SWEET POTATO FORAGE AS CATTLE FEED: EFFECT ON VOLUNTARY INTAKE OF DIFFERENT AMOUNTS ADDED TO A BASAL DIET OF CHOPPED SUGAR CANE STALK[1]

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Four cross bred Zebu bulls (220 to 300 kg) were used in a 4 x 4 latin square design to determine the effect on voluntary intake of adding sweet potato forage at 4 levels (0, 2.5, 5.0 and 7.5% of live weight, fresh basis) to a basal diet of chopped sugar cane stalk supplemented with a solution of molasses/urea (20% urea) at the rate of 50 g/kg sugar cane. Dry matter intake was recorded during the last 7 days of the experimental period of 21 days on each diet. Voluntary intake of dry matter increased linearly (r^2 = .97) as the level of sweet potato forage in the diet was increased. The improvement over the control was 34% for the diet with the highest level of sweet potato. Intake of sugar cane was not affected significantly by the feeding of supplementary sweet potato forage.

Key words: Cattle, sugar cane, sweet potato forage, voluntary intake

It is well known that voluntary dry matter intake is the principal determinant of rate of animal productivity. Up to the present time, adequate intakes on sugar cane based diets have only been obtained by the use of concentrate supplements with a high content of protein and energy nutrients that escape rumen fermentation. A number of trials have been carried out with the intent to substitute these concentrates with protein containing forages such as the aerial part of the cassava plant. However, the results obtained have so far been disappointing (Meyreles et al 1977a, b,c).

The sweet potato plant, Ipomoea batatas, represents another alternative as a means of obtaining protein from a forage which can be produced easily under tropical conditions.

The objective of this experiment was to determine the effect of this forage on the voluntary intake of chopped sugar cane stalk.

Materials and Methods

Treatments and Design: The treatments were levels of sweet potato forage of 0, 2.5, 5.0 and 7.5% of liveweight (fresh basis). The experimental design was a 4 x 4 Latin square with periods of 21 days, using the first 14 days for adaptation to the diet and the last 7 days for the experimental measurements.

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Animals and Diets: Four cross bred Zebu bulls ranging in weight from 220 to 300 kg were used in individual stalls where they were given the experimental diet at 9 am each morning. The sugar cane stalk (without tops) used as the basal diet was the variety 980. The sweet potato forage was cut at between 6 to 8 weeks of age from an experimental area exposed to repeated harvesting of the forage but without disturbing the root; the aerial part of the plant was harvested with a machete and all the forage possible collected with a rake. The remaining stem was left to encourage regrowth.

Procedure: The sugar cane stalk was chopped into particles of about 10 mm with a stationary forage harvester (Gehl CB600). It was supplemented with a solution of molasses/urea (20% urea) at the rate of 50 g/kg sugar cane. This part of the diet was offered on a free choice basis. The sweet potato forage was also chopped in the same harvester to give a particle size of about 5 mm. The sweet potato forage was fed at the same time as the sugar cane, but the two components were not mixed. It was noted that the animals consistently consumed all of the sweet potato forage before beginning to eat the sugar cane. Each animal also received 70 g/d of a mineral mixture composed of 50% salt and 50% dicalcium phosphate.

Measurements: The animals were weighed at the beginning of the experiment and subsequently at 21 day intervals corresponding to the beginning of each period in order to calculate the appropriate amounts of sweet potato forage to be given to each animal. In the adaptation period, measurements were made of total consumption of fresh material, while in the final 7 day period, samples were taken of the different forage components in order to estimate intake of DM. The °Brix (by refractometer) and pH of the cane were also measured.

Table 1:
Characteristics of the sugar cane and sweet potato forage during the experiment

	Experimental periods				X ±SEx
	1	2	3	4	
Sugar cane					
Dry matter, %	27.6	23.4	27.1	26.3	26.1 ±.94
Brix°	14.8	14.8	14.4	13.0	14.3 ±.43
pH	5.0	4.6	4.7	4.3	4.7 ±.14
Sweet potato					
Dry matter, %	12.2	13.1	12.4	10.2	11.9 ±.62

Results and Discussion

The composition of the sugar cane and the sweet potato forage during the four experimental periods are set out in Table 1. There was little variation in the composition of the forages during the trial. The Brix level that was encountered (13 to 15) wee somewhat less than would be expected normally for a sugar cane with DM

content of 26%, indicating perhaps that the sugar cane was not of good quality. The results for feed intake are set out in Tables 2 and 3 and are shown graphically in Figure 1. The data in Table 2 show the average intakes of the different diets, components while Table 3 summarizes the results of the statistical analysis made on the total intake of fresh and dry matter, the intake of sugar cane and the voluntary consumption indices.

The data show very clearly that there was a linear increase (r^2 = .97) in total intake of DM as the level of sweet potato forage in the diet was increased. The intake of sugar cane was not reduced significantly by simultaneous consumption of the sweet potato forage. These data are in marked contrast with the results reported by Meyreles et al (1977a) when cassava forage was added at different levels to a basal diet of sugar cane. The addition of cassava forage did not affect total voluntary DM intake as there was simply a substitution of sugar cane by the cassava forage.

Figure 1:
Influence of level of sweet potato forage on intake of total DM/animal/day

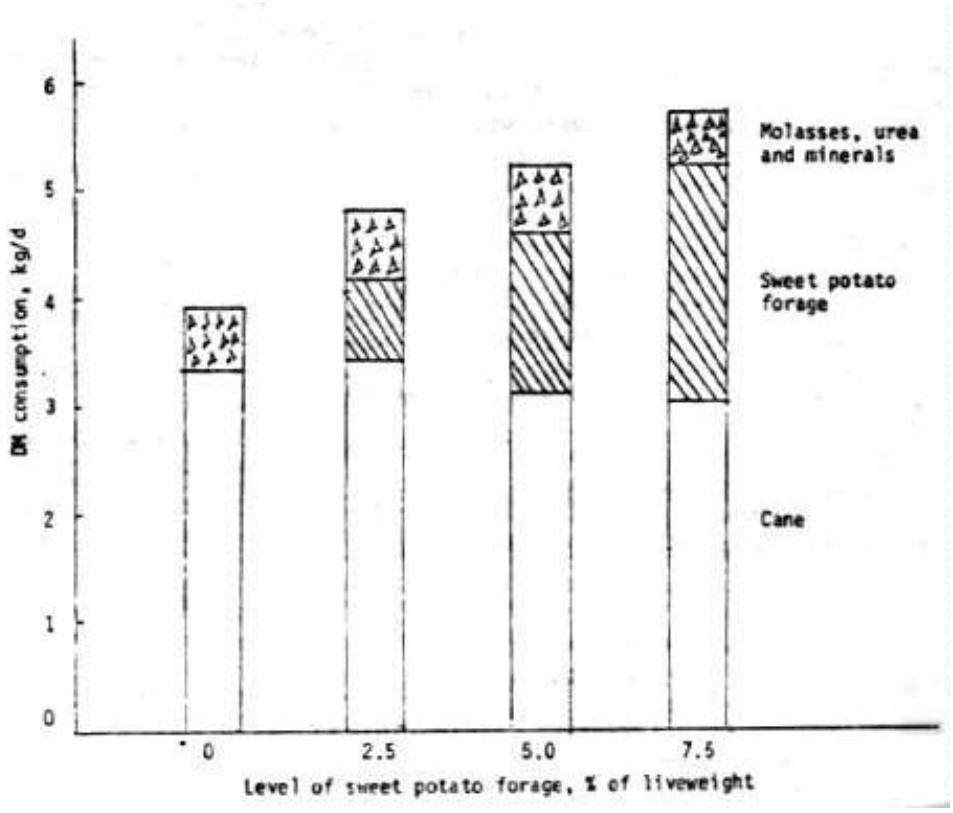

Table 2:
Mean values for intake of dietary components (kg/d)

	Level of sweet potato, % liveweight			
	0	2.5	5.0	7.5
Sugar cane	11.6	11.9	10.3	9.9
Molasses	.522	.525	.508	.402
Urea	.174	.175	.173	.136
Sweet potato forage	-	6.3	13.0	18.0
Minerals	.070	.070	.070	.070
Total DM	3.9	4.8	5.2	5.7

The data for voluntary consumption index in this experiment show that at the highest level of supplementation with sweet potato forage, the intake observed (2.12 kg DM/ 100 kg liveweight) was in the range considered adequate for growing cattle.

Table 3:
Mean values for voluntary intake of fresh and dry matter during experimental period

	Level of sweet potato, % liveweight				SEx	Prob[1]
	0	2.5	5.0	7.5		
Total fresh matter, kg/d	12.5	20.9	24.2	27.3	± 1.44	.002
Total dry matter, kg/d	3.9	4.8	5.2	5.7	± 0.313	.033
Fresh sugar cane, kg/d	11.6	11.9	10.3	9.9	± 1.09	.55
Sweet potato forage%forage DM[2]	0	22	41	50		
Voluntary Consumption Index[3]						
Total	1.58	1.88	2.01	2.12	± 0.121	.08
Sugar cane	1.33	1.32	1.18	1.10	± 0.111	.48

[1] Probability of "F" test
[2] Sweet potato forage as percent of total forage (sugar cane plus sweet potato)
[3] kg DM intake /100 kg liveweight/d

Conclusions

In this experiment, sweet potato forage stimulated significantly the total intake of DM in the ration without affecting the intake of sugar cane. This implies that probably the use of this forage protein will permit acceptable levels of animal performance to be obtained on diets based on sugar cane. It is interesting to note that the increase in the voluntary consumption index (34% above the control) was very similar to that reported by Preston et al (1976) when they used rice polishings as a supplement for sugar cane (30% above the control), and by Silvestre and Hovell (1978) who used wheat bran (34% above the control). The increase in total dry matter intake with mixtures of forage is in agreement with the results of Ffloulkes and Preston (1978)(with cane/banana forage mixtures) and Ffoulkes et al (1978) (with cane/sweet potato forage mixtures).

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