 2004). Duncan Multiple Range Test was used to separate means where there was significant difference.

RESULT AND DISCUSSION

Tables 1 and 2 showed the effect of season on haematological parameters of lambs of Northern

Nigerian sheep. Season had no effect ($P>0.05$) on all erythrocyte indices of lambs of Northern Nigerian sheep except mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH). Early dry season recorded higher MCV and MCH value than early wet season. The values for MCV were 28.51 ± 0.50 fl and 27.74 ± 0.40 fl for early dry and wet season, respectively while 9.34 ± 0.21 pg and 8.22 ± 0.16 pg were respectively for MCH during early dry and wet season (Table 1). Season significantly affected ($P<0.05$) all the leucocyte indices except monocytes (Table 2). Early wet season recorded higher values ($18.01\pm0.37 \times 10^6$ /litre) for WBC counts than early dry season ($11.68\pm0.4 \times 10^6$ /litre).

Table 1: Effect of season (Mean $\pm$ SEM) on erythrocyte indices of lambs of Northern Nigerian sheep

Erythrocyte count	Season		Overall mean	Reference value ¹	SEM
	Early wet	Early dry			
RBC ($\times 10^6$ /litre)	12.96 ± 0.07^a	12.90 ± 0.09^a	2.94	9-15	0.05
PCV (%)	24.67 ± 0.57^a	24.95 ± 0.72^a	24.78	24-45	0.44
HB (g/dL)	7.96 ± 0.21^a	8.09 ± 0.26^a	8.01	9 - 15	0.16
MCV (fl)	27.74 ± 0.40^b	28.51 ± 0.50^a	28.03	23-48	0.11
MCHC (pg)	32.79 ± 0.23^a	32.89 ± 0.29^a	32.83	31-38	0.18
MCH (g/dL)	8.22 ± 0.16^b	9.34 ± 0.21^a	9.28	8-12	0.13

^{a,b}Means with different superscripts along the rows are significantly different ($P<0.05$). RBC = red blood cell; PCV = packed cell volume; HB = haemoglobin counts; MCV = mean corpuscular volume; MCHC = mean corpuscular haemoglobin concentration; MCH = mean corpuscular haemoglobin.

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Table 2: Effect of season (Mean $\pm$ SEM) on leukocyte indices of lambs of Northern Nigerian sheep

Leucocyte count	Season		Overall mean	Reference value ¹	SEM
	Early wet	Early dry			
WBC ($\times 10^9$ /litre)	18.01 ± 0.37^a	11.68 ± 0.64^b	15.58	4 - 12	0.47
Neutrophils (%)	44.63 ± 0.68^a	40.42 ± 2.61^b	43.00	10 - 50	1.11
Lymphocytes (%)	53.33 ± 0.81^b	55.79 ± 2.64^a	54.28	40 - 75	1.13
Monocytes (%)	2.87 ± 0.29^a	2.73 ± 0.57^a	2.82	2 - 9	0.27
Eosinophiles (%)	2.94 ± 0.31^b	5.12 ± 0.84^a	4.03	0 - 10	0.49

^{a,b}Means with different superscripts along the rows are significantly different ($P<0.05$); WBC = White blood cell; ¹<http://www.merckmanuals.com>

The observed non-significant ($P>0.05$) variations among most of erythrocyte indices in this study was not in agreement with the report of Tibbo *et al.* (2008) which stated that season affected almost all erythrocyte series in small ruminants. Awodi *et al.* (2005) and Chineke *et al.* (2006) expressed that packed cell volume, haemoglobin and mean corpuscular haemoglobin are major indices for evaluating circulatory erythrocytes, and are significant in the diagnosis of anaemia and also serve as useful indices of the bone

marrow capacity to produce red blood cells in mammals. The low ($P<0.05$) values obtained for MCV and MCH in this study during the early wet season is still within the reference values (Table 1), so the animals cannot be said to be anaemic during this period. Rekwot *et al.* (1987) and Olayemi *et al.* (2009) associated ruminants managed extensively with high WBC counts. Fasae *et al.* (2011) attributed this phenomenon to high load of microbes in ruminants reared extensively. The WBC values were lower

($P < 0.05$) in this study during the early dry season probably because the microbe loads were reduced during dry seasons. Lambs could be more exposed to high microbes during rainy season because the environment is favours their growth during this period.

Conclusion and Recommendations

Effect of season on haematological profile of lambs from the studied population is more prominent on increased leukocyte counts during early wet season. It is therefore recommended that farmers should practice diseases prevention protocols such as anti-helminthic drenching and deworming regularly, especially during raining season.

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