DIGESTIBILITY AND VOLUNTARY INTAKE OF RATIONS BASED ON SUGAR CANE, LEUCAENA LEUCOCEPHALA AND RICE POLISHINGS[1]

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Eight bulls were used in a 4 X 4 latin square with two replications to compare the following treatments: (A) chopped whole sugar cane/tire. and 1 kg/d of rice polishings; (B) the same as (A) but with the addition of 3 kg/d of leucaena forage. © chopped whole sugar cane/urea with 3 kg/d of leucaena; and (D) a mixture of 75% leucaena and 25% chopped cane tops. The experimental periods were 18 days with collection of faeces during the last 5 days when the animals la were in metabolism cages. There were no significant differences in digestibility of DM which could be attributed to the treatments. However, voluntary intake was higher when rice polishings were fed. In the presence of rice polishings, leucaena did not affect intake, however, in its absence DM intake was significantly reduced by 30% by the legume. Intake was also lower on the mixture of legume and cane tops. It is concluded that leucaena should not be given as the sole supplement in sugarcane/ urea diets but that a small amount of rice polishings (or equivalent supplement) also be included.

Keywords: Sugarcane, cattle, leucaena, rice polishings, digestibility, voluntary

Experiments reported so far on the nutritive value of Leucaena leucocephala as a supplement for sugar cane, have related mostly to trials with dual purpose milking cows and calves (Alvarez and Preston 1976; Alvarez et al 1977; Alvarez et al 1978). The general finding has been that leucaena can replace the greater part (75%) of the rice polishings normally used as a supplement for the sugar cane/urea ration with no loss in animal performance. However, in the one experiment when leucaena was the only supplement for sugar cane/urea there was considerable loss of live weight of the cows and a significantly lower milk yield than when some rice polishings were also given (Alvarez and Preston 1976).

The objective of this experiment was to obtain information on the digestibility of rations of sugar cane/urea supplemented with leucaena and of the leucaena when given as the principal component of the diet.

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Materials and Methods

Treatments and Design: Eight bulls were used in a 4 x 4 latin square design with two replications to compare the following treatments: A) chopped whole sugar cane/urea and 1 kg/d of rice polishings; B) the same as (A) but with the addition of 3 kg/d of cut leucaena forage; C) chopped whole sugar cane/urea with 3 kg/d of leucaena; and D) a mixture of 75% leucaena and 25% of chopped sugar cane tops. The experimental period on each ration was 18 days during the last five of which complete collections were made of faeces when the animals were in metabolism cages. The experimental animals were eight Swiss x Zebu steers of approximately 18 months of age and 250 kg live weight.

Procedure: Mature sugar cane was divided into stalk and tops and each of these chopped separately prior to being recombined in the ratio of 75% stalks to 25% tops (fresh basis). To this mixture was added a solution of molasses/urea (176 g urea/kg of solution) at the rate of 50 g of solution/ kg of fresh sugar cane. At the same time 40 g of a mixture of equal parts of salt and rock phosphate (including trace minerals) was added to the ration, For treatments (A) and (B), the rice polishings were given as the first feed in the morning before offering the sugar cane. The Leucaena was cut daily and fed fresh; it comprised the leaves and fine branches which, it had been observed, were the parts of the plant consumed readily by the animals.

It was originally intended to make treatment (D) a diet of 100% leuceana However, this plan had to be changed as it was observed that intake on this regime fell steadily until, after 10 days, the animals refused to eat showing the typical salivation characteristic of mimosine toxicity. The addition of 25% of sugar cane tops appeared to correct the condition and help to support reasonable intakes.

Measurements: During the collection period the faeces were collected daily, weighed and a sub-sample retained at 3° until the end of the collection period when all sub-samples were bulked and analysed for DM. Voluntary intake was recorded daily and samples taken for DM and Brix (by refractometer).

Table 1 :
Mean values (X ± SEx) for parameters of nutritive value

	Sugar cane		
	Stalk	Tops	Leucaena
Dry matter,%	27.0±.55	26.0±.79	29.2 ±.11
Brix°	19.0±.52	10.3±.58	

Table 2:
Mean values for dry matter digestibility and voluntary intake by Zebu bulls

	Sugar cane ad libitum					
	1 kg/d rice polishings	1 kg rice polishings; 3 kg/d leucaena	3 kg/d leucaena	75% leucaeana 25% canetops	SEx	Probability of F test
Feed intake kg/d						
Sugar cane[1]	14.0+1.9	10.5+3.0	9.29+2.1	-	-	-
Leucaena	-	2.63+.69	3.00	9.11 +3.1	-	-
Cane tops	-	1.0	1.0	3.65+.79	-	-
Rice polishings	1.0	1.0	-	-	-	-
Minerals	.04	.04	.04	.04	-	-
Molasses/urea [2]	.70	.58	.51	-	-	-
Digestibility of Dm, %	62.2	65.8	64.7	63.8	0.85	.42
Consumption index [3]	2.00	1.99	1.55	1.45	0.10	.01

[1] 75% stalk 25% tops (fresh basis)
[2] 17.6% urea, 22.55 water. 59.9% molasses
[3] Daily DM intake/100 kg live weight

Results and Discussion

The principal parameters of nutritive value of the sugar cane (DM content; Brix) are given in Table 1 for the separate components of stalk and tops; the DM content of representative samples of leucaena ie also presented. Digestibility and voluntary consumption index mean values are given in Table 2.

There were no significant differences in digestibility of DM which could be attributed to treatments. However, voluntary intake was higher on the treatments which contained rice polishings. In the presence of rice polishings, leucaena did not affect intake; however in the absence of rice polishings, leucaena significantly reduced DM intake by 30%. Intake was also lower on the mixture of leucaena and cane toys.

In part, these results support the earlier observations of Alvarez and Preston (1976) that leucaena should not be given as the sole supplement in sugar cane/urea based diets; and that a small amount of rice polishings should also be included.

It is not known what is the minimum amount of rice polishings (or its equivalent), needed to give protection against the depressing effects of leucaena.

In their trial with dual purpose cows, Alvarez et al (1977) observed that the rice polishings could be reduced to as little as 0.5 kg/d, with restricted gracing on leucaena and that results on this combination were as good as with 2 kg daily of rice polishings without leucaena. It will be interesting to ascertain the minimum amount of rice polishings needed to support adequate animal performance on sugar cane when leucaena is the main protein source.

The negative effect of leucaena, when given as the only supplement to sugar cane, was not observed when this legume was used as the only protein source in a molasses/urea based diet (Hulman et al 1978). Comparisons of the effect of leucaena forage with different basal diets should yield useful information, in order to have a better understanding of the nutritional limitations of this legume.

Conclusions

The data from this experiment confirm that it is unwise to use leucaena as the only supplement in a sugar cane/urea based diet, and that some rice polishings (or equivalent substitute) should also be provided.

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