PERFORMANCE AND MORPHOSTRUCTURAL CHARACTERISTICS OF WEST AFRICAN DWARF GOATS FED DIET CONTAINING GRADED LEVELS OF ALKALINE TREATED MALTED SORGHUM SPROUT

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Abstract
A 90 day trial was conducted to determine the growth performance and morphostructural characteristics of West African Dwarf (WAD) goats fed diet containing graded levels of alkaline treated malted sorghum sprout (AMSP). A total of sixteen (16) WAD goats with an average weight of 5.8 ± 0.6 were randomly allotted into four dietary treatments in a completely randomized design. Four (4) diets were formulated to contain 0%, 20%, 40% and 60% of AMSP respectively. Data were collected on growth performance and morphostructural characteristics. Result showed that there were no significant differences (P>0.05) on all the growth parameters observed except the weight gain and feed conversion ratio. The weight gain values obtained in this study increased across the dietary treatment as the AMSP inclusion level increased but later decreased at 60% AMSP inclusion level. The highest value of final weight gain (18.6kg), weight gain (2.73kg) and average daily weight gain (32.54 g/d) were obtained in goats fed 40% AMSP. While the lowest final weight (7.14 kg), weight gain (1.55kg) and average daily weight gain (18.41g/d) was obtained in goats fed 60% AMSP. Goats placed on 40% AMSP had the best feed conversion ratio (8.60) and also recorded the highest body weight gain (2.93kg). Thus, it is concluded that 40% AMSP could be used in diets of growing West African Dwarf goats without any adverse effect on their performance and morphostructural characteristics.
Key words: Alkaline treatment, Malted sorghum sprout, morphostructural characteristics, West African dwarf goats and dry matter.

Introduction
In an attempt to mitigate the food production problem plaguing the goat industry in the country, there is need to necessitate the use of non-conventional feedstuffs (agro-industrial by-product) as alternative feedstuffs for the ruminant animal production. Malted Sorghum Sprout (MSP), a by-product of sorghum is a nonconventional feedstuff used as livestock feed but had been reported with low nutritive value due to its anti-nutritional factors (Aning *et al.*, 1998). Detoxification by means of processing might be a good means of reducing the level of anti-nutritional factors and increase the nutritive value of MSP. Alkaline treatments on feedstuffs have been investigated extensively by numerous reviews to increase their feeding value for ruminants (Jakson 1978; Wanapat *et al.*, 1985). One economical source of alkaline is the use of wood ash. Body measurement in addition to live weight of ruminants has been used to evaluate animal performance (Salako, 2006). This study was therefore carried out to assess performance and morphostructural characteristics of West African Dwarf goats fed diet 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 it lasted for a period of twelve weeks.

Experimental animals, diet and design*:* A total of sixteen WAD goats were obtained from a reputable farm in Oyo State**.** The animals with a pre-trial body weight of 5.8 kg ± 0.6 were randomly allotted into four dietary treatments in a completely randomized design. The malted sorghum sprout (MSP) was purchased in dried form from Life care ventures limited, Sango Otta, Ogun State. The dried MSP was subjected to alkaline treatment such that 5kg of MSP was thoroughly mixed 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) but with frequent stirring. On the 3rd, the mixture was brought out of the container, the water was allowed to seep out after which it was sundried on the concrete floor (Fanimo and Akinola, 2006). 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 as indicated in Table 1

Table 1: Chemical Composition (%) of the Experimental Diet

Parameters (%)	**Inclusion levels of AMSP**			
	0%	20%	40%	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
NFE	50.14	51.32	44.71	29.08
NDF	65.00	75.00	72.00	52.00
ADF	18.00	15.00	33.00	26.00
ADL	8.00	5.00	5.00	12.00
HM	47.00	60.00	39.00	26.00
CL	10.00	10.00	28.00	14.00

NFE: Nitrogen Free Extract, NDF: Neutral Detergent Fibre, ADF: Acid Detergent Fibre, ADL: Acid Detergent Lignin, HM: Hemicellulose, CL: Cellulose

Management of experimental animals**:** The animals were housed in a well-ventilated, washed and also fumigated using (DD force) prior to the arrival of the animals. On arrival, the animals were quarantined for a period of two 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). Guinea grass and cassava peels were 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.

Data Collection: Feed Intake and Live Weight Gain**:** At the beginning of the experiment, the goats were weighed and subsequently on a weekly basis prior to feeding in the morning. The initial live weight was

subtracted from the final live weight to determine the weight gained by the animals. Feeds offered and remnants were weighed daily to determine the feed intake of the animals. Both values were used to determine Feed Conversion Ratio (FCR).
Morphological parameters taken were: Body length, Life weight, Height at withers, Chest girth and Rump length. To achieve this, animals were put in an individual cage, allowed to balance in a particular position and restrained by a field assistant. The parameters were successfully measured using a tape rule.

***Chemical and Statistical analysis**:* The dried feed samples were milled separately through 2 mm screen and stored in polythene bags for chemical analysis. The proximate analysis and fibre fractions of the experimental diets were determined according to AOAC (2005) and Van Soest *et al.* (1991) respectively. Data obtained were subjected to one way analysis of variance (ANOVA) using SAS. (2004). Significant means were separated at 5% level of significant using the Duncan multiple range test of the same software.

Results and Discussion
Presented in Table 2 is the growth performance and linear body measurement of West African dwarf goats fed diet containing varying levels of alkaline treated malted sorghum sprout. There were no significant ($P<0.05$) difference in all the growth parameters and linear body measurement measured except the average daily weight gain (g/d) and feed conversion ratio. The weight gain values obtained in this study increased across the dietary treatments as the AMSP inclusion level increased but later decreased at 60% AMSP inclusion level. This could probably be due to the presence of some residual toxic components in Alkaline treated malted sorghum sprout that could have acted as anti-nutritional factors and then interfered with nutrient utilization reflecting in their respective final body weight values (Ogunsipe and Agbede, 1990). The highest value of final weight (8.61kg), and average daily weight (32.54g/d) was obtained in goats fed 40% AMSP while the lowest final weight (7.14kg) and average daily weight gain (18.49g/d) was obtained in goats fed 60% AMSP. The highest weight gain observed in goats on dietary treatments of 40%, 0% and 20% compared to 60% AMSP was an indication of nutrient intake from the diets that were well utilized consequently improved the total weight gain. This collaborates with the earlier reports of Badien (2002) that good level of diets supplementation will leads to better utilization of the diets by goats. Goats fed 40% AMSP had the best feed conversion ratio (8.60). The efficiency at which goats convert feeds for body weight in the present study compared unfavorably with the previous study of Yousuf and Adeoye, (2010) when West African Dwarf goats of similar body weight were fed shed leaves based diets. The highest values of body weight, chest girth, height at wither and height at rump obtained in goats fed 40% AMSP can be attributed to the fact that the nutrient was well utilized compared to other dietary treatments. This further buttressed the fact that the nutrition played a vital role in linear body dimension. This was in line with the findings of Otoikhian *et al.* (2008) who suggested that nutrition is the one of the major determinant of growth and physiological development of animals.

Table 2: Performance characteristics and Linear body measurement of West African Dwarf goats fed diet containing graded level of alkaline malted sorghum sprout

Parameters	Inclusion levels of AMSP				
	0%	20%	40%	60%	SEM±
Initial Weight(kg)	5.84	5.63	5.87	6.19	0.14
Final Weight (kg)	7.89	7.74	8.61	7.14	0.23
Average Daily Weight Gain (g/d)	24.41^{ab}	25.12^{ab}	32.54^{a}	18.49^{b}	1.88
Average Daily Feed Intake	304.80	281.13	278.12	272.40	10.79
Water Intake (l/day)	0.48	0.57	0.49	0.58	0.03
Feed Conversion Ratio	12.79^{ab}	11.39^{ab}	8.60^{b}	15.29^{a}	1.02
Body length (cm)	35.89	35.11	35.67	31.89	0.82
Chest girth (cm)	43.44	41.33	44.33	43.00	0.69
Rump length (cm)	37.11	36.56	36.89	35.67	0.57
Rump at wither (cm)	18.11	18.89	18.44	17.44	0.45
Height at wither (cm)	36.89	35.33	37.22	34.11	0.68
Height at rump (cm)	37.89	38.56	40.22	36.78	0.79

Means along the same row with different superscripts are significantly different (P< 0.05).

Conclusion

It can be concluded that goats fed diet containing 40% AMSP had better performance in terms of body weight gain and feed conversion ratio. Although there was no significant difference but body measurement values were more pronounce in goats fed diet containing 40% AMSP

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