LEUCAENA LEUCOCEPHALA AS A COMBINED SOURCE OF PROTEIN AND ROUGHAGE FOR STEERS FATTENED ON MOLASSES/UREA

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Twenty-two Zebu steers divided into three groups had free access to molasses/urea and received in addition either (a) l kg/d of rice polishings and chopped whole sugar cane at 31. of live weight; (b) 0.5 kg/d of rice polishings and 3 hr/d grazing on Leucaena leucocephala; (c) leucaena grazing only (3 hr/d). All the animals had free access to minerals and water. Live weight gain was significantly higher (P .03) on the combined leucaena/rice polishings treatment (615 g/d) than on the sugar cane/ rice polishings or the leucaena only treatments (430 and 481 g/d respectively). Good growth was being made on the leucaena only treatment (90u g/d) over the first 42 d of the trial, after which they appeared to suffer f from mimosine toxicity due to being made to graze immature plants (less than 30 d regrowth). The additional Supplement of rice polishings seemed to give some protection in this respect. The average stocking rate on the leucaena was 15 steers/ha, which was too high, considered in the light of the need to ensure a recovery period of at least 56 d, prior to grazing.

Key words: Cattle, molasses/urea, leucaena, rice polishings

With fattening diets based on molasses/urea, fish meal and restricted forage it has been possible to obtain rates of live weight gain of 800 to 900 g/d (Munoz et al 1970), However, the application of the system has often been limited by the cost and difficulty of obtaining the fishmeal supplement.

One way of reducing the dependence on expensive fish meal would be to use a forage with a high content of protein thus combining in one supplement the requirement for both roughage and protein. Such a system was developed by Fernandez et al (1977). They used the aerial part of the cassava plant (contains about 17% protein in DM) as the only supplement to molasses/urea and reported weight gains in Zebu bulls of 600 to 700 g/d.

Leucaena leucocephala is a tropical shrub legume which would also appear to have the desired characteristics for this dual purpose role. The leaf contains 28% protein in DM and the woody branches can be expected to provide adequate roughage characteristics to stimulate rumen function. Reports from Mauritius indicated good results when this plant was used as the only supplement to a diet of molasses/urea (Hulman at al (1978).

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The objective of the experiment described here was to obtain preliminary information on the use of Leucaena leucocephala as a supplement to liquid molasses/urea, using a restricted grazing system.

Materials and Methods

Treatments and Design: The treatments were: a) Liquid molasses/ urea free choice supplemented with 1 kg/d of rice polishings and chopped whole sugar cane (65% stalk/35% tops) at the rate of 3% of live weight (fresh basis); b) molasses/urea supplemented with .5 kg/d of rice polishings and with restricted grazing for 3 hr daily on a pasture of Leucaena leucocephala; c) molasses/urea supplemented only with restricted grazing of leucaena. There were 7 animals on each of treatments (a) and (b) and 8 on treatment (c).

Animals and Diets: Zebu steers were used of approximately 250 kg live weight and two years of age. Previously they had been on pasture; they were vaccinated and deparasitized prior to starting on the experiment. The three treatment groups were kept in a simple dry lot 2 with a concrete floor and a palm leaf shade; the space per animal was 10 m. The molasses contained 3% of urea (w/w) and was freely available in open troughs. The rice polishings supplement was given as the first feed in the morning, after which the animals on the grazing treatments spent 3 hr (from 8:00 to 11:00 am) on a pasture of Leucaena leucocephala (Peruvian variety) which had been planted in rows spaced 1.4 m apart. After grazing, the animals returned to their respective pens where they had free access to the molasses/urea, water, salt and minerals.

The pasture area was 1 ha, divided in 4 sub-divisions. It had been established 18 months previously and grazed regularly by other animals. At the moment of starting the experiment, approximately 70 days had elapsed since the previous grazing.

On treatment (a), the sugar cane was chopped in a forage harvester (Gehl CB600) to a particle size between 10 and 20 mm. It was given as one single feed in the morning immediately after the rice polishings.

Measurements: The intake of sugar cane was determined daily and of molasses/urea every week. An attempt was made to estimate the intake of Leucaena leucocephala at 14 day intervals by weighing animals before and after the period of grazing. The DM content of leucaena and the brix and the DM of the sugar cane were determined at weekly intervals. The animals were weighed individually at the beginning of the experiment and subsequently at 14 day intervals during the 112 days of the experiment which began on 24 July 1976. Rate of live weight gain was determined by regressing live weight on time on experiment.

Table 1:
Mean values for animal performance

Roughage[1] Rice Polishings	Sugar cane 1 kg/d	Leucaena 0.5 kg/d	Leucaena _	SEx/Significance by F test
No of steers	7	7	8	
Live weight. kg				
initial	251	247	.245	
Final	293	322	305	
Daily gain[2]	.430	.615	.481	±.04/P=.03
Feed intake, kg/d				
Molasses	4.1	4.1	4.6	
Urea	.104	.105	.116	
Forage[3]	8.6	4.6	2.9	
Minerals	.15	.11	.10	

[1]The leucaena contained (% of DM) N 4.22, fibre 26.7, ether extract 8.0, NFE 32.3; the DM % was 30.3 except when the immature plants were grazed (21.9% DM). The sugar cane contained 22.8% DM and the Brix in juice was 12.3°.
[2] Calculated by regression of live weight on time on experiment.
[3] Estimated as difference in live weight before and after grazing.

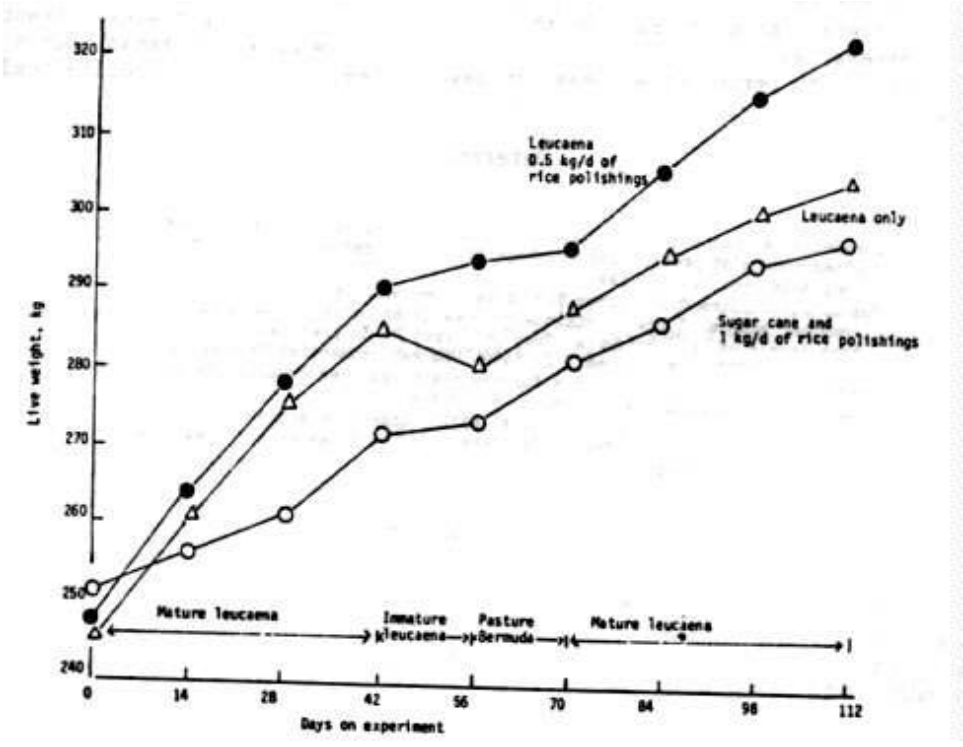

Figure 1: Growth curves for the three treatments (the nature of the grazing for the two leucaena treatments is shown at the foot of the graph; the period on Bermuda pasture following apparent toxic effects caused by grazing immature leucaena, was to allow the next leucaena paddock time to reach a mature stage of growth).

Results and Discussion

Mean values for animal performance are set out in table 1. The growth curves for individual treatments are given in figure 1.

Live weight gain was significantly higher for the treatment group receiving the combination of leucaena and rice polishings compared with the other treatments which did not differ one from the other. An important feature shown by the growth curves, is the excellent rate of growth on the treatment of molasses supplemented only with leucaena which during the first 42 days had a rate of gain of almost 900 g daily, comparable with the results for the combined supplement of rice polishings and leucaena.

The setback observed subsequently, in the leuceana only treatment, app_ peered to be caused by mimosine toxicity. At this time the animals on the grazing treatments had to be allocated to a paddock in which the regrowth period was only 30 days. There was a preponderance of leaves of a pale green colour in the regrowth and it is known that the mimosine content of these is considerably higher than in the mature material (Bobadilla, M unpublished data). Some of the animals also showed excessive salivation and there were also indications of reduced forage intake (table 1). Supplementation with rice polishings appeared to provide some form of protection since the depression in growth rate was less obvious on this treatment.

The animals given sugar cane as the forage were obviously inferior to those which received leucaena despite the fact that they received a relatively high level of rice polishings. Part of the poor response may have been due to the small particle size of the chopped sugar cane for it is known that this is an important factor determining animal performance on liquid molasses diets (Saldis et al 1977).

The average stocking rate on the leucaena grazing during the experiment was 15 steers/ha. This appears to be too high a level, on the basis that a minimum regrowth period of at least 56 days is needed to avoid mimosine toxicity.

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Received 15th August 1977