NUTRIENT INTAKE OF WEST AFRICAN DWARF GOATS FED DIETS CONTAINING GRADED LEVELS OF ALKALINE TREATED MALTED SORGHUM SPROUT

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ABSTRACT

A twelve week trial was conducted to determine the nutrients intake, digestibility and nitrogen utilization of West African dwarf (WAD) goats fed diets containing graded levels of Alkaline treated malted sorghum sprout (AMSP) using Panicum maximum as the basal diet. A total number of sixteen (16) WAD goats with an average live weight; 5.8 ± 0.6 kg were allotted on weight equalization into four (4) dietary treatments consisting of four goats per treatments in a completely randomized design. Four (4) diets were formulated to contain 0%, 20%, 40% and 60% AMSP. Data was collected on feed intake and nutrient intake was determined. Significant difference (P<0.05) were observed in all the nutrient intake parameters observed except the dry matter intake. Goats fed 40% AMSP recorded the highest total ash intake (27.01%), total acid detergent fibre (11.46%) and total cellulose intake (83.13%) compared with other dietary treatments. It can therefore be concluded that 40% AMSP can be used as potential sources of supplements in ruminants feed most especially during dry season as it enhanced nutrient intake.

Keywords: Nutrient, intake, WAD goats, Alkaline, Malted Sorghum Sprout,

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INTRODUCTION

Malted sorghum sprout (MSP) is a by-product of sorghum malting simply referred to separated root and shoots left after the malt extractions from the young germinating sorghum seedlings (Aletor *et al*., 1998). It is rich in organic nitrogen (Ikediobi, 1989) and also contains 88.79% dry matter, 26.38% crude protein, 2.35% ether extract, 5.21% ash, 51.06% nitrogen free extract, 49.57% neutral detergent extract, 31.25% acid detergent fibre, 3.92% acid detergent lignin, 18.32% hemicellulose and 27.33% cellulose (Saka *et al*., 2016). The anti-nutritional factors in MSP are tannin and hydrogen cyanide. Van Buren and Robinson (1969) reported that tannin influences the growth of animals in three main ways simply because they have astringent taste which affects palatability; decrease feed intake; form complexes with proteins thereby reducing its digestibility and finally act as an enzyme inactivators. More so, cyanide in MSP caused feed poisoning in animal (Wheeler, 1994). In order to improve the nutritional quality and to provide effective utilization of MSP in ruminant, it is essential that anti-nutritional factors be removed or reduced. Detoxification by alkaline treatments might be a good means of reducing the level of anti-nutritional factors and possibly increase MSP nutritive values. Alkaline treatment is economical because it involves the use of wood ash being regarded as a waste. More so alkaline treatments of high fiber roughages have been investigated extensively, and there are numerous reviews of their effect in increasing feeding value for ruminants (Wanapat *et al.*, 1985). This study is to determine the nutrient intake of West African dwarf (WAD) goats fed diets containing graded levels of Alkaline treated malted sorghum sprout.

MATERIALS AND METHODS

Experimental Site and Duration: The experiment was carried out at the Teaching and Research farm of Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan and the acclimatized period and feeding trial lasted for a period of four and twelve weeks respectively.

Experimental animals, diet and design: A total of sixteen WAD goats were obtained from Olorunda village in Ibadan, Oyo state. The animals were confined in well-ventilated individual pens that was cleaned, washed and disinfected with Royal Guard Lysol prior to the arrival of the animals. On arrival, the animals were acclimatized for a period of four weeks during which the goats were given prophylactic treatments; consisting of intra-muscular injection of oxytetracycline LA at 1ml/10kg live body weight and ivomectin at 1ml/25kg live weight. They were also administered vaccine against *Pestes des petit ruminant* (PPR). *Panicum maximum* was fed to the animals during the adjustment period. Fresh, cool, clean water was also made available throughout the experiment. After the adaptation, the animals were balanced on weight equalization into four dietary treatments in a completely randomized design. The dried brown malted sorghum sprout (MSP) was purchased from Life care ventures limited, Sango Otta, Ogun State and it was subjected to alkaline treatment (Fanimo and Akinola, 2006). The alkaline treatment was done by mixing 5kg of raw MSP with 300g of wood ash. The entire mixture was then mixed with 20 litres of water and left in a container for 72 hours (3 days) with frequent stirring. On the 3rd day, the mixture was brought out of the container, the water was allowed to seep out after which it was sundried on the concrete floor. The sundried alkaline treated MSP was then incorporated into the experimental diet at varying levels of 0%, 20%, 40% and 60% to formulate four dietary treatments.

Chemical and Statistical Analysis: The Proximate and fibre fraction analysis of the experimental diets and faecal samples were determined according to the procedure described by AOAC (2001) and Van soest *et al*. (1991) respectively. Data obtained were subjected to one way analysis of variance (ANOVA) using (SAS, 2005). Significant means were separated using the Duncan multiple range test of the same software.

Data Collection/ Feed intake: Feed offered daily per animal were recorded and refusal were weighed and recorded to compute feed intake on daily basis. In short, voluntary intake was estimated as the difference between the feed offered and that consumed. The feed was offered at 5% body weight of the animals. Intakes: Dry Matter Intake ($gday^{-1}$) = Feed intake on wet basis x DM of the feed/ 100

Nutrient Intake ($gday^{-1}$) = Dry Matter Intake ($gday^{-1}$) × Nutrient in feed/ 100

Nutrient in Feed was obtained from the proximate and fibre fractions analysis

Table 1: Chemical Composition of the Experimental Diet

Ingredients	Inclusion Levels of Alkaline Malted Sorghum Sprout			
	T_1 (0%)	T_2 (20%)	T_3 (40%)	T_4 (60%)
Dry matter	87.32	81.63	68.58	60.11
Crude protein	12.41	13.18	10.92	9.07
Ether extract	2.58	0.54	0.90	1.30
Ash	8.61	7.33	16.11	11.56
Nitrogen free extract	50.14	51.32	44.71	29.08
Neutral Detergent Fibre	65.00	75.00	72.00	52.00
Acid Detergent Fibre	18.00	15.00	33.00	26.00
Acid Detergent Lignin	8.00	5.00	5.00	12.00
Hemicellulose	47.00	60.00	39.00	26.00
Cellulose	10.00	10.00	28.00	14.00

RESULTS AND DISCUSSION

Presented in Table 2 is the nutrient intake of West African Dwarf goats fed diet containing graded levels of AMSP. There was significant difference ($p<0.05$) in all the parameters observed except the dry matter intake. The total dry matter intake value observed in this study decreased across the dietary treatment as the AMSP inclusion level increased. A non-significant dry matter intake values observed in this study showed that the alkaline

treatment employed was effective and efficient in reducing the bitterness that could have influenced the intake as it had been established by Morrison (1984) that MSP was somewhat bitter and unpalatable. The result obtained from this study was in agreement with the result of Choi *et al.* (2005) who reported no significant differences in feed intake when Korean black goats consumed diets containing CP ranging from 12 to 18% CP. The concentrate crude protein intake decreased across the dietary treatments as the inclusion levels of AMSP increased. Generally, it is well known that feed intake increases with an increase in dietary CP level (Cheema *et al.,* 1991) but here in this study the DMI was not affected but the concentrate crude protein intake decreased across the dietary treatments. The decrement observed in concentrate crude protein intake of the experimental goats across the dietary treatments could be attributed to the influence of alkaline treatment on MSP in reducing their crude protein content. This observation contradicted the study of Jia *et al.* (1995) who reported an increase in DMI of goats fed higher dietary CP levels. However, this was in line with the observation of Hwangbo *et al.* (2009) who reported that increasing or decreasing CP levels had no significant effect on DMI. Goats fed 40% AMSP recorded the highest concentrate and total ash intake and this could be attributed to the fact that the nutrients were better absorbed. The concentrate NDF intake values obtained was similar in goats fed 0, 20, and 40% AMSP based diet but significantly higher than goats on 60% AMSP based diet group. The concentrate ADL and ADF intake values obtained in this study decreased and increased respectively across the dietary treatment up to those that were fed 40% AMSP based diet. It was evident from the results of this study that the processing method employed to reduce the anti-nutritional factors of MSP was effective and therefore enhanced the nutrient intake.

Conclusion: It was concluded that alkaline treated malted sorghum sprout can be included up to 40% in compounded ration as it enhanced nutrient intake in WAD goats.

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Table 2: Nutrient Intake of West African Dwarf goats fed Diet Containing Graded Level of Alkaline Malted Sorghum Sprout

Parameters (g/day)	Inclusion Level of AMSP				
	T_1 (0%)	T_2 (20%)	T_3 (40%)	T_4 (60%)	SEM±
Dry Matter Intake					
Concentrate	145.12	126.07	128.07	107.51	7.42
Forage	159.69	155.06	150.05	164.89	5.65
Total	304.80	281.13	278.12	272.40	10.79
Crude Protein Intake					
Concentrate	18.01^{a}	16.62^{ab}	13.99^{ab}	9.75^{b}	1.23
Forage	12.14	11.78	11.40	12.53	0.43
Total	30.14	28..40	23.02	24.27	1.36
Ether Extract Intake					
Concentrate	3.74^{a}	0.68^{c}	1.15^{bc}	1.40^{b}	0.37
Forage	2.76	2.68	2.59	2.85	0.10
Total	6.51^{a}	3.36^{b}	3.75^{b}	4.25^{b}	0.39
Ash Intake					
Concentrate	12.50^{b}	9.24^{b}	20.63^{a}	12.43^{b}	1.40
Forage	6.79	6.59	6.38	7.01	0.24
Total	19.28^{b}	15.83^{b}	27.01^{a}	19.44^{b}	1.44

NDF Intake					
Concentrate	94.33[a]	94.55[a]	92.21[a]	55.90[b]	6.67
Forage	120.96	117.46	113.66	124.90	4.28
Total	215.29	212.01	205.86	180.81	8.45
ADL Intake					
Concentrate	11.61[a]	6.30[b]	6.40[b]	12.90[a]	0.98
Forage	45.51	44.19	42.76	46.99	1.61
Total	57.12	50.49	49.17	59.89	2.23
ADF Intake					
Concentrate	3.24[b]	2.49[b]	4.62[a]	2.54[b]	0.30
Forage	7.28	7.07	6.84	7.52	0.26
Total	10.52	9.56	11.46	10.05	0.41
Hemicellulose Intake					
Concentrate	68.21[a]	75.64[a]	49.95[ab]	27.95[b]	6.49
Forage	25.07	24.34	23.56	25.89	0.89
Total	93.28[a]	99.99[a]	73.51[ab]	53.84[b]	6.64
Cellulose Intake					
Concentrate	14.51[b]	12.61[b]	35.86[a]	15.05[b]	2.99
Forage	50.30	48.84	47.27	51.94	1.78
Total	64.81[ab]	61.45[b]	83.13[a]	66.99[ab]	3.43

[a,b] Means within the same row with different Superscripts differ significantly (P< 0.05). NDF: Neutral Detergent Fibre, ADL: Acid Detergent Lignin, ADF: Acid Detergent Fibre, AMSP: Alkaline treated Malted Sorghum Sprout.