

HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF YANKASA EWES FED VARYING LEVELS OF LOCAL AND INDUSTRIAL SUPPLEMENTED PREMIX

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ABSTRACT

The experiment was designed to evaluate the haematological and serum biochemical parameters of Yankasa ewe fed varying levels of local and industrial supplemented premix. The experimental design used was Complete Randomized Design (CRD), whereby twenty-five (25) Yankasa ewes were randomly allocated to five (5) treatment groups. Dietary premix of both local and industrial was administered to the animals at five (5) inclusion levels (0 as a control, local and industrial 25:75, 50:50, 75:25 and 100 % local), the feed offered and left over were recorded daily at the beginning of the growth studies, ewes were weighed and were subsequently weighed weekly. Blood samples were collected for haematological and serum biochemistry study, three (3) Yankasa ewes were randomly picked per treatment and bled through the jugular vein and 5 ml of blood samples per each was collected out of which 3 ml were transferred into a plastic tube containing Ethylene Diamine Tetra Acetic acid (EDTA) for haematological studies; while the remaining 2 ml were emptied into another vial free of EDTA used for serum biochemical studies. All data generated in this study were subjected to Analysis of Variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2008). The results of this study shows that significant differences were not observed between the treatments in all the parameters for haematological study and the values of most parameters measured were within the normal range. All serum biochemical parameters final values are observed to be within the normal range, with the exception of creatinine final values which shows that Yankasa ewes fed with local and industrial differs significantly from those fed 0 % premix (control). It can therefore be concluded that inclusion of both local and industrial premix at 50-100 % into the diet of Yankasa ewes, does not have any negative effect on the health of the animals as values of all the haematological and serum biochemistry parameters are within the normal value.

Key words: *Haematological, Biochemistry, Yankasa, Ewes and Premix*

INTRODUCTION

Haematological components, which consist of red blood cells, white blood cells or leucocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration are valuable in monitoring feed toxicity especially with feed constituents that affect the blood as well as the health status of farm animals (Oyawoye and Ogunkunle, 2004). Blood and serum parameters are useful for obtaining insights on the metabolic and health status of the animals, they are also responsible for various body functions, impairment of functions induced structural and physiological abnormalities, as well as the reflection of the current environmental conditions including nutritional management (Al-Fartosi et al., 2010). The haematological tests have been widely used for the diagnosis of various diseases and nutritional status of animal and information gained from these parameters usually used for the substantiation of the physical appearance and validation of changes in medical history which usually stand as the excellent basis

for animal medical judgment (Zaitsev et al., 2020).

The correct interpretation of the parameters is necessary and should be comparable with reference values appropriate for the region and the population in the area where the animals are being kept in order to ascertain metabolic status of sheep. Although, these parameters could also be influenced by several factors, such as sex, breed, age, stress, diet, level of milk production, handling, climate, physiological status; they could establish their relevance in the health and performances of the animals. In addition, these parameters are also used for determining the extent of tissue and organ damage and the response of defence mechanism of the animals which aid in the diagnosing different types of ailments (Dhama et al., 2019). Laboratory tests on the blood are vital tools that help detect any deviation from normal in the animal body (Ogunbajo et al., 2009). Serum biochemical components are the reflection of the blood metabolic outcomes in an animal (Amle et al., 2014). This study was designed to determine the haematological and serum biochemical parameters of Yankasa ewes fed varying levels of local and industrial supplemented premix.

MATERIALS AND METHODS

Experimental area

The research was conducted at the Teaching and Research Farm of University of Abuja. Abuja is the capital city of Nigeria located in the centre of the country; the area is geographically located on latitude 8.9810404⁰, longitude 7.176289⁰ and elevation of 491 m (Euromonitor, 2010).

Animal management, Feed formulation and formulation of local premix

Twenty five Yankasa ewes aged between 6 and 7 months, with average live weight 10 kg were used for the study. The animals were purchased from the local markets across the six Area Councils of the Federal Capital Territory. Namely: - Gwagwalada market, Dei-dei market, Kwali market, Abaji market, Rubochi market, Kuje market, Bwari market and Karshi market. Upon arrival of the twenty five Yankasa ewes, they the animals were quarantine for two weeks during which period they were treated against ecto- and endo- parasites using Ivermetin® as a dewormer, with a broad spectrum antihelmintic (Albendazole®), and also an injectable antibiotic oxytetracycline to prevent infections and boost the animals to withstand the experimental rigours. The sheep were also vaccinated against Peste de Petis Ruminantes (PPR) vaccine injected intramuscularly, this is relevant to provide immunity against Peste de Petis Ruminantes (PPR) which is a common disease of sheep in the study area. After the acclimatization period, the sheep were housed individually in concrete floored pens measuring 1.2 m² they were all tagged and screened to ensure that they were not pregnant while stool and blood were also collected for baseline analyses. Locally prepared premix was formulated by mixing the ingredients in the following proportions: dehydrated green powder, roasted flaxseed, roasted cumin seed powder and sprouted and dried fenugreek seed powder at 100 g, 100 g, 50 g and 50 g respectively.

Experimental set up

The design of the experiment used was Complete Randomized Design (CRD), whereby twenty-five (25) Yankasa lambs were randomly allocated to five (5) treatment groups comprising of five animals per treatment. The animals were randomized by their weights and placed into their groups fed basal diets, and 5 levels of industrially and locally compounded premix. **T1:** Yankasa ewes fed with 0 % local premix and 100 % industrial premix per 100 % of the concentrate experimental diet as control; **T2:** Yankasa ewes fed with 25 % local premix and 75 % of industrial premix, per 100 % of the concentrate experimental diet; **T3:** Yankasa ewes fed with 50 % local premix and 50 % of industrial premix per 100 % of concentrate experimental diet; **T4:** Yankasa ewes fed with 75 % local premix and 25 % of industrial premix per 100 % of the concentrate experimental diet; **T5:** Yankasa ewes fed with 100 % of local premix 0 % per 100 % of the concentrate experimental diet.

Blood analysis

Blood samples for haematology and serum biochemical indices were carried out using Sysmex Automatic analyzer Model As-0284-D, Netherlands). All data generated for this study were subjected to Analysis of Variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2008). Means were separated using Least Significant Difference (LSD) test of the same package.

RESULTS AND DISCUSSION

Table 4 gives summary of the haematological parameters of Yankasa ewes fed varying levels of local and industrial premix supplemented diets with the initial values for all the parameters measured found to be below the normal range, except in Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin Concentration (MCHC). Significant differences were not observed between the treatments in all the parameters. Similarly, the final values for all the parameters measured were found to be within the normal range. The Haematological parameters which shows that most of the parameters measured were within the normal range could mean that local premix and industrial premix in the diet of Yankasa ewes does not have any negative effect on the health of the animal. This is in agreement with the studies of Akinmoladun et al, 2018b ; Ladipo and Akinfemi, 2014 when animals are fed non- conventional feeds containing high levels of antinutritional compounds, and for an extended period, their growth rate, health status and disease resistance are negatively affected. The results obtained for haemoglobin in this study were 8.27-13.03 g/dl and they are within the normal range of 9.0-15.0 g/dl reported for small ruminants by (Merck Manual, (2012), this agrees with Fasae et al. (2014) who stated that increased haemoglobin (Hb) level with increased supplementation of maize cob with forage legumes.

Table 5 summarizes results of the serum biochemistry parameters of Yankasa ewes fed varying levels of local and industrial premix supplemented diets. All serum biochemical parameters final values are observed to be within the normal range. Serum biochemical characteristics of the blood parameters for Yankasa ewes measured in this study revealed that creatinine final values, shows that of Yankasa ewes fed with supplemented local and industrial premix differs significantly from those fed 0 % premix (control). Creatinine values of 1.37-1.57 (mg/dL) for this study fall below the normal range of 3.2–6.2 mol/μl reported by Pampari (2003). ALT, AST and ALP values are triggered by the presence of toxic substance in a feed (Iyayi, 1994; Alagbe et al., 2020). Mean globulin values in this study are higher than that reported by Abubakar et al. (2016) in Yankasa ram blood analysis but slightly lower than that reported by Kaneko et al. (2008) for healthy sheep. The differences in the total protein level may be attributable to differential diet intake and environment. Other studies revealed that serum protein may be used as an indirect measurement of the dietary protein quality (Alikwe et al., 2010; Garba and Halliru, 2019).

CONCLUSION

It is concluded on this study that inclusion of both local and industrial premix at 25-75 % into the diet of Yankasa ewes, does not have any negative effect on the health of the animals as values of all the haematological and serum biochemistry parameters are within the normal values.

RECOMMENDATION

Table 1. Composition and proximate analysis of supplemented experimental diets fed the Yankasa lambs

Parameters	T1 (0:100)	T2 (25:75)	T3 (50:50)	T4 (75:25)	T5 (100:0)
Maize offal (kg)	25.00	25.00	25.00	25.00	25.00
BDG (kg)	32.00	32.00	32.00	32.00	32.00
Cassava peel (kg)	19.50	19.50	19.50	19.50	19.50
Cowpea husk (kg)	23.00	22.00	22.00	22.00	22.00
Salt (kg)	0.50	0.50	0.50	0.50	0.50
Premix local and Industrial mixture (%)	0:100	25:75	50:50	75:25	100:0
Total 100 100		100	100	100	
Proximate Analysis as calculated					
Dry matter (%)	96.72	96.19	95.67	96.02	95.69
Crude protein (%)	14.56	14.50	14.44	14.38	14.32

Crude fibre (%)	11.63	12.49	11.98	12.11	11.63
Ash (%)	8.72	10.90	12.08	13.60	14.24
Ether extract (%)	3.41	4.11	4.71	3.92	3.98
Nitrogen Free Extract (%)	28.48	28.36	28.53	28.95	29.61
Metabolizable Energy (kcal/kg)	1822.78	1879.47	1932.22	1890.43	1898.00

Table 2. Haematological parameter of Yankasa ewes fed varying levels of local and industrial premix supplemented diets

Parameters		T1 (0:100)	T2 (25:75)	T3 (50:50)	T4 (75:25)	T5 (100:0)	SEM	LS	Normal-Range
WBC(X10 ³ /ul)	Initial	3.70	3.73	6.37	2.30	2.07	0.56		
	Final	6.31	8.22	11.20	11.67	11.79	1.33	NS	4 – 12
	Difference	2.61	4.49	4.83	9.37	9.72			
RBC(X10 ⁶ /ul)	Initial	1.66	2.64	1.75	5.80	2.41	0.513		
	Final	3.89	6.35	7.06	11.83	12.90	0.689	NS	9 – 15
	Difference	2.23	3.71	5.31	6.03	10.49			
Hb (g/dl)	Initial	6.13	4.90	6.90	7.70	6.63	0.505		
	Final	8.27	8.63	11.27	12.30	13.03	0.361	NS	8 – 16
	Difference	2.14	3.73	2.37	4.6	6.4			
PCV (%)	Initial	6.87	9.73	8.13	20.30	9.73	1.597		
	Final	14.50	23.67	29.93	43.53	39.07	2.222	NS	24 – 45
	Difference	7.63	13.94	21.8	23.23	29.34			
MCV (fl)	Initial	33.18	30.30	36.50	35.33	34.53	1.874		
	Final	34.13	39.70	50.43	50.96	53.84	1.461	NS	23 – 48
	Difference	0.95	9.4	13.93	15.63	19.31			
MCH (pg)	Initial	7.97	7.03	3.70	7.17	7.60	6.181		
	Final	10.40	11.20	11.63	11.90	12.00	2.381	NS	8 – 12
	Difference	2.43	4.17	3.93	4.73	4.4			
MCHC (g/dl)	Initial	32.13	34.07	35.27	32.13	30.33	11.662		
	Final	36.23	39.43	42.70	43.09	44.03	4.214	NS	31 – 38
	Difference	4.1	5.36	7.43	10.96	13.7			

Table 3. Serum biochemical parameter of Yankasa ewes fed varying levels of local and industrial premix supplemented diets

Parameter	T1 (0:100)	T2 (25:75)	T3 (50:50)	T4 (75:25)	T5 (100:0)	SEM	LS	Normal Range
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ALP (iu/L)	Initial	118.00	113.67	109.33	118.33	117.00	8.487	NS	93-387
	Final	174.67	270.40	360.33	362.67	365.00	28.16		
	Difference	56.67	156.73	251	244.34	248			
AST (iu/L)	Initial	46.33	49.00	40.33	48.67	48.67	1.841	NS	55.1-147.7
	Final	58.67	66.69	69.00	73.67	80.33	5.607		
	Difference	12.34	17.69	28.67	25	31.66			
ALT (iu/L)	Initial	12.23	12.00	12.30	12.17	12.06	3.368	NS	10.4-38.4
	Final	20.00	25.00	26.67	28.33	29.67	1.195		
	Difference	7.77	13	14.37	16.16	17.61			
Total protein (g/dL)	Initial	55.67	52.33	54.00	53.03	52.33	1.711	NS	60-79
	Final	62.13	73.67	78.33	79.00	79.00	4.791		
	Difference	6.46	21.34	24.33	25.97	26.67			
Albumin (g/dL)	Initial	20.33	20.00	20.30	21.01	20.00	0.855	NS	24-30
	Final	22.67	25.00	27.67	29.33	32.31	1.384		
	Difference	2.34	5	7.37	8.32	12.31			
Globulin (g/dL)	Initial	22.33	23.13	22.04	22.32	21.00	1.703	NS	29.8-69.8
	Final	30.08	42.67	44.67	46.34	48.33	3.765		
	Difference	7.75	19.54	22.63	24.02	27.33			
Urea (mmol/L)	Initial	2.83	2.77	2.10	2.50	2.73	1.765	NS	2.1-8.5
	Final	3.01	3.80	3.98	4.17	4.87	0.184		
	Difference	0.18	1.03	1.88	1.67	2.14			
Creatinine (mg/dL)	Initial	1.26	1.24	1.00	1.33	1.00	0.810	*	1.2 -1.9
	Final	1.37 ^b	1.43 ^a	1.47 ^a	1.49 ^a	1.57 ^a	0.114		
	Difference	0.11	0.11	0.19	0.16	0.57			
Glucose (mg/dL)	Initial	67.10	63.10	60.10	63.10	65.00	9.56	NS	50-80
	Final	67.20	73.50	70.22	73.50	75.30	1.39		
	Difference	0.10	10.4	10.12	10.4	10.3			

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