PERFORMANCE OF WEST AFRICAN DWARF (WAD) GOATS FED GAMBA GRASS (*Andropogon gayanus*) SUPPLEMENTED WITH DIET CONTAINING TREATED AND UNTREATED SWEET ORANGE (*Citrus sinensis*) PEELS

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ABSTRACT

A total of nine male grower West African Dwarf (WAD) goats of about 7-9 months, weighing between 9.60-10.33kg were used to evaluate the performance of WAD goats fed Gamba grass and supplemented with diets containing 70% unfermented and 70% fermented sweet orange peel meal. The peels after collection were divided into two, one part was immediately sun-dried, while the other was fermented for 24 hours before sun-drying, thereafter, were separately crushed and used to compound three diets. These were T_1, T_2 and T_3 to contain 0% sweet orange peel meal (SOPM), 70% unfermented sweet orange peel meal (UFSOPM) and 70% fermented sweet orange peel meal (FSOPM) respectively. These were used to feed the animals in a completely randomized design. Results showed that there were no significant differences ($p>0.05$) among the treatments in all the parameters measured. Since there was no any particular advantage between treated and untreated sweet orange peels, any of the treatments could be used as supplement for goats on forage.

INTRODUCTION

Small ruminants form an integral part in the livestock economy production system in Nigeria (Hossain *et al.*, 2002). This suggests the relative importance of goats within the livestock economy of Nigeria. The goat is one of the first animals to be domesticated by man, and today, it has penetrated to almost every country of the world (Alan, 1992).Goats are easier to keep and require smaller capital investment. They play a significant role in producing food for the human population, in Nigeria, small ruminants are significant in the socio-economic life of the people as they contribute about 35% of the national meat supply. This figure may be higher if the animals processed in slaughter houses for which records are not available are included (Oni, 2002).Goats in Nigeria are raised principally for meat production, and the small size enables it to integrate itself into dissimilar socio-economic situations prevalent in our country, but fluctuation in feed availability all through the year is a key factor militating against increased goat production. Babayemi *et al.* (2003) reported that forages are unimproved and low in nutritive value during the wet season, while during the dry season proper they are fibrous lignified with low productive value and even in short supply, thus the need for supplementation. Unconventional feedstuff which are cheap and not in high demand can be used as feedstuff for concentrate supplement for goats to cut down production. One such by-product is the sweet orange peels. They are available all through the year, and can be collected at no cost, and if properly harnessed will be a viable feed materials in goat production, this study was therefore designed to evaluate the performance of WAD goats fed *Andropogon gayanus* supplemented with diets containing treated and untreated sweet orange peels.

MATERIALS AND METHOD

A total of 9 male WAD goats of about 7-9 months of age and having an average weight of 10.30 kg were purchased from markets within Makurdi metropolis and used to evaluate the performance of WAD goats supplemented with diets containing sweet orange (*Citrus sinensis*) peels and fed *Andropogon gayanus*. The animals were vaccinated at the source against PPR using the PPR vaccine and given albendazole orally to check endo parasites. On arrival to the farm, the animals were randomly distributed into three treatment groups of three replicates each. Sweet orange peels were collected from retailers who peel and sell sweet orange for direct consumption. One part was fermented for 24hrs before sun-drying while the other part was sun-dried immediately. When they were properly dried, they were crushed using a cereal grinding mill and stored in synthetic bags for use. Three diets were formulated and compounded; these were designated T_1, T_2 and T_3 to contain 0% SOPM, 70% UFSOPM and 70% FSOPM respectively.

The animals were given 100g of the concentrate supplements daily between 08:00hr and 10:00hr, thereafter; they were served the *Andropogon gayanus ad libitum*, by suspending the grass with a rope tied to a stock into individual pens. This was done to facilitate feed intake and to also check feed wastage. Two weeks were allowed for the animals to get accustomed to the feed and the environment before data collection commenced. Feed intake was calculated by weighting the daily concentrate and grass remnants separately and subtracting it from the quantities fed. The animals were weighed weekly to evaluate their body gains. The experiment lasted for 49 days. Feed samples of T_1, T_2, and T_3 were analysed for their proximate constituents using the AOAC (1998) method. Data collected from the study was subjected to the analysis of variance (ANOVA) using the Minitab 14 (1991) statistical package.

RESULTS AND DISCUSSION

The dietary composition of the experimental diets is presented in Table 1. The dry matter (DM) ranged from between 88.06 -88.96 %, implying that the diets will have long shelf life. Crude protein(CP) values ranged from 14.33 - 15.27 % this was adequate and comparable with 14.72-16.41% CP for concentrate supplements of WAD goats fed diets containing sweet orange peel meal (Oloche *et al.*, 2013). Ether extract (EE) values ranged between 3.54-3.65%, this is adequate, as excess EE leads to quick spoilage of animal feed as a result of rancidity. Arigbede *et al.* (2011) reported similar EE values of 2.92 - 3.68% for concentrate diet containing *Enterolobium cyclocarpum* seeds for WAD sheep. Nitrogen free extract values were 66. 38%, 65.42% and 65.30% for T_1, T_2 and T_3 respectively, indicating that there was appreciable fermentable carbohydrate for energy production. Observed values in this study were appreciably higher than 26.97% - 31.02% NFE reported by Maigandi and Abubakar (2004) for red Sokoto goats fed varying levels of *Faidherbia albida* pods. Esugbohungbe and Odunyemi (2002) reported 52.10-59.81% NFE for goats fed *Terminalia catappa* and *Calypha wilkesiana* leaves. Ash values were between 5.96 - 6.15%, this means that there was sufficient minerals supply to the animals. The result on the growth performance of WAD goats fed the experimental diets is presented in Table 2. None of the parameters measured, showed treatment effect. The final weights ranged from 9.80kg - 11.07kgkg while the mean weight gain values were between 4.08g -14.97g/ day. This may mean that the treatments containing treated and untreated SOPM can also support goat production. Observed values were comparable with 6.85-20.54g for WAD goats fed diets containing SOPM (Oloche *et al.*, 2013). Yashim *et al.* (2013) also reported comparable values of 12.08-16.62g/day for red Sokoto bucks fed dried milled *Gmelina* leaves supplementation. Feed intake values ranged from 296.51g . – 315.33g/day, it did not follow any definite pattern or trend. This probably indicates that treatments with treated or untreated SOPM were palatable and also accepted by the animals. Values in this study were comparable with 291.55g – 313.42g/day reported for WAD goats fed cassava peel-cassava leaf meal based diet (Ukanwoko *et al.*, 2009).

Conclusion and Recommendation

Results show that replacing maize offal with fermented or unfermented sweet orange peel meal did not have adverse effect on the growth of the experimental animals. Thus farmers can adapt any of the treatments (fermented or unfermented SOPM at 70% level) as supplement for WAD goats particularly during the period of scarcity.to help alleviate the body weight losses that are usually experienced during the dry period.

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Table 1: Proximate composition of experimental dietsfed to the WAD goats (DMbasis)

Ingredients	T1 (0% SOPM)	T2 (70%UFSOPM)	T_3(70%FSOPM)
Rice offal	18	18	18
Maize offal	55.93	16.78	16.78
SOPM	0.00	39.15	39.15
Soy-bean	23.07	23.07	23.07
Bone ash	2.00	2.00	2.00
Common salt	1.00	1.00	1.00
Total	100	100	100
Determined (%)			
Dry matter	88.96	88.96	88.15
Crude protein	15.77	14.36	16.44
Crude fibre	9.61	9.81	10.06
Ether extract	3.59	3.54	3.65
Nitrogen free extract	64.94	66.42	63.7
Ash	6.09	5.96	6.15

SOPM = Sweet orange peels meal. UFSOPM =Unfermented sweet orange peel meal: FSOPM = Fermented sweet orange peel meal

Table 2: Performance of WAD goats fed the experimental diets

	Experimental diet			
Parameters	T_1(0%SOPM)	T2 (70%UFSOPM)	T3(70%FSOPM)	SEM
Initial weight (kg)	10.33	9.60 1	0.17	0.88^{ns}
Final weight (kg)	11.07	9.8	10.5	0.83^{ns}
Total weight gain (kg)	0.733	0.2	0.33	0.50^{ns}
Mean weight gain (g)	14.97	4.08	6.73	2.12^{ns}
Total forage intake (kg	9.26	8.46	9.01	0.46^{ns}
Total concentrate intake (kg)	6.19	6.07	5.73	0.47^{ns}
Mean feed intake (g)	315.33	296.51	300.9	15.77^{ns}
Feed conversion ratio	21.06	72.67	44.71	29.32^{ns}

ns= not significant (p>0.05); T_1= 0% sweet orange peel meal, T_2 = 70% unfermented sweet orange peel meal; T_3= fermented sweet orange peel meal