EFFECT ON VOLUNTARY INTAKE AND DIGESTIBILITY OF SUPPLEMENTING CHOPPED SUGAR CANE STALK WITH CANE TOPS, BANANA LEAVES OR CASSAVA FORAGE[1]

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Four Zebu bulls of about 200 kg liveweight were used in a 4 x4 Latin square to measure the voluntary intake and digestibility of chopped sugar cane stalk when given alone (control) or sexed (67:33 fresh basis) with cane tops, banana leaves or cassava forage. Results were (± SE of mean): DM digestibility 67.1, 72.1, 68.7 and 64.4 ± 2.42%; total DMI 2.98, 3.43, 4.00 and 4.10 ± 0.21 kg/d; cane stalk intake 2.98, 2.55, 2.97 and 3.03 ± 0.21 kg DM/d, for the control, cane tops, banana leaves And cassava forego treatments respectively Thus the addition of all three forages significantly (P = .03) improved total DMI without having any significant effect on cane stalk intake or DM digestibility.

Key words: Sugar cane, cattle, forage mixtures, digestibility, intake

The addition of protein rich and readily degradable forages to sugar cane diets has been shown to stimulate total voluntary consumption in cattle, while maintaining a high level of digestibility (Ffoulkes and Preston 1978; Ffoulkes et al 1978). It was suggested that the forages may have supplied by-pass protein to the animal and may also have improved the ecosystem within the rumen, and thereby improved the rate of microbial degradation of the sugar cane fibre.

The objective of this experiment was to compare the effect on digestibility and voluntary intake of including different forages in the basal diet of sugar cane stalk.

Materials and Methods

Animals, Treatments and Design: Four Zebu bulls of approximately 200 kg liveweight were used in a 4 x 4 Latin square design with periods of 2 weeks. The dietary treatments were as follows:

(A) Sugar cane stalk
(B) Cane stalk plus cane tops
(C Cane stalk plus banana leaves
(D) Cane stalk plus cassava forage.

All forages were chopped with a forage harvester, The forages were mixed into the basal diet of chopped cane stalk at a rate of 33% of the total diet (fresh weight); 50 g

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molasses/urea (20% w/w) was added for each kg (fresh weight) of cane stalk.

Procedures: The animals were kept in individual stalls for a 7 d adaption period, and then placed in digestibility cages for 7 d, a total collection of faeces being made for the last 6 d.

Results

The results of the measurements of digestibility and voluntary intake are given in Table 1. There were significant increases in try matter intake

Table 1 :
Apparent digestibility and consumption of chopped sugar cane stalk when fed atone or mixed with cane tops, banana leaves or cassava forage, to Zebu bulls (means of 4)

Supplemented forage	Cane stalk				SEx	P[1]
	-	Cane Tops	Banana leaves	Cassava forage		
Stalk : forage						
Fresh basis	100.0	67.33	67.33	67 33	-	-
Dry basis	100.0	70.30	74.26	74 26	-	-
Voluntary intake, kg DM/d						
Cane stalk	2.98	2.55	2.97	3.03	0.21	-
Forage	-	0.88	1.03	1.07	-	-
Total	3.98	3.43	4.00	4.10	0.21	0.03
Apparent digestibility%	67.1	72.1	68.7	64.4	2 42	0.26
Digestible DM, kg/d	2.08	2.62	2.75	2.65	0.19	0.17
Consumption index[2]						
DM	136	1.65	1.82	1.86	0.10	0.05
Digestible DM	0.97	1.19	1.25	1.21	0.09	0.22

All diets were supplemented with 50 g molasses/urea (20%)/kg fresh cane stalk.
[1] Probability of 'F' test
[2] Voluntary intake/100 kg liveweight

(DMI) (P = .03) when the mixed dicta were compared with the basal diet of chopped cane stalk. These increases were 22% (cane tops), 34% (banana leaf) and 38% (cassava forage), and, since the intake of cane stalk were not affected, were due to the additional forage in these rations. The alight depression of cane stalk intake when cane tops were added was not significant statistically (P = .50). Apparent digestibility of DM did not differ significantly between treatments, and thus improvements in digestible DMI were similar (cane tops 26%, banana leaf 32%, cassava forage 27%) to improvements expressed as DMI.

The Brix° (by refractometer) of the cane and DM content of the components and

mixtures of the diets for each period of measurement are presented in Table 2. Differences in the DM content of the cane components, banana leaf or cassava forage between experimental periods were not great.

Table 2:
Brix ° of cane and DM content of components and mixtures of the dietary treatments for each period of measurement

	Components					Diet mixtures[1]		
	Cane			Banana	Cassava	Cane Stalk:leaf 67:33 DM%	Cane: banana 67:33 DM%	Cane: cassava 67:33 DM%
	Stalk DM%	Brix°[2]	Leaf DM%	Leaf DM%	Leaf DM%			
1	27.7	13.0	28.6	19.9	20.0	28.4	25.8	25.8
2	27.8	13.0	21.0	21.1	19.4	26.2	26.2	25.7
3	27.3	11.2	22.9	20.1	19.8	26.2	25.4	25.3
4	26.7	13.3	22.7	16.7	19.5	24.8	23.1	23.9
Mean	27.4	12.6	23.8	19.5	19.7	26.4	25.1	25.2
±SEx	±.3	±.5	±2.3	±1.0	±.1	±.7	±.7	±.4

The molasses/urea (20%) had a mean DM of 36.7% + 2.6 (SEx)
[1] Calculated from DM of components and their relative proportions in the complete diet
[2] By refractometer

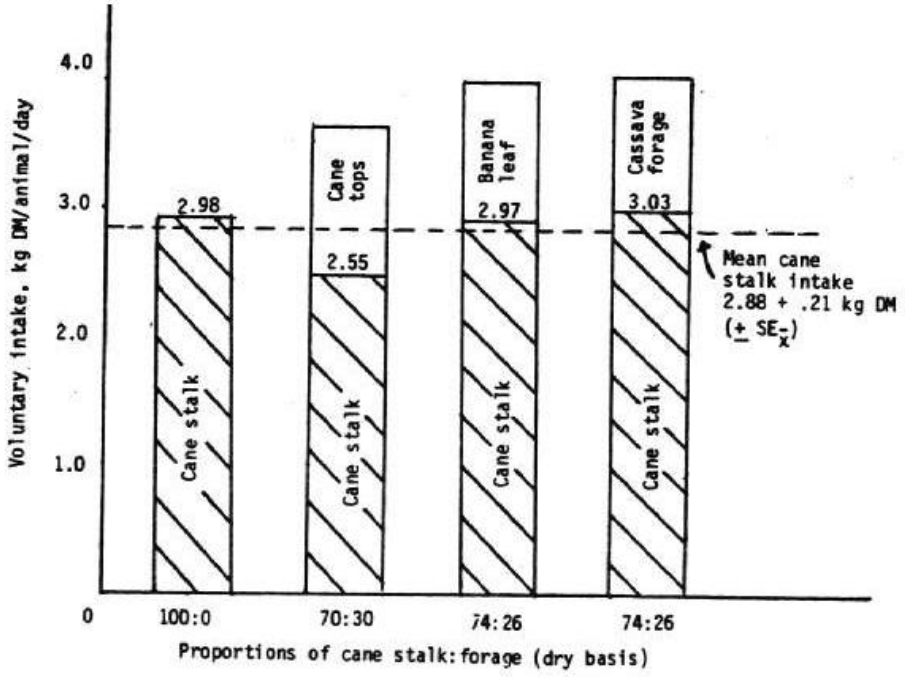
Discussion

The relatively poor consumption of the basal diet is normal for diets of cane stalk alone (Ferreiro and Preston 1976, 1977; Ferreiro et al 1977), and in this experiment, was probably further reduced because of the low quality of the cane (Brix° 12.6), Digestibility of the cane stalk fibre was therefore expected to be relatively high owing to a long mean residence time in the rumen (calculated by difference; the digestibility of the non-sugar DM of the cane stalk was 47% which is higher than the values calculated by Ravelo et al (1978)). From the crude protein (CP) content of the components of the forages as reported by various authors and shown in Table 3, it was estimated that the cane tops, banana leaf and cassava forage provided an intake of about 50, 180 and 200 g CP/d respectively. These quantities of protein seem to be too low to explain the effect of the forages on intake in terms of their supply of by-pass protein to the animal, and it is more likely that their main effect may be to improve rumen function.

Table 3:
Mean values for crude protein of the components of the diets used in the experiment

	N x 6.25 (% DM)	Source
Cane stalk	0.8	Ferreiro et al (1977)
Cane tops	2.7	Preston (1977)
Whole banana leaf	17.6	Ffoulkes et al (1978)
Cassava forage	18.2	Meyreles et al (1977)

Figure 1:
Dry matter intake of chopped cane stalk when given alone, or mixed (67:33 fresh basis) with chopped cane tops, banana leaf or cassava forage, to Zebu bulls (200 kg liveweight)



Assuming that there is sufficient fermentable energy available from the basal diet, the most important effect of these forages may be the provision of a source of plant protein as substrate for the microbes within the rumen. The consequence of this would be an increase in microbial activity and therefore an increase in the rate of DM turnover in the rumen. At higher levels of substitution of forage for sugar cane, there may be quantities of forage protein sufficient to escape rumen fermentation, passing into the duodenum as protein available directly to the host animal, However, until facilities enable us to investigate this further, the exact mode of action of these protein forages is still conjecture. Nevertheless, it is clear from the results of this experiment that they effected an increase in DMI, and it is therefore anticipated that the addition of these forages to sugar cane diets may result in an improvement in animal performance.

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