RUMEN FERMENTATION PARAMETERS AND MICROBIAL COUNTS OF WEST AFRICAN DWARF RAMS FED BASAL DIETS SUPPLEMENTED WITH MULTI-NUTRIENT BLOCKS.

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ABSTRACT
A ninety days feeding trial was conducted to assess the effects of basal diet supplemented with Multi-nutrient blocks rumen fermentation parameters and microbial counts of West African Dwarf (WAD) rams. Fifteen WAD rams were used for the experiment, using *Panicum maximum* as the basal diet. The experiment had five (5) treatments with three animals per treatment. Rumen parameters such as acetic acid, total volatile fatty acid are significantly ($P<0.05$) different across the treatments. The total bacteria counts, total fungi counts and total coliform count were also significantly ($P<0.05$) different across the treatment respectively. The use of basal diet supplemented with multi-nutrient blocks at 30% inclusion level of ruminant feed improved the rumen fermentation parameters and microbial counts of West African Dwarf Sheep..
Keywords : Basal diet, microbial counts, Multi-nutrient block, Ram, Rumen parameters

INTRODUCTION
Nutrition is perhaps the most important consideration in Livestock management. Inadequate supply of both quantity and quality of feeds is responsible for the low livestock productivity. Seasonal variability in Nigeria affects the nutritive quality of natural pastures which in turn, affects animal's live-weight (Suilapwa and Simukoko, 2001). However, to alleviate the shortage in feed during the dry season, farmers collect agro-industrial by-products, dry and store them for later use. The competition between man and livestock for conventional feedstuffs has necessitated the need to explore alternative feed resources that are rarely consumed by man but which can meet the nutritional requirement of goat with little or no processing. (Saksathir *et al.*,2011).

Sheep in Nigeria suffer several nutritional stress in the dry season as a result of seasonal variability that affects the availability and nutritive quality of pastures which in turn marked decrease in nutrient intake and utilization. Small ruminant feed requirement in the tropics is aggravated by high cost of conventional feeds and lack of alternative source of feeds particularly during dry season when forages are scarce. This has necessitated the need to search for alternative source that are cheaper and readily available (Okoruwa and Adewumi, 2010)

Formulation of multi-nutrient blocks (MNB) from low cost and locally available feed materials that do not compete with human food has been described as very promising (Makkar 2007). To enhance small ruminants productivity in Nigeria and other developing countries, alternative nutritional practices should include feed supplementation by the use of multi-nutrient blocks containing fermentable nitrogen and other microbial growth enhancement factors (Makkar, 2007).

This study is designed to evaluate the rumen fermentation parameters and microbial counts of West African Dwarf rams fed diet supplemented with Multi-nutrient Blocks..

MATERIALS AND METHODS
The experiment was carried out at the Small Ruminant Unit of the Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria. The area lies within thhe rain forest ecological zone and fall within Longitude and latitude 7^0 and 27^0 and 3^0 , 25^0 respectively. Five (5) experimental concentrate diets containing varying levels of molasses at 0%, 10%, 20% and 30% in replacement of corn bran and cassava peel meal. Other fixed ingredients in the diets include Groundnut cake urea, Corn cob, palm kernel cake, cassava starch, limestone, bone meal, premix and salt. The gross composition of the experimental diets is as presented in Table 1. Twelve WAD sheep aged 6-7 months were used for the experiment. The rams were given prophylactic treatments before the commencement of the experiment and randomly allotted to five treatment groups of 3 animals per treatment having balanced them for weight. The experimental design was a completely randomized design and lasted for 3 months. The basal diet (Guinea grass) was supplied at 3% body weight in the morning and 2% multi -nutrient block supplied also in the morning. Fresh water was supplied *ad-libitum* while feeding was done at 07.00 hrs and 16.00 hours Daily feed intake and weight gain were monitored and recorded. Rumen fluid was collected by the use of a suction tube. The rumen fluid was filtered through the layers of cheese cloth. . The sample was divided into three parts:; first portion was used for ammonia

nitrogen analysis with 5ml of H_2SO_4 added to 50ml of rumen fluid. The mixture was centrifuged at 60,000 for 15minutes and supernatant yellow fluid was pipetted and stored at 20^0 C for analysis using Kjheldal method and volatile fatty acid concentration by using HPLC (Slavica, 2010)The rumen fluid was collected at the end of the feeding trial and taken to laboratory for analysis to know the volatile fatty acids, the lactic acid, the rumen pH, the ammonia nitrogen and microbial counts.

Chemical Analysis

The proximate composition of experimental diet was carried out according to method of (A.O.A.C,1995) while fibre fractions analysis was done according to (Van soest and Robertson,1985)

Statistical Analysis

Data obtained was subjected to one-way analysis of variance in a completely Design using (SAS,1999). Significant means were separated using Duncan Multiple Range Test (Duncan,1955)

Table 1: Percentage (%) Composition of the Experimental Concentrate

Ingredients	0%	10%	20%	30%	0%
Corn bran	0.00	20.00	10.00	0.00	30.00
Molasses	0.00	10.00	20.00	30.00	0.00
Cassava peel	30.00	0.00	0.00	0.00	0.00
Groundnut cake	10.00	10.00	10.00	10.00	10.00
Urea	2.00	2.00	2.00	2.00	2.00
Corn -cob	15.00	15.00	15.00	15.00	15.00
Cassava starch	15.00	15.00	15.00	15.00	15.00
Palm kernel cake	20.00	20.00	20.00	20.00	20.00
Salt	1.00	1.00	1.00	1.00	1.00
Limestone	4.00	4.00	4.00	4.00	4.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Premix	1.00	1.00	1.00	1.00	1.00
Total	100	100	100	100	100
Calculated Analysis					
Energy(MJ)	10.50	10.52	10.54	10.52	10.53
Crude protein (%)	14.65	15.59	14.89	13.69	16.69
Fibre (%)	15.90	15.89	15.49	15.66	15.79

RESULTS AND DISCUSSION

Ingredients composition of experimental concentrate diets are shown in Table 1. The chemical composition of the experimental diets (Table 2) shows that Crude protein (CP) contents ranged between 162.1g/kg DM in 0% inclusion level to 149.2g/kg DM in treatment 4 and was not consistent with the values of 9500 g/kg DM to 1000 g/kg DM obtained by ARC (1990).

Table 2: Chemical Composition of Experimental Concentrate Diet

Parameters (%)	**T_1 0%**	**T_2 10%**	**T_3 20%**	**T_4 30%**	**T_5 0%**
Dry matter	89.84	90.03	89.89	89.91	89.45
Crude Fibre	11.37	14.67	15.59	15.75	11.30
Crude Protein	16.21	15.28	14.92	15.97	16.10
Crude Fat	3.74	3.61	3.57	3.55	3.80
Ash	7.59	7.14	6.88	7.21	7.50
Nitrogen free extract	50.93	49.33	48.93	48.25	50.85
NDF	41.69	42.93	49.87	48.95	41.50

ADF	21.08	31.79	38.79	39.05	20.15
ADL	9.79	10.78	11.06	10.76	9.70
Hemicellulose	20.61	11.14	11.08	9.90	20.65
Cellulose	11.29	21.01	27.73	28.29	11.10

NDF = Neutral Detergent Fibre
ADF = Acid Detergent Fibre
ADL = Acid Detergent Lignin
HEMICELLULOSE = NDF – ADF
CELLULOSE = ADF – ADL

Table 3 shows the rumen parameters and microbial counts of West African Dwarf goats fed pineapple waste with yeast supplementation. There were significant differences ($p > 0.05$) in the Acetic acid and Total volatile acid respectively. Treatment 5 which had the 0% inclusion of molasses with 30% inclusion of Corn bran had the highest pH (6.07) which was in agreement with the findings of Wells and Russels (1996) and Aye and Adegun, 2010 whose value was (5.5-7.5) which was recommended to be a standard rumen pH values. Total coliform counts (TFC) and Total fungi (TFC) were significantly influenced ($p>0.05$) by the diets. Bacteria counts of rumen is dependent on rumen ammonia concentration and pH of the rumen fluid and both are factors dependent on the type of diet fed.

Table 3: Effect of Feeding Graded Levels of Pineapple Waste with Yeast Supplementation on Rumen Parameters at the Start of the Experiment

Rumen Fluid	**T1**	**T2**	**T3**	**T4**	**T5**	
Parameters	**0%**	**10%**	**20%**	**30%**	**0%**	**SEM±**
Rumen pH	5.73	5.90	5.90	6.10	5.70	0.06
NH3-N (%)	9.17^{c}	10.30^{ab}	9.92^{b}	10.62^{a}	9.10^{c}	0.18
Lactic Acid (%)	5.11^{b}	8.87^{ab}	5.56^{b}	10.04^{a}	5.10^{b}	0.77
Acetic Acid (%)	3.65^{b}	5.39^{ab}	4.32^{b}	7.51^{a}	3.60^{b}	0.57
Propionic Acid (%)	2.49^{b}	3.95^{b}	2.92^{b}	4.47^{a}	2.50^{b}	0.33
Butyric Acid (%)	3.82^{b}	6.02^{ab}	4.44^{ab}	6.81^{a}	3.80^{b}	0.50
Total bacteria count (cfum1-1x10^{6})	11.80^{a}	7.60^{c}	8.67^{b}	8.87^{b}	11.85^{a}	0.48
Total fungi count (cfum1-1x10^{6})	0.40^{b}	0.27^{c}	0.47^{b}	0.73^{a}	0.50^{b}	0.05
Total coliform (cfum1-1x10^{6})	1.07^{c}	1.47^{b}	1.90^{a}	0.73^{d}	1.08^{c}	0.14

^{abc} = value in the same row with different superscripts are significantly ($P<0.05$) different
SEM – Standard Error of Mean

CONCLUSION

It can be concluded from this research work that inclusion of molasses to the multi-nutrient block at 30% molasses and 0% Corn bran increased the production of total volatile fatty acids used as a precursor for energy production of West African Dwarf ram and did not have any negative influence on rumen fluid parameters, and microbial counts.

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