HAEMATOLOGICAL AND SERUM BIOCHEMICAL INDICES OF WEST AFRICAN DWARF (WAD) SHEEP FED VARYING LEVELS OF AMMONIUM SULPHATE SUPPLEMENTATION

***Akinlade, A.T. and Ososanya, T.O.**
Department of Animal Science, University of Ibadan, Ibadan, Nigeria
**Corresponding e-mail: topes1725@yahoo.com, Tel.:+234 08034425735*

Abstract

The haematology and serum biochemical parameters of sixteen (16) West African Dwarf (WAD) sheep weighing 16.8±0.12kg were assigned to diets containing 0.00, 0.25, 0.50 and 0.75% levels of ammonium sulphate as T1, T2, T3 and T4 respectively for 105 days. In a completely randomized design, each ewe was fed 5% body weight of the diet and wilted guinea grass in a 60:40. Variations in haematological parameters due to treatments were inconsistently significant except for platelet and white blood cell. The erythrocytes/white blood cell ($x10^6/mm^3$) varied from (4.31) T1 to (5.15) T4. The lowest packed cell volume (39.50%) was obtained for sheep on 0.00% $(NH_4)_2SO_4$. Erythrocytes/red blood cell was normal and ranged from 11.84 in T1 to 13.28 in T4. Alanine aminotransferase (ALT) ranged from 15.75 to 24.75 (units/L) fall within the normal range. None of the sheep in the treated groups showed neither an abnormal growth, nor behaviour and signs of illness during the study period. The results showed that, WAD sheep could tolerate the $(NH_4)_2SO_4$ at levels up to 0.75% inclusion without a significant alteration of the blood constituents.

Keywords: Haematology, serum biochemistry, WAD sheep, ammonium sulphate.

Introduction

Blood is an important index of physiological and pathological changes in an organism (Bush, 1991). The primary function of the blood is to transport oxygen from respiratory organs to body cells (Noah, 2015) distributing nutrients and enzymes to cells and carrying away waste products (Robert, 2016) thereby maintaining homeostasis of the internal environment. The various functions of the blood are carried out by the individual and collective actions of its constituents, that is the cells and plasma (Akinmutimi, 2004).

Haematological tests have been widely used for the diagnosis of various diseases and nutritional status of animal. The information gained from the blood parameters would substantiate the physical examination and together with medical history provide excellent basis for medical judgment (Tim, 2016). In addition, it would help determine the extent of tissue and organ damage, the response of defence mechanism of the patient and aid in the diagnosing the ailment(Tim, 2016).

The objective of this study was to determine the effect of ammonium sulphate supplementation on hematological and serum biochemical indices of West African Dwarf (WAD) sheep.

Materials And Methods

The study was conducted in sheep unit of the Teaching and Research Farm, University of Ibadan, Nigeria.7 m/ls of blood were collected through the jugular vein-puncture of the rams.5mls of the blood were collected into sterilized glass tube containing ethylene-diamine-tetra-acetic acid (EDTA) for haematological study. The remaining 2m/ls of the blood were put in glass tube without anti-coagulant for serum biochemical assays. Data collected were subjected to Analysis of variance (ANOVA) and least significance difference (LSD) using Statistical Analysis System (SAS, 2002).

Result And Discussion

The packed cell volume (PCV) obtained in the present study (39.50 - 44.00%) was higher than the normal range (31.5 – 36.7 for ewe) reported for sheep (Baneejee, 2007). The increase in PCV might be attributed to inclusion of ammonium sulphate in the diet. The higher PCV values obtained in this study might likely be a sign of healthier sheep, T4 tend to have higher PCV values thanT1. The result of the haemoglobin (Hb) value shows that T4 had higher values than other treatments but the value obtained in this study fall within the normal range reported for sheep (Baneejee, 2007). There was observed difference in all treatments which suggest the oxygen carrying capacity of the blood was higher in T4. Generally, increase in the Hb concentration is associated with greater ability to resist disease infection and low level is an indication of disease infection and poor nutrition (Cheesbrough, 2004).The RBC values obtained in this study were within the normal values reported by (Campbel *et al.*, 2003). The RBC values observed to be higher in T4 than T1. The high RBC counts may be associated with conditions that cause the body to

Table 1: Gross compostion of experimental diet (% DM)

Ingredients	T1	T2	T3	T4
Ammonium Sulphate $(NH_4)_2SO_4$	0.00	0.25	0.50	0.75
Urea $(NH_2)_2CO$	1.00	1.00	1.00	1.00
Dry Cassava Peel	60.00	60.00	60.00	60.00
Brewers Dry Grain (BDG)	23.00	23.00	23.00	23.00
Palm Kernel Cake (PKC)	10.00	10.00	1.00	10.00
Dicalcium Phosphate (DCP)	1.00	1.00	1.00	1.00
Oyster Shell (OS)	2.00	2.00	2.00	2.00
Salt (Nacl)	2.00	2.00	2.00	2.00
Premix (Growers)	10.00	1.00	1.00	1.00
Total	**100.00**	**100.25**	**100.50**	**100.75**

T1: 0.00% $(NH_4)_2SO_4$, T2: 0.25% $(NH_4)_2SO_4$, T3: 0.50% $(NH_4)_2SO_4$, T4: 0.75% $(NH_4)_2SO_4$

Table 2: Heamatology values and serum biochemistry of wad sheep fed ammonium sulphate supplemented diets.

PARAMETERS	T1	T2	T3	T4	SEM	Ref.
PCV (%)	39.50^{b}	41.00^{ab}	42.50^{ab}	44.00^{a}	1.11	27-45
Hb (g/dL)	13.40^{b}	14.00^{ab}	14.60^{ab}	15.20^{a}	0.38	9-15
RBC($x10^6/mm^3$)	11.86^{b}	12.34^{ab}	12.81^{ab}	13.28^{a}	0.25	9-15
PLATELET ($x10^3/mm^3$)	6.87^{d}	8.13^{c}	9.50^{b}	9.93^{a}	0.50	8-11
WBC ($x10^6/mm^3$)	4.31^{d}	4.55^{c}	4.77^{b}	5.15^{a}	0.20	5-10
TOTAL PROTEIN (g/dL)	7.71^{d}	8.08^{c}	8.28^{b}	8.43^{a}	0.08	6-8
AST. (units/L)	76.25^{d}	83.44^{c}	90.63^{b}	103.75^{a}	12.61	12-229
ALT. (units/L)	15.75^{d}	18.25^{c}	21.75^{b}	24.75^{a}	2.14	3-47
ALP. (units/L)	269.00^{d}	276.38^{c}	283.75^{b}	289.25^{a}	14.39	70-390
BUN (mg/dL)	9.75^{d}	10.00^{c}	10.75^{b}	11.00^{a}	0.20	8-20
CREATININE (mg/dL)	1.08	1.20	1.35	1.48	0.06	1-2
CHOLESTEROL (mg/dL)	57.75^{d}	59.50^{c}	61.75^{b}	63.00^{a}	1.37	52-76

a, b, c: Means within rows with different superscripts are significantly diffe rent from each other ($P<0.05$).

T1: 0.00% $(NH_4)_2SO_4$, T2: 0.25% $(NH_4)_2SO_4$, T3: 0.50% $(NH_4)_2SO_4$, T4: 0.75% $(NH_4)_2SO_4$, SEM: Standard Error Mean, PCV: Packed Cell Volume, Hb: Heamoglobin, RBC: Red Blood Cell, WBC: White Blood Cell, AST: Aspartate aminotransfer ase,ALT.: Alanine aminotransferase,ALP: Alkaline phosphatase,BUN: Urea nitrogen,Ref.: Merck veterinary manual.

make too many red blood cells (Polycythemia) or impaired pulmonary function, while low RBC counts may be associated with iron deficiency, internal bleeding, some types of anemia or some vitamin deficiency, internal bleeding, some types of anemia or some vitamin deficiency.

In table 2, the significant higher value of WBC recorded for T4 compare to other treatments could be as a result of the animal possessing a protective system suggestive of a well adapted immune system (Tambuwal *et al.*, 2002). The value of WBC obtained in this experiment supported the reports of Daramola *et al.*, (2005) that WAD sheep possess a protective system providing a rapid and potent defense against any infective agent. Sheep under T4 had the greatest value of WBC and the values decreases as the level of inclusion of ammonium sulphate decreases. The leucocyte count (WBC) was higher in ewe than the values obtained for the rams. This findings is similar to the reports of Egbe-Nwiyi *et al.*, (2000) and Addass *et al.*, 2010 who reported that age has no significant influence but sex had an influence ($P<0.05$) on the total WBC. The higher leucocyte count (WBC) in this study is an indicator of immune response to infections or toxic substances in the organism and a low count is an indication of pathogenic infection or presence of antigens in the organism (Bradbury *et al.*, 1999).

Serum biochemical indices is used to determine the level of heart attack, liver damage and to evaluate protein quality and amino acid requirements in animals as reported by (Harper *et al.*, 1979). The urea level in the study shows that T4 had higher values than T1. Generally, the value tends to be higher compared to the values 1.5 mmol/L(Akinmutimi, 2004). The urea value obtained was within the range of 8 to 20 mg/dl (Banejee, 2007) in matured domestic animals. The creatinine values in the present study were within normal range and differ ($P<0.05$) among the treatments. High creatinine is indicative of poor protein and amino acid metabolism that can lead to impaired renal function and cardiac infarction (Akinmutimi, 2004). Increased creatinine has been associated with tannin toxicosis in cattle consuming tannin-rich oak fodder (GARG *et al.*, 1992). High level of blood cholesterol may result in its deposition on the walls of the blood vessels and these deposits may eventually harden to atheroschlerotic plaque, this may block important blood vessels and result in a myocardial infraction. The values for total protein concentration obtained were higher in T4 than T1. This agrees with the report of (Kamatu *et al.*, 1988) that plasma protein help to transport calcium and phosphorus and other substances in the blood by attachment to the albumin.

Conclusion

It can be concluded that the haematological and biochemical parameters for WAD sheep studied fall within normal range. The observed differences may be due to nutritional effect. That is, WAD sheep fed with ammonium sulphate and *Panicum maximum* supplementation diets showed remarkable influence on the haematologiclal and serum biochemistry values. This therefore suggests that feeding ammonium sulphate supplemented feed had no deleterious effect and could be used as an alternative feed for WAD sheep especially at 75% inclusion.

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