CASSAVA FORAGE AS A PROTEIN SOURCE IN SUGAR CANE DIETS FOR CATTLE: EFFECT OF SUPPLEMENTATION SULPHUR AND DRIED CASSAVA ROOT[1]

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24 Zebu bulls, 18 months of age of initial live weight 164kg were given a basal diet of chopped whole sugar cane (80%) and chopped cassava forage (20%). Addition of ammonium sulphate (57 g/d) or sun dried cassava root meal (500 g/d) were investigated in a 2x2 factorial design with two replications (3 animals per treatment group). The cassava forage was cut at between 3 and 5 months of regrowth and had a DM content of 2.52%. The sugar cane contained 23.6% DM and had 10.7°Brix. After 84 days on experiment, daily gains tended to be reduced by addition of ammonium sulphate (from 290 to 257 g/d) while the effect of the cassava root meal was to increase live weight gain (from 240 to 307 g/d).

Key words: Cattle, sugar cane, cassava, sulphate, growth

The addition of cassava forage to sugar cane diets led to increases in rate of live weight gain in cattle relative to unsupplemented controls (Meyreles et al 1977a;1977b) however the order of improvement was low, maximum weight gains not exceeding 200g/d. This was considerably less than was reported in Colombia with a similar ration (Moore 1976). Suggested reasons for this poor performance have been: the solubility of the protein; presence of toxic glucosides; and the diluting effect of the cassava forage on the overall fermentable energy content of the diet. With monogastric animals there have been indications of improved performance on rations containing cassava forage when supplementary sulphate was given (Wyllie 1976, personal communication).

The object of this experiment was to evaluate the effect of additional sulphate in the presence or absence of supplementary sun-dried cassava root.

Materials and Methods

Treatments and Design: A 2 x 2 factorial design was used to evaluate the effect of (A) supplementary sulphur (none or 14 g/d) as ammonium sulphate; and (B) sun-dried ground cassava root (none or 500g/d). There were two replications (3 animals per treatment group).

Animals: A total of 24 Zebu bulls was used. They were between 1 and 1.5 years of age and had an initial live weight of 160-170 kg.

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Diets: The sugar cane used during the trial was variety 980 and had an average of 23.6 ± .74% DM, 10.7 ± 1.4 Brix and pH 4.91 ± .35 (means and SD; n= 6, 50, 47 respectively The cassava was the variety Zenon harvested at between 3 and 5 months of regrowth (see Meyreles 1977a), with a mean DM content of 25.2%.

Housing: The animals were housed in pens with a cement floor (2.5 m2 per animal) in an open-sided building.

Procedure: The mixture of sugar cane and cassava forage was fed ad libitum. The sugar cane was chopped in a forage harvester (Gehl-CB600) in particles of approximately 10 mm. The cassava forage was harvested approximately 30 cm above ground level and was chopped in a stationary forage chopper (Model Gehl). The cassava root was harvested from plots which had been used for forage production. It was chopped in the stationary forage chopper and sundried by the sun, prior to grinding in a hammer mill. The sugar cane and the cassava forage were harvested and fed on the same day. The sugar cane was put first in the feed trough, the urea and sulphate (where appropriate) solution was added, followed by the cassava forage and the cassava root meal. This feeding procedure was done once daily in the morning. Two urea solutions were prepared, one containing 20 3 g urea/100 ml water and the other 15g urea and 11.6 g ammonia sulphate/100 ml water. In each case, the rate of addition was 50 ml of solution/kg of fresh sugar cane. Minerals were given daily to each treatment group at the average daily rate of 35 g dicalcium phosphate and 3.5 g salt. The experiment was carried out during the wet season from 2 August to 25 October 1977.

Measurements: The animals were weighed individually at the beginning of the experiment and subsequently at two week intervals. Live weight gain was determined at the end of the experiment by the regression of live weight on time on experiment. Feed intakes were recorded daily together with measure. meets of Brix, pH and DM content of the sugar cane and the DM of the cassava forage and root. Average performance of the pen was used in the analysis of variance.

Results and Discussion

The overall level of animal performance in this experiment (tables 1 and 2) was superior to that reported by us in previous trials, however, it was still considerably less than the potential for Zebu cattle fed sugar cane diets adequately supplemented, which is about 800 g/d (Preston et al 1976). The improvement in performance compared with previous trials can partly be attributed to a change in management, since the sugar cane was fed fresh immediately after it was chopped. In previous trials with cassava forage the sugar cane was allowed to preferment for 24 hr prior to feeding. It is now known that this practice generally leads to reduced animal performance (Preston et al 1977).

A factor which certainly contributed to the low overall performance was the low sugar content of the cane which averaged only 10.7 °Brix, According to Alvarez and Preston (1976), performance on immature cane is only half of that expected for mature cane.

Table 1:
Mean values for animal performance during 84 day trial (two replicates of one group of 3 animals per treatment

Chopped cassava root	None		500 g/d			
Ammonium sulphate	With	Without	With	Without	SEx	Probability
Live weight, kg						
Initial	160	170	157	166		
Daily gain	.208	.272	.307	.303	±.046	.47
Feed intake, kg/d						
Sugar cane	9.92	12.1	9.87	11.6		
Cassava forage	3.21	3.66	3.18	3.49		
Urea	.074	.123	.074	118		
Ammonium sulphate	.057	_	.057	-		
Minerals	.070	.070	.070	.070		
Total DM	3.39	4.02	3.79	4.28		
Consumption index[1]	2.02	2.23	2.22	2.36	±.071	.11
Conversion[2]	8.05	9.05	9.56	7.54	±.84	.61

[1] Daily intake of DM/100 kg live weight
[2] DM intake/gain in live weight

Effect of Sulphur: Surprisingly, the results indicated a negative effect on animal performance due to the inclusion in the diet of additional sulphate. This was most marked for consumption index. The effect may have been related to the choice of salt (ammonium sulphate), since good results were claimed by Siebert et al (1976) when sodium sulphate was combined with urea in a sugar cane diet in Australia. These authors, however, did not examine the separate effects of the sulphate and the urea. There seem to be no problems with adding low levels of ammonium sulphate since Ferreiro et al (1977) reported an improvement in live weight gain on a sugar cane diet when ammonium sulphate was added at the rate of one g/kg of sugar cane. By comparison in our experiment, the level of ammonium sulphate was equivalent to approximately 6 g/kg of sugar cane.

Effect of Cassava Root: There were tendencies for all three parameters of animal performance to be improved by addition of 500 g/head/d of cassava root meal to the sugar cane ration (table 2). This response is in agreement with the earlier report of Silvestre et al (1977) where addition of 1000 g of cassava root meal per animal per day increased gain from 230 to 400 g/d when meat meal was the protein source.

Table 2 :
Overall means for effects on animal performance of ammonium sulphate and dried cassava root

	Effect of sulphate			Effect of cassava root			
	Without	With	Probability	Without	With	SEx	Probability
Gain in live weight, kg	.290	.257	.51	.240	.307	±.033	.22
Consumption index	2.29	2.12	.11	2.12	2.29	±.05	.11
Conversion	8.05	9.05	.61	9.56	7.54	±1.3	33

It is probable that the tendencies attributed to the treatments in this experiment, namely a reduction in feed intake due to addition of ammonium sulphate and improvement in performance due to feeding of cassava root meal, would have reached higher levels of significance, if it had been possible to extend the trial for a longer period. This was not possible, unfortunately, due to shortage of cassava forage which necessitated premature termination of the experiment.

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