NUTRIENTS INTAKE AND WEIGHT GAIN OF WEST AFRICAN DWARF GOATS FED MAIZE OFFAL SUBSTITUTED WITH UREA-MOLASSES TREATED CASSAVA PEEL DIETS

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ABSTRACT

A study that involved 20 West African Dwarf (WAD) goats aged 1½ - 2 years with an average live weight of 13.86kg was carried out to evaluate nutrients intake, weight gain, nitrogen retention and feed to gain ratio of WAD goats fed maize offal substituted with urea-molasses treated cassava peels meal. The goats were divided into 5 groups of four goats per group and allotted to individual pens in a completely randomly design. The experimental period lasted for 63days excluding two weeks of adaptation. Five diets were formulated such that maize offal was substituted with ensiled urea-molasses cassava peels at ratio 0% (A), 20% (B), 30% (C), 40% (D), 50% (E) respectively. Diet D had the highest recorded value of 22.10% CP while diet B had highest NDF (32.39%) and energy (16.61KJ/100gDM). Nutrients intake, daily weight gain and feed to gain ratio were significantly ($P<0.05$) influenced by the treatments except nitrogen retention, hemicelluloses and cellulose. The highest dry matter (549.42g/day) and crude protein (108. 95g/day) intake were observed in goats fed diet B. All the diets were adequately utilized however, goats fed diet B have the best weight gain (61.90g/day) and convert their feed to flesh better than others goats. Hence, the diet was palatable, acceptable and tolerable to the goats without a sign of ill-health. Thus, maize offal replaced with ensiled 20% urea-molasses treated cassava peels meal could be a good source of protein and energy that would enhance nutrient utilization by ruminants (sheep and goats) and reduce cost.

Keywords: Goats, nutrient intake, nitrogen retention, urea-molasses, weight gain.

INTRODUCTION

Animal feed has always been a major limiting factor in the growth of the livestock industry in developing countries. Most of the feed ingredients are imported and a large proportion of foreign exchange is spent for this purpose. Thus, goat can be sustained with post harvest crop residues silage during difficult months of the dry season. Cassava is a staple crop often sown in Nigeria to balance up for carbohydrate in the diet (FAOSTAT/FAO, 2003). Hydrogen cyanide (HCN) toxicity is considered to be a limiting factor in using high level of cassava peels and leaves in the diets of both ruminant and monogastric. This HCN could be gotten rid-off if properly dried and processed (Tewe, 1992). Besides, cassava can play a major role in replacing grain in animal ration in developing countries (Omoike, 2006). Cassava peels form the bulk of residue from cassava root after post-harvest and processing. It is a good source of energy in ruminant feeding systems, serving either as the main basal diet or as a supplement. Ruminants can be fed not only on cassava tuber, but also the stem, leaves, peel and other by - products of the tuber

Consequently, a volume of thought has also been invested in carrying out research on cassava peel which over the years has often been regarded as waste. This research work makes use of cassava peel that has been sun dried and ensiled with other ingredients such as the molasses and urea fertilizer. This study is therefore aimed at evaluating the effect of replacement of maize offal by urea-molasses treated cassava peel in diets of West-African Dwarf (WAD) goats.

MATERIALS AND METHODS

The experiment was carried out at the Teaching and Research Farm of the Federal University of Technology, Akure. The chemical analysis was carried out at the nutrition laboratory of the Department of Animal Production and Health, Federal University of Technology, Akure. The maize offal was bought at maize mill at the Owena Artillery Barracks, Akure. The cassava peels were gotten at a 'garri' processing plant located at Igbatoro road, Akure. The cassava peels was sundried, treated with Urea-Molasses and ensiled for 4 weeks using 120 L capacity drums. Five experimental diets were formulated such that maize offal was replaced with urea-molasses treated cassava peels at varying levels of 0% (A), 20% (B), 30% (C), 40% (D) and 50% E. Other ingredients added to make complete diets included; palm kernel cake (30.00%), poultry litter (17.00%), bone meal (2.00%) salt (0.50%) premix (0.50%). Twenty West African Dwarf (WAD) goats of 1½ -2years old, weighed averagely 13.86kg were selected from the flock of goats unit of the Teaching and Research Farm. The experimental period lasted 63days excluding two weeks of adaptation. The goats were fed the experimental diets at rate of 3.5% of their body weight and drinkable water was supplied *ad libtum* at 7.00am throughout the experimental period. Samples of feed, faeces and urine were analyzed for chemical composition using the methods of AOAC (2000). Gross energy (KJ/100gDM) was calculated using method of Ekaneyake *et al*. (1999). All data generated were subjected to analysis of variance (ANOVA), and the treatment means compared by the methods of Duncan's Multiple Range Test using SPSS (2006) Version 15.0.

RESULTS AND DISCUSSION

The Table 1 shows the chemical composition of the experimental diets fed to the WAD goats. The dry matter (DM) of the experimental diets ranged between 91.26 (diet E) and 91.69% (diet A) which compared favourably to dry matter values reported by Fajemisin *et al.*(2012) when cassava peel diets fed to goats was substituted with *Cajanus cajan* hay. The observed highest crude fibre content (19.90%) was observed in diet C while the least value (13.53%) was obtained in diet A. Crude protein values increased with the increased quantity of urea-molasses treated cassava peels in the diets. The crude protein contents of the diets were more than the critical 7% CP recommended for ruminant animals by McDonald *et al.* (1995). It implied that the CP content of the diets was adequate to support the goats during growth and reproduction. The soluble carbohydrate content of the diets ranged from 45.89 (diet E) to 52.83% (diet A). The highest Neutral detergent fibre (32.39%), Acid detergent fibre (23.84%) and Acid detergent lignin (17.51%) values were observed in diet B. These observed values were similar to the values reported by Fajemisin *et al.* (2015) when differently processed corncob meals based diets were fed to West African Dwarf sheep.

The Table 2 shows the results of the nutrients intake of the WAD goats fed the experimental diets. All parameters determined were significantly ($P<0.05$) influenced by the inclusion of urea-molasses treated cassava meal in the diets except hemicelluloses and cellulose. The DMI ranged from 351.55 (diet E) to 549.42g/day (diet C), this observation could be attributed to the protein quality, palatability and acceptability of the experimental diets. The average voluntary dry matter intake values of the goats were above 3.5% of the body weight recommended for small ruminants by McDonald *et al*. (1995). This observation also agreed with the report of Ahamefule (2005) that higher level of crude protein stimulates dry matter intakes. The CP intake by the goats fed diet C was 108.95g/day and least CP intake was recorded for goats fed diet E. The highest crude fibre (105.01g/day) consumption was observed in goats fed diet B while the least value was recorded for goats fed diet E. The soluble carbohydrate intake (263.89g/day) observed in treatment B was the highest, while goats fed diet E had the least (161.33g/day).

The fibre fractions intake was significantly ($P<0.05$) influenced by the treatment, this might be attributed to the varying concentrations of the protein content of the diets. However, highest contents of NDF (171.20g/day) and ADF (125.80g/day) were observed in goats fed diets C and B respectively compared to control diet. It implied that the diets furnished enough protein that enhanced fibre intake and degradability by the rumen microbes.

Table 3 shows the performance characteristics of the goats, all the parameters determined were significantly ($P<0.05$) influenced by treatment with the exception of initial and final live weight and nitrogen retention. Weight gain per day ranged between 19.68g/day (diet D) and 61.90g/day (diet B) and significantly ($P<0.05$) influenced by the treatment. However, the weight of goats fed diets B might be attributed to the protein quality of the diet and dry matter intake by the goats. This agreed with the findings of Adebowale and Taiwo (1996) that weight gain was dependent on dry matter intake, protein quality and digestibility of the nutrients. The nitrogen retention of the goats was not (P>0.05) influenced by the treatment however, the nitrogen retention of goats fed control diet was lower compared to other goats. The highest feed to gain ratio was recorded for goats fed diet D and the least value was recorded for the goats fed diet B however, the goats fed diet B utilized their feed better than the other goats. It implied that the diet furnished enough protein and energy that enhanced the growth performance of the goats fed diet B.

CONCLUSION

This study revealed that maize offal substituted with urea-molasses treated cassava peel meal could meet the protein and nutrient requirements of the West African Dwarf goats. The goats fed diet B convert their feed to flesh better than other goats. The performance of the WAD goats in terms of nutrients intake, daily body weight gain and feed to gain ratio were optimal at 20% urea-molasses treated cassava peel meal. Hence, maize offal substituted with ensiled 20% urea-molasses treated cassava peels meal could be a better source of protein and energy to support goat production, purposeful use of cassava waste and reduce environmental pollution.

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Table 1: Chemical composition of the maize offal substituted with urea-molasses treated cassava peel diets fed to West African Dwarf goats.

	Diets				
Parameters	A	B	C	D	E
Dry matter	91.69	91.39	91.56	91.27	91.26
Crude protein	16.31	18.20	19.83	22.10	23.30
Crude fibre	13.54	19.90	18.05	16.93	14.10
Ether extract	6.14	5.05	5.19	4.29	4.99
Ash	11.18	6.84	10.30	9.06	11.72
Nitrogen free extract	52.83	50.01	46.63	47.62	45.89
Neutral detergent fibre	27.81	32.39	31.16	28.76	31.82
Acid detergent fibre	19.45	23.84	22.78	21.40	23.43
Acid detergent lignin	16.54	17.51	16.71	15.59	16.76
Hemicellulose	8.36	8.55	8.38	8.36	8.38
Cellulose	2.91	6.33	6.07	5.81	6.67
Gross energy KJ/100gDM	16.11	16.61	16.08	16.09	15.78

n=3

Table 2: Nutrients intake (g/day) of West African Dwarf goats fed maize offal substituted with urea-molasses treated cassava peel diets.

	Diaets					
Parameters	A	B	C	D	E	SEM
Dry matter	453.08^{c}	527.68^{b}	549.42^{a}	457.71^{c}	351.55^{d}	18.57
Crude protein	73.90^{e}	96.04^{c}	108.95^{a}	101.15^{b}	81.91^{d}	3.43
Crude fibre	61.35^{d}	105.01^{a}	99.17^{b}	77.49^{c}	49.57^{e}	5.72
Ether extract	27.82^{a}	26.65^{a}	28.51^{a}	19.64^{b}	17.54^{b}	1.30
Ash	50.65^{b}	36.09^{d}	56.59^{a}	41.47^{c}	41.20^{c}	2.01
Nitrogen free extract	239.36^{c}	263.89^{a}	256.19^{b}	217.96^{d}	161.33^{e}	9.84
Neutral detergent fibre	126.00^{c}	170.92^{a}	171.20^{a}	131.64^{b}	111.86^{d}	6.52
Acid detergent fibre	88.12^{c}	125.80^{a}	125.16^{a}	97.95^{b}	82.37^{d}	4.94
Acid detergent lignin	74.94^{b}	92.40^{a}	91.81^{a}	71.36^{b}	58.92^{c}	3.47
Hemicellulose	37.88	45.12	46.04	38.26	29.46	1.65
Cellulose	13.18	33.40	37.47	26.59	23.45	2.29
Energy	72.99^{b}	87.65^{a}	88.35^{a}	73.65^{b}	55.47^{c}	3.81

a,b,c, means on the same column with different superscripts are significantly varied ($P < 0.05$)

Table 3: Performance of West African Dwarf goats maize offal substituted with urea-molasses treated cassava peel diets

	Diaets					
Parameters	A	B	C	D	E	SEM
Nitrogen intake	11.84^{b}	15.37^{ab}	17.43^{a}	16.18^{ab}	13.11^{ab}	0.75
Faecal nitrogen	5.69^{b}	7.77^{ab}	9.08^{a}	7.20^{ab}	5.98^{b}	0.44
Urinary nitrogen	0.78^{a}	0.46^{b}	0.52^{ab}	0.61^{ab}	0.43^{b}	0.05
Nitrogen retention	5.37	7.14	7.83	8.37	6.70	0.44
Initial weight	13.85	13.85	13.87	13.86	13.87	0.23
Final weight	16.50	17.75	17.50	15.10	15.48	0.66
Daily weight gain	42.06^{b}	61.90^{a}	57.62^{a}	19.68^{d}	25.56^{c}	4.52
Feed/gain ratio	10.77^{bc}	8.52^{c}	9.54^{c}	23.26^{a}	13.75^{b}	1.48

a,b,c, means on the same column with different superscripts are significantly varied ($P < 0.05$)