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Short Communication

Replacement value of *Etanda africana* seed meal for soybean meal in diet of growing West African dwarf goats

Belewu, M. A.*, Fagbemi, T., Olatunde, B. J. and Otonekwu, I. P.

Microbial Biotechnology and Dairy Science Laboratory, Department of Animal Production, University of Ilorin, Nigeria.

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Effect of feeding *Etanda africana* seed meal on the consumption, weight gain and digestion of West African dwarf (WAD) goats (n=15) were determined in a 56 day feeding trial using a completely randomized experimental design. The *E. africana* seed meal replaced either 50 or 100% of the soybean meal in diets B and C respectively, while diet A (control) contained 15% soybean meal. Other ingredients in the supplement included rice husks 20%, palm kernel 10%, vitamin-mineral premix 1% and salt 1%. Total dry matter intake and ether extract intake were similar among diets; however, the ether extract intake of diet C was numerically higher compared to the other diets. Conversely, the lignin intake and crude fibre intake were higher for diet C compared to other diets (A and B). Average daily weight gain was similar across the three diets. Digestibilities of crude protein and lignin were greater for diet A (control) than for diets containing *E. africana* seed meal ($P < 0.05$). However, digestibilities of crude fibre, ether extract, acid detergent fibre and neutral detergent fibre were similar ($P > 0.05$) in all the three diets. The results of this trial suggest that *E. africana* seed meal can replace soybean meal in the diet of growing WAD goats.

Key words: *Etanda africana* seed meal, feed intake, weight gain, digestibility coefficient, soybean meal, WAD goat.

INTRODUCTION

Etanda africana, a leguminous plant, can grow to the height of between 7 and 12 m (Arbonnier, 2004). The plant is mostly found in the southern sahel and sudanian ecozone savannahs and eastern South Africa (Turnbull, 1986).

It is one of the Malian medicinal plants used for the treatment of various illnesses. The bark is reputed to cause abortions, but a decoction prepared from the root acts as a stimulant and tonic (Arbonnier, 2004).

Research has also shown that the plant can be used as an antidote against various toxic agents because of its emetic properties. Beverages prepared from the leaves, bark, roots and shoots are used for healing various ailments and reducing fever (Arbonnier, 2004). The leaves are used for preventing suppuration and also provide an effective dressing for wounds (Wickens, 1996). However, the nutritional evaluation of the seed as novel for livestock is still lacking, hence the objective of this study was to evaluate the efficacy of *E. africana* seed meal in the diet of West African Dwarf (WAD) goats.

*Corresponding author. E-mail: milkyinka@yahoo.com. +2348020594079.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Animal Pavilion of the Department of Animal Production, University of Ilorin, Nigeria. The University is located in central Nigeria, in an area in which rain fall is 7months of the year (rainfall of 1500 mm) with 5 months being dry, temperature 25^{O}C and 5 months of dry season and relative humidity of between 80 and 90% during the day in rainy season.

Experimental diets

The *Etanda africana* seed was harvested around the University of Ilorin during the dry season of 2006. The seeds, which are mostly abundant during the dry season, were easily collected from the trees, which grow rapidly in this ecological zone. The *E. africana*

Table 1. Ingredients and chemical (g/kg DM).

Ingredients	Diets		
	A	B	C
Cassava waste	530.00	530.00	530.00
Soybean meal	150.00	75.00	-
Etanda africana seed	-	75.00	150.00
meal	200.00	200.00	200.00
Rice husk	100.00	100.00	100.00
Palm kernel cake	10.00	10.00	10.00
Vitamin-mineral premix	10.00	10.00	10.00
Salt			
Total	**1000.00**	**1000.00**	**1000.00**
Chemical Composition (g/kg DM)			
Dry matter	904.80	888.20	906.60
Crude protein	199.00	162.00	133.40
Ether extract	90.00	80.00	90.00
Lignin	69.30	91.20	91.00
Neutral detergent fibre	686.20	653.00	577.50
Acid detergent fibre	272.10	237.00	209.40

and the soybean seeds were toasted (60^{O}C) to eliminate or reduce the presence of some anti-nutritional factors (tannins, spawning) and to increase their acceptability by the goats. The seeds (soybeans and *E. africana*) were crushed through a hammer mill. The Etanda seed was used to replace 50 and 100% of the soybean meal in diets B and C respectively. Diet A was the control diet (Table 1).

Animal and management

The West African Dwarf goats (Buck) used for the study were kept in individual pens measuring 1.5 x 0.75 x 1.8 m. The pens were thoroughly washed and disinfected with morigad before the arrival of the animals. Two weeks prior to the start of the experiment the goats were treated against ecto and endo-parasites using ivomec; L-oxytetracycline was given against cold and pneumonia.

Fifteen WAD young goats (initial weight 8.39 ± 3.21 kg) were randomized to the pens and experimental diets in a completely randomized design model. A 14 day period of adjustment preceeded the 56 days experimental periods. The animals were fed *ad libitum* twice daily (at 8.00 am and 4.00 pm). Water was available at all times. Feed intake was obtained by deducting the weight of the orts collected each morning from the weight of feed offered.

Digestibility of the diets was evaluated during the last 10 days of the collection periods. The animals were placed individually in the metabolic cages for the total faecal output of each animal during the collection period. The collected faeces was weighed accurately and mixed well while sub-samples (5% total faeces per day) was taken in a labeled polyethene bags. The bags were kept in a deep freezer at -18^{0} C until needed for making composite sample for the entire period.

Chemical analysis

The proximate composition of the feeds, feaces and the orts were determined using the methods of AOAC (1990) while fibre fraction was determined by the method of VanSoest (1963).

Statistical design

The data collected were subjected to analysis of variance for a completely randomized design model (Steel and Torries, 1980) and the means were separated by the Duncan (1955) multiple range test.

RESULTS

The nitrogen concentration of diet A (control, soybean meal based diet) was considerably higher than those of diets B and C (50 and 100% *E. africana* seed meal respectively) (Table 1). Diet C contained more lignin and neutral detergent fibre (NDF) than diet A and B. However, the ADF of all the diets supported the minimum required by animal of this weight (NRC, 1978).

Neither dry matter intake, ether extract intake or daily weight gain were affected (P>0.05) by the inclusion of *E. africana* seed meal in the ration (Table 2). However, crude protein intake of diet A was higher than those of diets B and C (P>0.05). Acid detergent fibre and neutral detergent fibre were similar for diets A and B (P>0.05) and lowest for diet C. However, lignin intake was greatest in diet C, greater in diet B and great in diet A (P<0.05).

Crude protein and lignin digestibilities were lower for the *E. africana* seed meal diets (B and C) than for diet A. Digestion of dry matter, crude fibre, ether extract, NDF and ADF were similar for all diets.

DISCUSSION

The lower crude protein intake of *E. africana* seed meal based diet compared to the control diet A (soybean meal based diet) could be attributed partly to the higher crude protein content of this diet A (control). Similar observation was reported when soybean meal based diet was compared with tigernut meal in the diet of growing WAD goats (Ajibola, 2006). The crude fibre content of the diet could have influenced the crude fibre intake by animal fed this diet.

The higher crude fibre intake of diet C could have enhanced digestion, thus improving the volatile fatty acids supply to the animals. The lower lignin intakes with diets B and C were similar to the intake patterns obser-ved for crude fibre.

Conversely, dry matter and ether extract consumption were slightly higher for diets B and C than for diet A (P>0.05). These findings could be due partly to the concentration of these nutrients in *E. africana* seed meal (Adeniyi, 2006).

It was assumed that digestibility coefficients (DM, CF, EE, NDF and ADF) for the three diets would be similar (Table 2). The higher digestibilities of crude protein and lignin in diet A (control) could be attributed to the higher intake of these ingredients. Hemicellulose digestibility was higher in the *E. africana* based diets compared to the

Table 2. Feed intake, apparent digestibility coefficient and weight gain of the experimental animals.

Ingredients	Diets			
	A	B	C	±SEM
Dry matter intake (g/d)	1540.00	1630.00	1560.00	0.05NS
Dry matter digestibility (g/kg DM)	707.8	674.20	670.90	3.70NS
Crude protein intake (g/d)	306.46	264.06	208.10	0.01NS
Crude protein digestibility (g/kg DM)	722.90[a]	657.50[b]	660.90[b]	2.38*
Crude fibre intake (g/d)	96.25ab	92.91b	131.04c	3.84*
Crude fibre digestibility (g/kg DM)	751.10	738.900	716.70	2.05NS
Ether extract intake (g/d)	138.60	130.40	140.40	0.05NS
Ether extract digestibility (g/kg DM)	951.50	835.80	769.10	9.57NS
Hemicellulose intake (g/d)	637.72[a]	678.08[b]	574.24[c]	0.03*
Hemicellulose digestibility (g/kg DM)	679.00[a]	778.60[a]	951.90[b]	3.53*
Lignin intake (g/d)	106.72[a]	116.06[a]	141.96[b]	0.01*
Lignin digestibility (g/kg DM)	750.7[a]	683.00[b]	673.80[b]	1.03*
NDF intake (g/d)	1056.75 [a]	1064.39 [a]	900.90[b]	0.04NS
NDF digestibility (g/kg DM)	729.60	700.90	684.90	1.84NS
ADF intake (g/d)	419.03	386.31	326.66	0.08NS
ADF digestibility (g/kg DM)	689.30	668.60	649.60	2.10NS
Weight gain (g/d)	62.00	61.00	60.00	0.10NS

Mean along the row with similar superscripts are not significantly different (P>0.05)* P<0.05; NS = not significantly different (P>0.05)

control diet (A). This suggests that lignin degrading organisms in the rumen would have more energy to degrade lignin since these organisms can convert cellulose to glucose. There was no significant difference (P>0.05) in the daily weight gain of the experimental animals. This suggests that *E. africana* could be used to replace soybean meal without any detrimental effect on the animal performance.

Conclusion and implication

The results presented here suggest that *E. africana* seed meal can be added to the diet of WAD goats, as a substitute to soybean meal, without impairing performance.

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