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HAEMATOLOGICAL AND BIOCHEMICAL INDICES OF GROWING YANKASA RAMS FED VARIOUS SUPPLEMENTS DURING EARLY RAINY SEASON GRAZING

¹Yakubu, A. K. ¹Yahya, M. M. ²Chana, Z. M. and ²Bislava, M. B.¹Department of Animal Science, Modibbo Adama University Yola²Department of Animal Science, University of MaiduguriCorresponding Author: Yakubu, A. K. [*yakubukirfiahmed@gmail.com](mailto:yakubukirfiahmed@gmail.com) 08036780390

Abstract

A study was conducted to assess the variation in haematological and biochemical indices of growing Yankasa rams fed various supplements during early rainy season grazing. The study was conducted at Abubakar Tafawa Balewa University Teaching and Research Farm, Bauchi. Sixteen (16) growing Yankasa rams were used. Four supplemental diets were formulated, the animals were allowed to graze natural pasture from morning to evening (9am-5pm). Six hundred grams (600g) of the supplementary diets were offered twice a day, 300g in the morning before grazing and 300g in evening after grazing. The supplements consist of African locust bean pulp (ALBP), maize bran (MB), poultry litter (PL), cotton seed cake (CSC) and groundnut haulms (GNH). The study lasted for eighty days in a complete randomized design (CRD) of four treatments with four replications. Blood samples were collected and analysed. The results showed that, red blood cells (RBC), blood urea nitrogen (BUN) and aspartate aminotransferase (AST) were significantly ($P < 0.05$) influenced by dietary treatments. The parameters not affected were haemoglobin (HB), packed cell volume (PCV), white blood cell (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), protein, glucose and albumin. It was concluded that, values obtained for haemato-biochemical indices were within the recommended levels of a healthy animals. Therefore, this indicates that the proportions of energy and protein in the supplements is efficient for normal physiological function of growing Yankasa sheep.

Key words: Haematology, Biochemistry, grazing, supplements, Yankasa rams

Introduction

Small ruminants such as sheep and goats play important role in the livestock subsector of the Nigerian agricultural economy (Lakpini, 2002). But their production is largely limited by unavailability and high cost of feeds (Lamidi and Ologbose, 2014). The unavailability of feed is more persistent in dry season when natural pastures mature and became highly fibrous and low in crude protein content (Oni *et al.*, 2010). It is in this respect that non-conventional energy and protein materials of farm and agro-industrial waste origin are presently being utilised for livestock production in Nigeria (Okonkwo *et al.*, 2008). The African locust bean pulp (*Parkia biglobosa*) is a yellow coloured substance that is sweet to taste when ripe, which indicates the presence of sugar and thus a potential energy source. The pulp also contain beta carotene a precursor of vitamin A, which is known to improve appetite and consequently the growth performance of livestock (Gernah, 2007; Yakubu *et al.*, 2017).

Materials and Methods

Experimental site

The experiment was conducted at the Abubakar Tafawa Balewa University Bauchi Teaching and Research farm, located at Yelwa along Tafawa Balewa Road, Bauchi. Bauchi State occupies a land area of about 49,119km² (18,965sq mi), approximately 5.3% of Nigerian's total land area. The average annual rainfall ranges from 700mm in the north to 1300mm in the south western part of the state. The rain



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usually starts in April and ends in October. Minimum temperature of 22°C is usually in December/January while maximum temperature of 40°C is around March/April (BSOW 2018).

Experimental Design and feeding procedure

Complete Randomised Design (CRD) was used in the experiment as outlined by Steel and Torrie (1980). Sixteen (16) growing Yankasa rams were assigned to four (4) dietary treatments coded as Diets A, B, C and D respectively with four (4) animals per treatment. The animals were allowed to graze natural pasture from morning (9am) to evening (5pm). Six hundred grams (600g) of supplementary diets were offered twice a day, three hundred grams (300g) in the morning before grazing and remaining 300g in the evening after grazing. African locust bean pulp, Maize bran, cotton seed cake, poultry litter and groundnut haulms were used as a supplements at various proportions as shown in Table 1. Water was offered *ad-libitum*.

Table 1: Composition of the Supplemental Diets

Supplements				
	A	B	C	D
Natural Pasture	ALBP + MB	ALBP + PL	ALBP + CSC	ALBP + GNH
	(50:50)	(70:30)	(50:50)	(50:50)

ALBP=African locust bean pulp MB= maize bran, CSC= cotton seed cake, GNH= groundnut haulms and PL= poultry litter.

Data Collection

Blood samples were collected from two (2) animals in each treatment during the last week of the experiment. The blood samples were collected from the jugular vein as outlined by Coles (1986). Bleeding was done early morning before feeding. About 7ml of the blood sample was collected, 3ml of each sample was placed in an Ethylene Diamine Tetracetate (EDTA) (anti-coagulant) bottle to analyse for haemoglobin (Hb), Packed Cell Volume (PCV), erythrocyte (RBC) and leucocyte (WBC) according to the methods described by Yakubu *et al.* (2017). Calculation of the Erythrocyte indices including mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were derived from the values obtained from Red Blood Cells (RBC). The remaining 4ml was placed in a universal bottle and allowed to stand for about 2 hours at room temperature, to allow for coagulation to take place. The universal bottle was thereafter used to centrifuge at 4000RP/M for 5 minutes to separate the serum. The serum was used to analyse for blood urea nitrogen (BUN), total protein (TP), albumin, glucose (GLU), Aspartate amino transferase (AST), and alanine amino transferase (ALT) according to the methods described by Aljameel *et al.* (2017).

Results and Discussions

The packed cell volume (PCV) and Haemoglobin (Hb) concentration observed for all the animals in this study showed no any significant effects across the treatments. The values (9.17 to 12.01g/dl) for Hb Concentration in this study were comparable with (9.27 to 11.72g/dl) observed by (Garba and Halliru, 2018) when the author determined the haematological and serum biochemistry of Yankasa rams fed complete diets containing rice straw. Similarly PCV values (27.08 to 31.82%) observed in this study were slightly similar with the values (29.20 to 30.02%) by Alabi and Ososanya (2017) but lower than the values (45.03 to 62.93) reported by (Garba and Halliru, 2018). Red blood cells were significantly ($P<0.05$) affected by the treatment means, the values (6.81 to $8.64 \times 10^{12}/l$) in the present study were lower than (11.02 to 11.87) reported by Alabi and Ososanya (2017), but higher than (3.93 to $4.01 \times 10^{12}/l$) by



Mubi *et al.* (2015) when growing Yankasa sheep were fed diets containing cotton seed cake and maize offal. White blood cell concentration were similar for animals in all the treatments. The values (8.96 to $10.87 \times 10^9/L$) were higher than (4.5 to $6.86 \times 10^9/l$) and (4.00 to $6.18 \times 10^9/l$) reported by Mubi *et al.* (2015) and Abdullahi *et al.* (2020) when the later fed Balamis rams *Brachiaria decumbens* as basal diets with different protein supplements. Mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were not affected by the treatment means. The MCV values (28.61 to 31.71 fl) in this study were lower than (91.40 to 105.60 fl) obtained by (Garba and Halliru, 2018). While the MCH values (8.64 to 11.62 pg) were comparable to (10.85 to 12.85 %) by Abdullahi *et al.* (2019). But MCHC values (19.67 to 20.30 g/l) by Garba and Halliru, 2018) were lower than the (30.28 to 32.75 g/l) recorded in this experiment. Blood urea nitrogen (BUN) was found to be significantly ($P < 0.05$) affected by the treatment means. The values (4.80 to 9.35 mmol/l) in the present study were higher than (4.60 to 5.67 mmol/l) obtained by Aruwayo *et al.* (2011). Total protein (TP), glucose and albumin were not significantly different between the treatment means. The values (5.66 to 6.07 g/dl) for TP were higher than the (3.45 to 4.15 g/dl) reported by Mohammed *et al.* (2020). Albumin values (2.47 to 3.46 g/dl) in the present experiment fell within the range (2.7 to 3.7 g/dl) for small ruminants as reported by Radostits *et al.* (2000). The AST in this present study was statistically ($P < 0.05$) different between treatment means, the values (123.40 to 132.35 IU/L) were slightly similar with the values (121.67 to 152.00 IU/L) by Garba and Halliru (2018). ALT values (11.27 to 12.87 IU/L) recorded in this trial were comparable with the values (11.00 to 15.00 IU/L) reported by Wada *et al.* (2014).

Table 2: Haematological Parameters of growing Yankasa Rams fed Various Supplements During Early Rainy Season Grazing

Parameters	Treatments				SEM	LOS	Reference value
	A	B	C	D			
Haemoglobin (g/dl)	12.01	10.32	9.17	10.67	0.26	NS	8.00-16.00
Packed cell volume (%)	27.08	27.92	31.26	31.83	0.76	NS	24.00-45.00
Red blood cell ($\times 10^{12}/L$)	6.81 ^b	7.64 ^{ab}	7.19 ^{ab}	8.64 ^a	0.14	*	5.00-10.00
White blood cell ($\times 10^9/L$)	10.21	8.96	10.86	10.87	0.27	NS	4.00-12.00
MCV (fI)	28.61	26.83	30.64	31.71	1.06	NS	23-48
MCH (pg)	8.64	9.68	9.69	11.62	0.30	NS	8-12
MCHC (g/dl)	30.28	31.75	32.75	30.21	0.58	NS	31-34

^{abc} Means within the same row with different superscript are significantly different ($P < 0.05$)

MCV= mean corpuscular volume, MCH= mean corpuscular haemoglobin and MCHC= mean corpuscular haemoglobin concentration, SEM= standard error mean, NS= not significant

Table 3: Biochemical Parameters of growing Yankasa Rams fed Various Supplements during Early Rainy Season Grazing

Parameters	Treatments				SEM	LOS	Reference value
	A	B	C	D			
BUN (mmol/L)	9.35 ^a	7.70 ^{ab}	4.80 ^b	5.55 ^b	0.28	*	3.7-10.3
Protein (g/dl)	5.66	6.07	5.76	5.76	0.14	NS	5.9-7.8
Glucose (mg/dl)	2.66	2.96	2.81	3.21	0.15	NS	2.4-4.5
Albumin (g/dl)	3.41	2.47	3.46	3.07	0.10	NS	2.7-3.7
AST (IU/L)	123.40 ^b	113.80 ^c	131.45 ^{ab}	132.35 ^a	0.77	*	60-280
ALT (IU/L)	11.96	11.36	12.87	11.27	0.38	NS	14-43

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Conclusion

It was concluded that, values obtained for haemato-biochemical indices were within the recommended levels. Therefore, this indicates that the proportions of energy and protein in the supplements is efficient for normal physiological function of growing Yankasa sheep.

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