

SERUM BIOCHEMICAL INDICES OF WEST AFRICAN DWARF RAMS FED SELECTED BROWSE PLANTS AND GUINEA GRASS HAY

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ABSTRACT

Serum metabolites of West African dwarf growing rams fed selected browse fodders with guinea grass hay basal diet for 70days feeding trial was conducted at Teaching and Research Farm of Oyo State College of Agriculture and Technology Igbo-ora, Nigeria. Sixteen (16) growing WAD rams of age 6-9 months with body weight of 9.00 - 12.00kg were randomly allocated to four treatments with four rams per treatment and 2 rams as replicate in a completely randomized design. The experimental diet was fed at 3% body weight of individual ram while *G. arborea*, *S. sesban* and *F. thonningii* fodders were fed at varied proportions with *Panicum maximum* hay. The compared treatment diets were: T₁ (sole100%PM hay), T₂ (70%PM hay: 30%GA), T₃ (70%PMhay: 30%SS) and T₄ (70% PM hay: 30%FT) and fed for each individual ram per day. Significant ($p<0.05$) differences were observed in all parameters determined across the dietary treatments. Ram fed diet T₃ had the highest Total protein (6.41g/dl), while the lowest value (5.80g/dl) for TP was recorded on ram fed diet T₁. Ram fed diet T₄ recorded least albumin (2.20g/dl) while highest albumin (2.80g/dl) was recorded in ram fed diet T₃. However, rams fed T₃ diet were observed to have the highest ALT value of 32.00I μ L while those fed T₄ diet had the lowest value of 15.00I μ L. From the results, T₃ proved to be the best diet of this study. The study revealed that 70%PM hay: 30%SS mixture diet has a good nutrient profile and enhanced the productivity of growing rams.

Keywords: Tropical browse plant fodders, WAD rams, Serum biochemical indices.

INTRODUCTION

The scarcity and soaring cost of convectional protein feedstuffs necessitate research into alternative resources for sustainable ruminant production. Use of browse legumes as supplement cold help to alleviate the problem of dry season feeding of ruminants and equally reduce high cost of feeding associated with the use of convectional protein feeds (Olafadehan, 2013). In arid and semi-arid zones, browse fodders provide the largest part of protein supply during the driest months. For example, it is estimated that in the Sahel up to 80% of the protein ration is provided by plants of the *Capparaceae* family during the three driest months of the year (Baumer, 2011). The use of browse plants as supplement have been shown to enhance intake, improve growth rate and increase reproduction in ruminants (Okafor *et al.*, 2012). The potential of browse fodders in overcoming this problem have been recognized (Olafadehan and Okunade, 2016). Tropical trees and shrubs are an important component of the fodder resources for livestock and wildlife. The ability of their foliages to remain green and maintain their crude protein (CP) content makes them potential sources of protein and energy (Olafadehan, 2013). Blood indices are important indicators of farm animal's physiological stages, as they show the link between nutrition and health status of the animal (Jiwuba *et al.*, 2016). Thus, this study was designed to evaluate serum biochemical indices of West African dwarf growing rams fed selected browse plants with guinea grass hay.

MATERIALS AND METHODS

Experimental site and animals

The experiment was conducted at the Sheep and Goat Unit, Teaching and Research Farm, Oyo State College of Agriculture and Technology, Igboora. Sixteen (16) growing West African dwarf rams weighing between 9.00 - 12.00kg and of 6–9 months of age were used. The animals were allowed to acclimatize for two weeks and treated against ectoparasites and endoparasites prior to the commencement of the experiment.

Harvesting and processing of experimental diets

The forages were harvested from pasture demonstration plot of the college farm. *Panicum maximum* forage were cut at 15cm above the ground level at pre-flowering stage, chopped at 3 cm long and wilted for 2-3hours in the sun and air dried under shade for four to five days by spreading on a concrete floor and turning thoroughly to facilitate uniform drying for saving storage to prevent bleaching and loss of nutrients, bailed, and

stored for the experiment. Fresh *Gmelina arborea*, *Sesbania sesban* and *Ficus thonningii* foliage were harvested daily around the College vicinity.

Experimental layout, design and feeding method

A total of 16 rams were allocated by weight into four treatments of four rams per treatment and two rams as replicate in a completely randomized design (CRD). Table 1 shows the proximate composition of the experimental diets (T₁=sole 100% PM hay, T₂=70%PM hay: 30% GA, T₃=70% PM hay: 30% SS, and T₄=70%PM hay: 30% FT). The *Panicum maximum* hay and browse fodders combinations were thoroughly mixed to minimize selection by the animal. Each group of animals was assigned to an experimental diet and fresh and clean water was provided *ad libitum*.

Table1: Proximate composition of selected browse fodders with *Panicum maximum* hay combination fed to the rams

Parameters (%)	T ₁ 100PM Hay	T ₂ PM70GA30	T ₃ PM70SS30	T ₄ PM70FT30
DM	78.21	81.10	81.14	80.56
CP	8.32	16.71	18.69	17.60
CF	27.33	19.87	19.02	20.11
EE	1.32	2.30	2.39	2.34
Ash	7.09	9.70	10.62	9.67
NFE	31.86	33.04	32.08	34.05
*ME(Kcal/Kg)	1546.85	1979.33	2025.87	2051.39

DM= Dry Matter, CP= Crude Protein, CF= Crude Fibre, EE= Ether Extract, NFE=Nitrogen Free Extract, *ME= Calculated Metabolizable energy, PM=*Panicum maximum* hay, GA=*Gmelina arborea* fodder, SS=*Sesbania sesban* fodder, FT=*Ficus thonningii* fodder.

Data Collection and Analysis

At the end of the feeding trial, a new hypodermic needle and syringe (for each animal to avoid cross-contamination) was used to collect 5ml blood sample via the jugular vein from three randomly selected rams from each treatment and was discharged into a sterile plain bottle to allow clotting at room temperature and serum was decanted for analysis. The obtained data on selected serum biochemical indices were subject to one-way analysis of variance (SAS, 2013), while differences among the means were separated using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The result of serum biochemical indices is shown in Table 2. The result revealed that biochemical indices were significantly ($p < 0.05$) influenced by the treatment. The total protein observed for WAD rams fed diets T₂, T₃ and T₄ in this study was within the range of 6.1 – 7.5g/dl reported by Merck (2011) whereas significantly lower total protein of rams fed T₁ diet is an indication of the relatively poor protein quality of the diet, the level and availability of the dietary protein (Olafadehan, 2011). The albumin concentration recorded for West African dwarf rams in this study was lower than 3.90 – 4.45µ/L reported by Yusuf *et al.* (2012) but like that obtained by Oyebanji and Ayandiran (2014). All the experimental rams were within the range of 2.7 – 4.4g/dl for globulin (Merck, 2011). Rams fed diet T₂ had the highest globulin, while rams fed diet T₃ had the least globulin. However, the concentrations were higher than 0.61 – 1.60g/dl reported by Daramola *et al.* (2005) for WAD goats. There was significant difference ($p < 0.05$) in the serum cholesterol level of the experimental animals. The rams fed diets containing selected browse fodders with *Panicum maximum* hay mixture (T₂, T₃ and T₄) had lower ($p < 0.05$) cholesterol levels than T₁ diet that containing sole *Panicum maximum* hay. Cholesterol is conventionally used for diagnosing human and domestic animal's hepatic damage (Silanikove and Tiomkin, 1992). The blood cholesterol of the rams in this study were within the values 56.80 – 103.90mg/dl reported by Yusuf *et al.* (2012). It was observed that the blood cholesterol level of the animals fed diets T₃ and T₄ was far below the normal blood cholesterol values of 65 – 136mg/dl reported by Merck (2011) hence indicating that selected browse fodders with *Panicum maximum* hay mixture as a potent hypocholesterolemic agent, which agreed with the submission of Esonu *et al.* (2001) that haematological constituents reflect the physiological responsiveness of the animal to its internal and external environments (including feed and feeding).

Table 2: Serum biochemical indices of growing West African Dwarf rams fed selected browse fodders combination with *Panicum maximum* hay

Parameters (%)	T ₁ 100PM Hay	T ₂ PM70GA30	T ₃ PM70SS30	T ₄ PM70FT30	SEM (±)
Total protein (g/dl)	5.80 ^d	6.20 ^c	6.41 ^a	6.35 ^b	0.08
Albumin (g/dl)	2.60 ^{ab}	2.50 ^c	2.80 ^a	2.20 ^{cd}	0.06
Globulin (g/dl)	3.40 ^c	3.70 ^{ab}	3.00 ^{cd}	3.10 ^a	1.05
Glucose (mg/dl)	65.32 ^a	62.41 ^c	62.89 ^b	59.33 ^d	1.40
AST (I.µL)	62.00 ^d	86.00 ^a	83.00 ^b	65.00 ^c	1.08
ALT (I.µL)	18.00 ^c	30.00 ^{ab}	32.00 ^a	15.00 ^d	0.76
Cholesterol(mg/dl)	74.00 ^a	70.00 ^b	60.00 ^c	57.00 ^d	1.98
Creatinine (mg/dl)	1.50 ^{bc}	1.70 ^a	1.40 ^c	1.50 ^{bc}	0.02

^{a b c d}Means on the same row with different superscript are significantly different (P< 0.05). AST= Aspartate aminotransferase, ALT= Alanine aminotransferase

CONCLUSION

The results of this study indicated that combination of grass-based diet *Panicum maximum* hay with browse fodder in the diet of WAD rams enhanced immune and reduced blood cholesterol level. Also, the health status of West African dwarf rams was improved when selected browse fodders and *Panicum maximum* hay combination diet were used as feed, therefore, indicated that the nutritive- potential of this legume foliage can go a long way in solving the problem of dry season feeds in ruminants. In addition, blood metabolites in rams were better pronounced in diet that contained 30% *Sesbania sesban* fodders + 70% *Panicum maximum* hay mixture.

RECOMMENDATION

Based on the obtained result, the inclusion of 30% *Sesbania sesban* fodders + 70% *Panicum maximum* hay mixture is recommended for optimum protein- energy ratio to achieved microbial synthesis with this dietary combination

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