PERFORMANCE CHARACTERISTICS AND RUMEN FLUID PARAMETERS OF WEST AFRICAN DWARF GOATS FED GRADED LEVELS OF PINEAPPLE (*Ananas comosus)* WASTE WITH YEAST (*Saccharomyces cerevisiae)* SUPPLEMENTATION.

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ABSTRACT

A ninety days feeding trial was conducted to assess the effects of Pineapple waste (PW) with Yeast supplementation (YS) on performance, rumen parameters and microbial counts of West African Dwarf (WAD) goats. Twelve WAD goats were used for the experiment, using *Panicum maximum* as the basal diet. The experiment had four treatments with three animals per treatment. The total body weight gain of the animals were significantly (P<0.05) higher than the control. Average daily feed intake was significantly different (P<0.05) and the highest value was recorded in goats fed 30% inclusion in the diet (3.90kg). The feed conversion (FCR) ratio was also significantly different (P<0.05) and the lowest FCR was recorded in diet containing 30% inclusion level of Pineapple waste with Yeast supplementation. Rumen parameters such as pH, lactic acid, propionic acid, butyric acid were also significantly (P<0.05) different across the treatments. The total bacteria counts, total fungi counts were also significantly (P<0.05) different across the treatment respectively. The use of Pineapple waste (PW) with yeast supplementation at 30% inclusion level of ruminant feed improved the performance characteristics, rumen fermentation parameters and microbial counts of West African Dwarf Goats.

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 animals' 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 completion between man and livestock for conventional feedstuffs has necessitated the need to explore alternatives feed resources that are rarely consumed by man but which can meet the nutritional requirement of goat with little or no processing (Saksathit *et al.*,2011).

Goats 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)

Pineapple waste is such an example of Agro-industrial by-products that can be explicated to a good advantage for ruminant animal nutrition in Nigeria. Pineapple waste is usually discarded as waste after processing, is also rich a rich source of energy, but low in protein (Fadel *et al.*, 2000).

Yeast products such as *Saccaromyces cerevisiae* appear to be more useful in manipulating the microbial ecosystem of the rumen to improve feed utilization and productive efficiency of the ruminants. This study is designed to evaluate the performance and rumen fermentation parameters of West African Dwarf goats fed diet containing pineapple wastes with yeast supplementation.

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. Four experimental concentrate diets containing varying levels of pineapple waste at 0%, 10%, 20% and 30% in replacement of maize bran

with yeast supplementation were formulated. Other fixed ingredients in the diets include wheat offal, dried brewers grain, oyster shell, premix and salt. The gross composition of the experimental diets is as presented in Table 1. Twelve WAD goats aged 6-7 months were used for the experiment. The goats were given prophylactic treatments before the commencement of the experiment and randomly allotted to four 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. 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 collected 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 (Vansoest 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)

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). The performance characteristics (Table 3) shows that total weight gain and growth rate were significantly different ($P<0.05$). The results obtained from the experiment based on weight gain agrees with the earlier findings of (Okoruwa and Adewumi, 2010) which says higher growth rate and lower feed conversion ratio had indicated better performance of the animals. . Also, the inclusion of yeast (*Saccaromyces cerevisiae*) in the concentrate feed had a positive effect on weight gain which is in line with what was reported by Fickers *et al*. (2005) that supplementation of yeast improved feed utilization and productive efficiency of ruminants.

Table 4 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 Ammonia nitrogen, Acetic acid, Lactic acid, Propionic acid and Butyric acid respectively. Treatment 4 which had the 30% inclusion of pineapple waste with yeast supplementation had the highest pH (6.10) which was in agreement with the findings of Wells and Russels (1993) whose value was (5.5-7.5) which was recommended to be a standard rumen pH values. Bacteria counts of rumen are dependent on rumen ammonia concentration and pH of the rumen fluid and both are factors dependent on the type of diet fed.

CONCLUSION

It can be concluded from this research work that inclusion of pineapple waste with yeast supplementation in the diet of West African Dwarf (WAD) goats did not have any negative influence on performance characteristics, rumen fluid parameters, and microbial counts.

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

Ingredients	**Levels of Inclusion**				
	0%	**10%**	**20%**	**30%**	
Maize bran	50.00	40.00	30.00	20.00	
Pineapple	0.00	10.00	20.00	30.00	
Oyster shell	5.00	5.00	5.00	5.00	
Wheat offal	24.50	24.50	24.50	24.50	
Premix 0.25	0.25	0.25	0.25		
DBG 20.00	20.00	20.00	20.00		
Yeast -	+	+	+		
Total 100	100	100	100		
Calculated analysis (%)					
Crude protein	14.37	14.97	14.24	14.01	
Crude fibre	8.98	10.89	12.11	13.00	
M.E. (MJ/KgDM)		8.17	8.93	8.99	9.10

Positive sing (+) indicates with yeast supplementation of the rate of 1g on daily basis. Negative signs (-) indicates without yeast supplementation.

Table 2: Chemical Composition of Experimental Concentrate Diet

Parameters	T_1 0%	T_2 10%	T_3 20%	T_4 30%	
Dry matter	89.84	90.03	89.89	89.91	
Crude Fibre	11.37	14.67	15.59	15.75	
Crude Protein	16.21	15.28	14.92	15.97	
Crude Fat	3.74	3.61	3.57	3.55	
Ash	7.59	7.14	6.88	7.21	
Nitrogen free extract		50.93	49.33	48.93	48.25
NDF	41.69	42.93	49.87	48.95	
ADF	21.08	31.79	38.79	39.05	
ADL	9.79	10.78	11.06	10.76	
Hemicellulose	20.61	11.14	11.08	9.90	
Cellulose	11.29	21.01	27.73	28.29	

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

Table 3: Performance Characteristic of West African Dwarf Goat Fed Pineapple Waste with Yeast Supplementation

	Treatments				
Parameters	**0%**	**10%**	**20%**	**30%**	**SEM±**
Initial body weight (kg)	7.30	7.83	7.50	7.00	0.14
Final body weight (kg)	10.13^{b}	11.26^{a}	10.65^{ab}	10.90^{a}	0.38
Total weight gain (kg)	2.96^{c}	3.43^{ab}	$3.16b^{c}$	3.90^{a}	0.13
Growth rate (g/d)	34.90^{c}	42.74^{ab}	37.25^{bc}	45.87^{a}	1.61
Average daily intake (g/d)	414.00	460.86	437.52	422.88	13.22
FCR	11.91^{a}	10.84^{a}	11.71^{a}	9.19^{b}	0.36

^{abc} means on the same row having different superscripts are significantly ($P<0.05$) different
SEM – Standard Error of Mean

Table 4: Effect of Feeding Graded Levels of Pineapple Waste with Yeast Supplementation on Rumen Parameters at the Start of the Experiment

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

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