SWEET POTATO FORAGE AS CATTLE FEED: VOLUNTARY INTAKE AND DIGESTIBILITY OF MIXTURES OF SWEET POTATO FORAGE AND SUGAR CANE[1]

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Four Zebu bulls of 200 kg live weight were used in a 4 x 4 latin square design to determine digestibility and voluntary intake of mixtures of chopped whole sugar cane and sweet potato forage in the proportions 100:0, 67:33, 33:67 and 0:100 (dry basis). The diets were recede isonitronenous with urea, and minerals were also given. There was an indication that voluntary intake of dry matter was lower on the sugar cane control than on the other diets containing sweet potato forage. Dry matter digestibility was in the-range 64 to 70% and did not differ between treatments. When the sugar cane control diet was compared with the. treatment in which one third of the cane was replaced with sweet potato forage then the dry ratter consumption index was significantly (P< .01) higher on the latter by 39% while intake of digestible DM was increased by 34%. The intake of sugar cane was reduced by only 9% when sweet potato forage was substituted at the one third level. It is proposed that the increase in voluntary intake caused by adding sweet potato forage to sugar cane may be due partly to the protein in the sweet potato forage acting as a by-pass nutrient and partly to improved rumen function due to the physical nature of this forage.

Key words: Sugar cane, sweet potato forage, cattle, digestibility, voluntary intake

In the experiment reported by Ffoulkes and Preston (1978) substituting one third of the dry matter (DM) of a basal diet of chopped whole sugar cane with banana forage led to an increase in rate of DM intake by 104% compared with the basal sugar cane diet. The DM digestibility coefficient was also increased significantly.

The present experiment was set up to examine the effect on digestibility and intake of another tropical forage (sweet potato) when mixed with sugar cane.

Materials and Methods

Animals, Design and Diet: Four young Zebu bulls of approximately 200 kg live weight were used in a 4 x 4 latin square design with periods of 14 days. The following proportions of whole sugar cane and sweet potato were fed to the animals:

Diet	Dry matter basis		Fresh matter basis	
	Whole cane	Sweet potato	Whole cane	Sweet potato
A	100	-	100	-
B	67	33	45	55
C	33	67	15	85
D	-	100	-	100

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The whole cane component was prepared as a 65 : 35 (fresh basis) ratio of stem to tops.

The diets were supplemented with minerals (60 g/d) and balanced for nitrogen by the addition of 100 g molasses/urea (20% urea w/w) per kg of fresh sugar cane, and balanced for molasses by adding 25 g of pure molasses/kg to sweet potato forage.

Procedures: These were described by Ffoulkes and Preston (1978).

Results

The data for apparent digestibility and voluntary intake are presented in Table 1. There were no significant differences between treatments for the parameters of digestibility and voluntary intake, however there was an indication that intake of DM was significantly lower on the sugar cane control than on the other treatments containing sweet potato forage.

Table 1 :
Mean values for apparent digestibility and voluntary intake of different proportions of whole sugar cane and sweet potato forage in diets fed to 200 kg Zebu bulls

	Sugar cane : sweet potato forage proportions (DM basis)					
	100:0	67:33	33:67	0:100	SEx	Prob[2]
Digestibility of DM, %	70.2	67.8	63.9	70.6	± 2.9	.43
Voluntary intake, kg/d						
Dry matter (DM)	3.88	5.41	5.70	4.51	± 0.54	.19
Digestible DM	2.73	3.65	3.60	3.35	± 0.39	.41
Consumption index[1]						
Dry matter	1.73	2.41	2.51	2.00	± 0.23	.18
Digestible DM	1.21	1.62	1.59	1.48	± 0.17	.40

[1] kg feed/100 kg live weight/day
[2] Probability of "F' test

Since one of the objectives of the experiment was to determine the effect of only partial substitution (one third) of the sugar cane by sweet potato forage, an analysis was made of the two treatments, of sugar cane only and sugar cane substituted with one third of its DM weight by sweet potato. This analysis (Table 2) confirmed the lack of difference in digestibility of DM but showed that the DM consumption index was significantly higher ($P < .01$) by a factor of 39% for the combined sugar cane : sweet potato forage treatment. Intake of digestible DM also tended to be higher when sweet potato forage was fed ($P < .10$). Table 3 shows the amounts of DM consumed in the form of sugar cane and sweet potato and the protein and nitrogen intakes from sweet potato and urea respectively. The intake of sugar cane was reduced by only 9% when sweet potato forage was substituted at the one third level. The sweet potato forage contributed important amounts of protein (assuming that most of the nitrogen in this forage was in protein form) rising from 370 g/d on the one third substitution to 900 g/d when only sweet potato forage was given.

Table 2:
Effect on digestibility and voluntary intake of substituting one third of the sugar cane with sweet potato forage (DM basis)

	Sugar cane: Sweet potato forage			
	100:0	67:33	SEx	Prob[2]
Digestibility of DM, %	70.2	67.8	5 .9	.71
Consumption index[1]				
Dry matter	1.73	2.41	0.12	.01
Digestibility DM	1.21	1.62	0.17	.10

[1] Intake (kg) per 100 kg live weight/day
[2] Probability of “F" test

Table 3:
Intake of dietary components and sources of N in diets of different proportions of whole cane and sweet potato forage as fed to 200 kg bulls

	Sugar cane : sweet potato forage proportions (DM basis)			
	100:0	67:33	33:67	0:100
DM intake, kg/ d				
Total	3.88	5.41	5.70	4.51
Sugar cane	3.88	3.62	1.88	-
Sweet potato	-	1.79	3.82	4.51
Protein from sweet potato, g/d	-	370	784	900
Nitrogen from urea, g/d	136	124	68	-

Discussion

The effect of mixing sweet potato forage into a basal diet of sugar cane was not as dramatic as that observed with mixtures of sugar cane and banana forage (Ffoulkes and Preston 1978). Nevertheless, rate of consumption of DM was increased by 39% with one third substitution of sugar cane by sweet potato forage (Figure 1). The large standard error for intake on the diet 33 cane : 67 sweet potato indicates probably that there was considerable variation between animals on this diet in terms of selection of the two forage components.

A major difference between the effects of sweet potato forage and banana forage was in the supply of protein. When banana forage was added to sugar cane the amounts of protein provided by this forage were 115, 150 and 157 g/d for increasing rates of substitution of the sugar cane; in contrast, in the present experiment the amounts were 370, 784 and 900 g/d.

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arriving at the duodenum according to whether this is mainly of microbial origin or also contains substantial quantities of feed protein. This work is now in progress in our laboratory.

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