

Haematological and Serum Biochemical Indices of Weaner Yankasa Rams Fed a Mixture of Bambara Nut Offal and Rice Offal as Supplement to *Panicum maximum*.

¹Shettima, I ¹Ocheja J.O, ¹Yahaya, B, ²Abalaka, A.E ¹Turaki, A.U ¹Bukola, A.O, Umar,H. A, Umar,S.J

¹Department of Animal Science, Federal University, Kashere, Nigeria

²Department of Biochemistry, University of Calabar, Nigeria

(Shettima, I : shettima31@yahoo.com.)

ABSTRACT

Twelve (12) Yankasa weaner rams were allotted into four (4) dietary treatments of three(3) rams each. The rams were fed concentrate supplement diets containing varying levels of a mixture of bambara nut offal and rice offal at ratios 25:75%, 50:50%, and 75:25% bambara nut to rice offal for T2, T3 and T4 respectively at 150g per ram/day and *Panicum maximum* at 200g/ram/day for a duration of sixty three (63) days .T1 was however fed 350g *Panicum maximum* only . The experimental design was a completely randomized design ,data were analyzed using a one way analysis of variance and least significant difference was used to separate the significant means.(SPSS version 23, 2015 edition) Samples of concentrate diets and *Panicum maximum* were analyzed for their proximate composition using the methods of AOAC (2000)), on the last day of the experiment blood samples for haematological and serological studies were collected in sample bottles from the jugular veins of the goats ,using needles and syringes. Values for daily supplement intake(120.00 to 140.00 g) and total daily feed intake(320.00 to 355.65 g) were significant.($P<0.05$), values for daily forage intake ranged from 216.15 – 320.00g and showed significant ($P<0.05$) differences . All the haematological and serum biochemical parameters determined were significantly($P<0.05$) different ,but the supplemented groups had better values than the control. It was therefore concluded that concentrate supplementation of forages was a necessity for optimum haematological and serum biochemical values in weaner yankasa rams. Bambara nut offal and rice offal were recommended for inclusion in supplement diets for weaner yankasa rams for improved haematological and serum biochemical values . Further research using Yankasa rams of other ages was also recommended.

Keywords: Haematology, Serum Biochemistry, Supplementation, Bambara nut offal, *Panicum maximum*, Weaner Rams

1.0 INTRODUCTION

Contemporary ruminant feeding in a developing country like Nigeria is partly geared towards searching for inexpensive readily available resources which can partially or wholly serve as substitute for the scarce expensive feed stuff and inadequate forages (Okoruwa and Adewumi, 2010).

The use of agro by-products have been suggested by some researchers as a way of alleviating this

problem (Ocheja *et al* 2021; Ocheja *et al* 2020; Okpanachi *et al* 2018)

When using agro by-products it is important to assess the health status of the animals because some are known to affect blood parameters (Olabanji *et al.*, 2007). A readily available and fast means of assessing the clinical and nutritional health status of the animals in feeding trial may be through haematological and serum biochemical analysis.

Nutrition, breed, sex, age, reproductive status, environmental factors, stress etc are known to affect blood biochemical parameters (Balikci *et al.*, 2007). Belewu and Ogunsola (2011) asserted that serum creatinine helps in evaluating the liver functions and diseases while serum urea evaluates renal function and it may also indicate dehydration. as well as feed protein quality and utilization. Endogenous substances could manifest through reduced protein utilization thereby increasing the catabolism of amino acids which would be subsequently degraded into urea and creatinine (Sathyamorthy *et al*, 1981). Accurate determination of creatinine clearance time is crucial to rational drug therapy because many drugs are either partially or wholly eliminated by the kidney(Schalm,1975)

Many by –products are now used to feed ruminant animals .due to inadequate grasses as well as high cost of feed materials especially during the long dry season, thus necessitating blood analysis (Oyibo *et al.* 2020)

The aim of this work therefore was to assess the effects of concentrate supplementation of *Panicum maximum* on the haematological and serum biochemical profiles of weaner Yankasa rams.

2.0 MATERIALS AND METHODS

2.1 Experimental Location: The experiment was conducted at the Sheep and Goat unit of the Livestock Teaching and Research farm, Kogi State University, Anyigba. Anyigba is located in the derived Guinea Savannah zone of Nigeria on latitude 7°15' and 7°29' N of the equator and longitudes 7°11' and 7°32'E of the Greenwich meridian. The zone lies in the warm humid climate of the tropics with clearly marked wet and dry season in April to October and November to March respectively, the annual rainfall ranges from 1400-1500mm, the ambient temperature is about 25°C with the highest in March and April The average altitude is 420 meters above sea level (Ifatimehin *et al.*,2011).

2.2 Feed preparation, Experimental Animals, and Management:

Twelve (12) Yankasa Weaner rams were used for the study, the animals were housed individually and vaccinated against Peste du petit ruminant (PPR), using Tissue culture rhinderpest vaccine. The rams were also given prophylactic treatments using antibiotics. The *Panicum maximum* used for the experiment were harvested from within Kogi State University campus, Anyigba. and wilted for 24hours to reduce the moisture content before feeding , the concentrate feed components were Bambara nut offal , rice offal, bone meal and Table salt as shown in Table 1 below. These ingredients were mixed together to formulate the diets. The rams were allotted in a

Completely Randomized Design (CRD) into four (4) treatments. Each treatment had three (3) rams. Each ram was fed 150g of the supplement diet at ratios 25:75%, 50:50% and 75:25% (bambara nut offal: rice offal) for T2, T3 and T4 respectively per day one hour after serving them *Panicum maximum* at 200g/ram /day. The rams in T1 were fed 350g *Panicum maximum* only per day.

Feed served the rams was weighed daily and the left over was also weighed and subtracted from the quantity of feed served to determine the feed intake. The rams were weighed at the beginning and end of the experiment. The study duration was sixty three (63) days after an adjustment period of 7 days.

Table 1: Composition of Supplement Diets (% Dry matter)

Ingredients	Composition/Treatments			
	T ₁	T ₂	T ₃	T ₄
Bambara Nut Offal	0.00	24.00	48.00	72.00
Rice Offal	0.00	72.00	48.00	24.00
Table salt	0.00	1.00	1.00	1.00
Bone meal	0.00	3.00	3.00	3.00
Total		100	100	100
Calculated Nutrient Content (% DM)				
Crude protein		14.00	16.65	18.80
Crude fibre		19.30	17.40	16.50
ME (Kcal/kgDM)		2680	2720	2800

2.3 Blood Sample Collection

The blood samples for heamatological and serological studies were collected in sample bottles from the jugular vein of each rams using needles and syringes. The blood samples for serological analysis were put in sample bottles containing ethylene diamine tetra acetic acid (EDTA) anticoagulant, the blood samples were centrifuged thus allowing the clear sample to be separated for testing.

The Serum was analyzed for creatinine, urea, alkaline phosphate, cholesterol and blood sugar

The experimental design was a completely randomized design (CRD). Data were analysed

using the method of Baker and Silvertown (1985). The uncoagulated blood samples were analysed for packed cell volume , haemoglobin concentration, red blood cell count and white blood cell count.

2.5 Proximate Chemical Analysis; Samples of *Panicum maximum* and the supplement diets were analyzed for their proximate composition using standard procedure according to AOAC (2000).

2.6 Experimental design and Statistical Analysis

using a one-way analysis of variance (ANOVA) and significant differences were separated using least

significant difference (LSD) with the aid of SPSS version 23 , 2015 edition.

3.0 RESULTS AND DISCUSSION

3.1 Proximate Composition of *Panicum maximum* and Concentrate Diets

The proximate composition of *Panicum maximum* and concentrate diets are presented in Table 2

The protein content of 11.40% for *Panicum maximum* was below the range of 12-18%

recommended for growing ruminants in the tropics (NRC 1996), this shortfall was however compensated for by the supplement diet. The protein , energy and crude fibre values of the supplementary diets were within recommended values for growing ruminants in the tropics (Lakpini *et.al.*,2002) , the ether extracts values were within the values of 5 – 6 % recommended for ruminants(Maithison *et.al.*1997)

Table 2: Proximate Composition of Concentrate Diets and *Panicum maximum* (% DM)

NUTRIENTS		T2	T3	T4	<i>Panicum maximum</i>
Crude protein	-	14.55	16.30	18.95	11.40
Crude fibre	-	19.80	17.62	16.00	18.50
Nitrogen free extracts	-	48.00	50.50	51.00	41.10
Ether extracts	-	4.00	4.50	5.05	6.00
Ash	-	10.30	8.40	7.10	19.80
Dry matter	-	94.45	95.55	94.30	54.90

3.2 Feed Intake of Experimental Weaner Rams

The feed intake of the experimental weaner rams is presented in Table 3

The daily supplement intake of 120.00 to 140.00g (T2 – T4) , and total daily feed intake of 320.00 – 355.65g were both significantly (P>0.05) different, with T1 having the highest values for both parameters .The

daily forage intake values were significantly (P>0.05) different, with T1 having the highest, the values were lower than 920 – 931.65g reported by Ocheja *et al.*,(2011,)who also fed *Panicum maximum* to Yankasa rams, the observed discrepancy could be due to season of the experiments / stage of maturity of the grass.

Table 3: Feed Intake Data of Experimental Weaner Rams

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Daily Supplement Intake (g)	-	120.00 ^a	130.50 ^b	140.00 ^c	23.00
Daily Forage Intake (g)	320.50 ^a	230.70 ^b	216.75 ^b	215.65 ^b	17.80
Total Daily Feed Intake (g)	320.50 ^b	350.70 ^a	347.25 ^a	355.65 ^a	22.78

a, b,c Treatment means on the same row with different superscripts differ significantly (p<0.05)

SEM Standard Error of Mean

3.3 Heamatological Profile of Experimental Weaner Rams

The heamatological profile of the experimental weaner rams is summarized in Table 4

All the heamatological parameters determined showed significant (P<0.05) differences, with values for the supplemented treatments being better than those of the control(T1). The packed cell volume values ranged from 22.00 to 34.50%, the white blood cell count values ranged from 12.30 to 16.50 x10³ul.

All the reported values were within normal range for weaner rams, this indicated that the supplement diets were nutritionally adequate for the rams (Ocheja *et al* ,2021). Abnormally low packed cell volume , red blood cell count and heamoglobin concentration signifies aneamia while abnormally high white blood cell count is indicative of microbial or parasitic infections(Olabanji *et al* ,2007) The rams were however free from all of the above conditions.

Table 4: Heamatological Profile of Experimental Weaner Rams

Heamatological Parameters	T ₁	Treatments			SEM
		T ₂	T ₃	T ₄	
Packed Cell Volume (%)	22.00 ^c	28.40 ^b	32.50 ^a	34.50 ^a	6.80
Heamoglobin(g/dl)	7.66 ^c	8.50 ^b	9.70 ^a	9.90 ^a	3.00
Red Blood Count(x10 ³ ul)	1.80 ^c	2.60 ^b	2.80 ^a	2.90 ^a	1.09
White Blood Count(x10 ³ ul)	16.50 ^a	13.30 ^b	12.40 ^c	12.30 ^c	0.12
Monocytes (%)	12.50 ^c	15.00 ^b	17.10 ^a	17.80 ^a	2.10

a, b,c Treatment means on the same row with different superscripts differ significantly (p<0.05)
SEM= Standard Error of Means :

Serum Biochemical Profile of Experimental Weaner Rams

Values for urea and creatinine showed significant (P<0.05) differences, while the values for blood glucose, cholesterol and alkaline phosphate were not significantly (P>0.05) different, the values for the supplemented treatments were generally better. All the values however fell within normal range for weaner rams

Abnormally high alkaline phosphate is indicative of bone disease, liver disease, bile obstruction (Ocheja *et al* ;2021;Oyibo *et al* 2020) the values showed that the rams were free from these conditions Variations could also be due to feed preparation and handling of blood samples, genetic, environment, sex and age of animals. Normal urea values indicates that the protein was of good quality and well utilized.

Table 5: Serum Biochemical Profile of Experimental Weaner Rams

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Blood Sugar (mg/dl)	35.40	35.90	34.00	34.50	1.00
Creatinine (mol/l)	18.90 ^a	16.55 ^b	16.60 ^b	16.50 ^b	0.95
Urea (mmol/l)	2.90 ^a	1.90 ^b	1.55 ^b	1.50 ^b	0.34
Alkaline phosphate m/l	52.00	53.12	53.50	52.60	1.06
Cholesterol (Mmol/l)	4.00	4.35	4.30	4.40	0.50

a, b,c Treatment means on the same row with different superscripts differ significantly (p<0.05)
SEM Standard Error of Means

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The heamatological and serum biochemical values for the supplemented treatments were better than values for the control(unsupplemented treatment)

Concentrate supplementation of forages is a necessity for optimum haematological and serum biochemical values in weaner Yankasa rams

4.3 Recommendations

Supplement diets containing varying levels of bambara nut offals and rice offal can be fed to weaner Yankasa rams for improved heamatological and serum biochemical profiles. Further research should be carried out using rams of other ages

REFERENCES

- AOAC (2000) Association of Official Analytical Chemists. Official methods of Analysis 17th Edition Washington, D.C. Pp. 3 – 22.
- Baker F.S and Silvertown R.E (1985) Laboratory Technology 5th Edition, Butter S.C London RP 481-494.
- Balikci, E , Yildiz, A, Gurdodan F(2007) Blood Metabolites Concentration During Pregnancy and Post Partum in Akkaraman Ewes. *Small Ruminant Research* 67: 247 - 251
- Belewu ,M.A, and Ogunsola, F.O (2010) Heamatological and Serum Indices of Goats fed Fungi –Treated Jatropha curcas Kernel cake in a mixed ration . *Journal of Agricultural Biotechnology and Sustainable Development*. 2(3):035 - 038
- Ifatimehin, O.O, Musa, S.D and Adeyemi, J.O (2011) Managing Land Use Transfoermentation and Land Surface Temperature Change in Anyigba , Kogi State ,Nigeria. *Journal of Geography and Geology*.3:77 - 85
- Lakpini, C. A. M., Adamu, A. M., Ehoche, O. W. and Gefu, J. O. (2002). Manual for Small Ruminant Production in Nigeria. Compilation for a Training Workshop on Small Ruminant production held at the National Animal Production Research

- Institute, Zaria Nigeria 13th – 18th January 2002 Pp. 55 – 62.
- Maithison, G. W., McAlhster, T. A., Cheng, K. J., Dong, Y., Galbraith, J. and Dmytruk, O. (1997). Methane from farm animals. Abstract of workshop on green house Gas Research in Agriculture, Saint Foy March 12 – 14, Pp. 40 – 45.
- NRC, National Research Council, (1996). Nutrient requirements of beef cattle 7th Rev. Ed. National Academy Press Washington, DC. P. 27.
- Ocheja, J.O, Oguche, H.G, Opaluwa, H.I, Okpe, A.A, Okpanachi, U, and Lalabe, B.C (2011) Analysis of Varying Proportions of a Mixture of Bambara Nut Offal and Rice Offal Supplement fed to Weaner Rams. *Int. Journal of Agric. and Development Economics (IJADE)* 1 (1): 68 – 73
- Ocheja, J.O, Halilu, A, Shittu, B.A, Eniolorunda, S.E, Ajagbe, A.D, and Okolo, S.E(2021). Haematology and Serum Biochemistry of Yearling West African Dwarf Goats Fed Cashew Nut Shell Based Diets. *Veterinary Medicine and Public Health Journal.* 2(1):17 – 22
- Ocheja, J.O, Usman, G.O, Ahmed, S.H, Boyi, P.U, Akoh, J.O, Adamu, A.T and Eboh, S(2020) Performance and feed Bio-Economics of Growing West African Dwarf Goats fed Diets Containing Graded Levels of Steam-Treated cashew nutshell . *Animal and Veterinary Sciences (Special Issue : Promoting Animal and Veterinary Science Research)* 8(1):14 - 18
- Okpanachi, U, Okpanachi GAC Kaye-J, Agu C.I and Odah E.O(2018), Haematological profile and serum biochemistry of West African Dwarf goats fed sun-dried yellow cashew pulp based diets *journal of applied science* 19:319-324.
- Olabanji, R. O, Farinu, G. O, Akinlade J. A, Ojebiyi O. O, Odunsi A. A. and Akingbade A. A (2007) Studies on Haematological and Serum biochemical characteristics of weaner rabbits fed different levels of wild sunflower (*Tithonia diversifolia*) Hons A Grey) leaf – blood meal mixing *International Journal of Agriculture and Rural Development*, 4 (1 and 2): 80 – 89.
- Okoruwa, M.I and Adewumi, M.K(2010) Effects of Replacing *Panicum maximum* with Dried Pineapple Pulp on Nutrient digestibility and Nitrogen Balance of West African Dwarf Sheep . *Nigerian Journal of Animal Science.* 2(3):108 - 115
- Oyibo, A, Effienokwu, J.U, Shettima, I, Umar, A.Y, Ahmed, S.H, Emmanuel, A.T, and Adamu, A.T.(2020). Serum Biochemistry of West African dwarf Goats fed some Browse Species supplemented with a Concentrate Diet. *Animal and Veterinary Sciences (Special Issue; Promoting Animal and Veterinary Science Research)* 8 (2):41 - 44.
- SPSS, (2015) Statistical packages for social sciences. Version 23.0 SPSS Inc. Pp. 16 – 19.