

HAEMATOLOGICAL PARAMETERS OF WEST AFRICAN DWARF RAMS FED SELECTED BROWSE PLANTS AND GUINEA GRASS HAY

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ABSTRACT

The impact of 70-days feeding trial of selected browse fodders with guinea grass hay basal diet on haematological parameters of West African dwarf rams was investigated at the 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 dietary treatments with four rams each and 2 rams per 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: T_1 (sole 100% PM hay), T_2 (70% PM hay: 30% GA), T_3 (70% PM hay: 30% SS) and T_4 (70% PM hay: 30% FT) and fed to each individual ram per day. Significant ($p < 0.05$) differences were observed in all parameters determined across dietary treatments except monocyte. Ram fed diet T_3 had the highest Packed cell volume (26.0%), while the lowest value (23.0%) was recorded on ram fed diet T_1 . Ram fed diet T_1 recorded least haemoglobin (6.80g/dl) while the highest (8.60g/dl) was recorded in ram fed diet T_3 . However, ram fed T_3 diet had the highest Red Blood Cell count of $10.21 \times 10^6/\mu\text{l}$ while those fed T_1 diet recorded the lowest value of $8.14 \times 10^6/\mu\text{l}$. From the results, T_3 proved to be the best diet in this study as it has a good nutrient profile and enhanced the productivity of growing rams.

Keywords: Tropical browse plant fodders, Guinea grass hay, WAD rams, Haematological parameters.

INTRODUCTION

The role of livestock, especially small ruminants, to most developing nations' socio-economic development and food security cannot be overemphasized. Apart from their preference over other livestock due to their ability to withstand harsh environmental conditions, sheep production forms an integral part of rural farming life, providing them with an animal protein source and income from sales (Akinmoladun *et al.*, 2019). In Nigeria, the long dry season characterized by animal feed shortages (both in quantity and quality) and poor nutritional value of forages is a major factor limiting their sustainable development and productivity. Poor nutrition, occasioned by low voluntary intake and reduced digestibility, are the root cause of low reproductive performance, depression in growth rate, loss of body condition and decreased immunity in livestock. A possible solution is to identify and explore alternative and non-conventional feed resources of no feeding value to humans, locally available and with high nutritional potentials (Akinmoladun *et al.*, 2018). Fodder trees and browse plants can be used as a nitrogen (N) supplement to the diet, as Bogale *et al.* (2008) found that the N was a nutrient deficient in several tropical pastures. It can be used as green or hay for livestock, particularly small ruminants, because of easy digestion, low fibre fractions, and contain a high proportion of protein reached to 23.8% (Gebreyowhans and Zegeye, 2019). Blood indices are important indicators of farm animals' 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 haematological parameters 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 such as lice and endoparasites like tapeworms 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 2-3 hours 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, baled, 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 body 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 discharge into the sample bottles containing ethylene diamine tetra acetic acid (EDTA) as anticoagulant and the bottles were shaken thoroughly to ensure proper mixing of the blood with the anticoagulant for estimation of haematological parameters. The obtained data were subject to one-way analysis of variance (SAS, 2013), while differences among the means were separate using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The result of haematological parameters is shown in Table 2. The result revealed that haematological parameters were significantly ($p < 0.05$) influenced by the treatment except monocyte. The mean Packed cell volume (PCV) observed in this current study with value ranged from 23.0 – 26.0% compared favourably with 25 – 30% reported by Opara *et al.* (2010). It implies that the protein content of the diets was adequate since the values were within normal range for healthy WAD goats (Daramola *et al.*, 2005). The PCV recorded in this study was lower than the 34.0 – 37.0% reported by Okah *et al.* (2014) fed WAD bucks with differently processed poultry droppings. The variations in PCV might be attributed to increase in environmental temperature which was similar to the observation made in this study. Haemoglobin concentrations ranged between 6.80 and 8.60 g/dl but higher than the 5 – 6g/dl reported by Belewu and Ogunsola (2010) for goats fed fungi treated *Jatropha curcas* kernel cake rations. Thus, the dietary treatments seemed to be capable of supporting high oxygen carrying capacity blood in the rams. Haemoglobin values fell within normal range implying that the dietary protein fed to the animals was of high quality and adequate. In general, increase in Hb concentration is associated with greater ability to resist disease infection, and low level is an indication of disease infection and poor nutrition (Njidda *et al.*, 2013). The red blood cell values ($8.14 - 10.21 \times 10^6/\mu\text{l}$) observed in this study were higher than the reported values of $8.1 - 9.7 \times 10^6/\mu\text{l}$ by Fayomi *et al.* (2014) on feeding trial using Moringa multi-nutrient blocks. The white blood cell counts of $5.40 - 6.75 \times 10^3/\mu\text{l}$ observed were within the range of $5.5 - 8.7 \times 10^3/\mu\text{l}$ reported by Fayomi *et al.* (2014). The lymphocytes concentrations ranged from 56.0 – 62.0%; these values were within the broad range of 47 – 82% reported by Daramola *et al.*, (2005) while the obtained neutrophils value compared favourably to the concentrations (17.00 – 36.4%) reported by Tambuwal *et al.* (2002). These concentrations of lymphocytes and neutrophils are suggestive of a well-developed immune system in the West African Dwarf rams with such number of immune cells to proffer good health (Daramola *et al.*, 2005).

Table 2: Haematological parameters 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 (±)
PCV (%)	23.00 ^c	25.00 ^a	26.00 ^a	24.00 ^b	0.08
Hb (g/dl)	6.80 ^c	8.50 ^{ab}	8.60 ^a	7.30 ^{cd}	0.05
RBC (x10 ⁶ ul)	8.14 ^c	10.18 ^{ab}	10.21 ^a	9.23 ^{cd}	1.01
WBC (x10 ³ ul)	5.40 ^d	6.55 ^b	6.75 ^a	5.65 ^c	1.50
Platelets (ul)	94.00 ^d	117.00 ^b	122.00 ^a	106.00 ^c	2.28
Lymphocyte (%)	56.00 ^d	60.00 ^b	62.00 ^a	58.00 ^c	0.02
Neutrophils (%)	35.00 ^c	34.00 ^d	37.00 ^b	40.00 ^a	1.04
Monocyte (%)	2.00 ^a	3.00 ^a	3.00 ^a	3.00 ^a	0.06
Eosinophil (%)	1.00 ^a	1.00 ^b	2.00 ^b	1.00 ^b	0.08
MCV (fl)	28.56 ^a	25.54 ^{ab}	25.47 ^c	26.00 ^b	1.82
MCHC (%)	29.57 ^d	32.69 ^b	33.08 ^a	30.42 ^c	1.50
MCH (pg)	8.35 ^c	8.35 ^c	8.42 ^{bc}	8.43 ^a	0.28

^{a b c d} Means on the same row with different superscript are significantly different ($P < 0.05$). PCV= Packed cell volume, MCH= Mean Corpuscular Haemoglobin, RBC= Red blood cell, WBC= White blood cell, MCHC= Mean Corpuscular Haemoglobin Concentration, MCV = Mean Corpuscular Volume.

CONCLUSION

The results of this study indicated that combination of grass-based diet *Panicum maximum* hay with browse fodders (*Gmelina arborea*, *Sesbania sesban* and *Ficus thonningii*) in the diet of WAD rams enhanced immune, and the health status of 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, haematological parameters in rams were better pronounced in diet that contained 30% *Sesbania sesban* fodders + 70% *Panicum maximum* hay mixture.

RECOMMENDATION

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

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