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THE USE OF LEUCAENA LEUCOCEPHALA OR SUGARCANE TOPS AS SOURCES OF FORAGE IN CATTLE DIETS BASED ON MOLASSES/UREA, SUPPLEMENTED WITH CHICKEN LITTER AND/OR WHEAT BRAN

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32 Zebu bulls with initial weights of between 154 and 194 kg were used in a trial to compare two sources of forage - sugarcane tops and *Leucaena leucocephala* , and two supplementation treatments - no supplementation (control), 1 kg/animal/d wheat bran, 1.5 kg/animal/d chicken litter or wheat bran + chicken litter.

Feed conversion and liveweight gains were consistently better where leucaena was the source of forage. In the control treatments where molasses/urea was supplemented only with the forage source, liveweight gains were more than doubled as a result of using leucaena rather than the sugarcane tops (585 vs 241 g/d). Where leucaena was supplemented with chicken litter or a mixture of chicken litter and wheat bran, daily gains were higher at 789 and 890 g/d respectively.

The results lend support to the belief that *Leucaena leucocephala* has an important role to play as an on-farm source of protein, and that in molasses/urea based diets in particular it acts as an effective source of roughage and protein.

Chicken litter was again shown to be a useful supplement for molasses based diets where only poor quality forage, such as sugarcane tops, is available.

Key words: Leucaena leucocephala, sugarcane tops, cattle, fattening, chicken litter melaza, urea

As a consequence of the increased use of chicken litter in feedlot fattening diets based on molasses in the Dominican Republic, it was considered of interest to evaluate this by-product in a series of experiments, which to date have allowed us to establish:

1. The most suitable levels of chicken litter where used as a supplement to molasses based diets (Meyreles and Preston 1980).
2. The importance of the presence of urea in the molasses even when chicken litter is used as a supplement (Meyreles and Preston 1982b).
3. The value of wheat bran and/or high quality forage, for example sweet potato forage, as complementary sources of protien for chicken litter/molasses diets (Meyreles and Preston 1982a).

The principal objective of the present work was to study the use of *Leucaena leucocephala* forage as a protein supplement in diets based on molasses/urea, in the knowledge that this legume has given promising results as a source of protein in previous works in the tropics (NAS 1977; Jones 1979, Hill 1971).

Sugarcane tops were used as the control forage,this being a forage which is easily obtainable in sugar-producing countries, but which is of low nutritive value.

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Materials and Methods

Treatments and design: The principal treatments consisted of the two forages, i.e. sugarcane tops or leucaena forage. These were given with diets of molasses/urea alone (control), or with chicken litter and/or wheat bran as supplements. The design was a factorial arrangement, 2 X 2 X 2 with 2 replicates.

Animals and housing: 32 young Zebu bulls were used with an initial weight of between 154 and 194 kg, which were housed in groups of 2 in pens with slatted floors, in a roofed building open at the sides.

Diets: The characteristics of the components of the diets used are shown in Table 1. The chicken litter, whose base was of rice hulls, came

Table 1:
Characteristics of dietary components ($\bar{x} \pm SE\ \bar{x}$)

	DM	°Brix	% N in the DM
Sugarcane tops	25.1 ± .26	11.6 ± .23	0.33 ± .024
Leucaena	28.8 ± .88		2.45 ± .18
Wheat bran	87.1 ± .25		2.50 ± .05
Chicken litter	87.5 ± .36		1.90 ± .098

from commercial broiler houses. Its nitrogen content was reduced because of exposure to the rain.

The leucaena was harvested daily. The plantation had been established between one and two years. It was cut approximately 1 m above ground level, at cutting intervals of between 6 and 10 weeks.

The sugarcane tops were generally harvested daily, although from time to time the whole cane was cut in the field and separated and the tops chopped one or two days later.

Procedure: All the animals had free access to molasses/urea (2.5%), in troughs separate from the forage. Those given sugarcane tops received them chopped and ad libitum, and those receiving leucaena were given this forage chopped, but at the rate of 3% of the liveweight of the animal on a fresh basis. The levels of wheat bran and chicken litter were fixed at 1.0 and 1.5 kg/animal/day respectively.

Measurements: The animals were weighed individually every two weeks. Daily liveweight gain was determined by regression analysis of liveweight against time in the experiment. The daily consumption of the animals was measured both on a dry and fresh basis.

Results

The sugarcane tops, the leucaena and the poultry litter all contained lower levels of nitrogen than would normally be expected for these

materials (Table 1). The cane tops had occasionally dried out through being left attached to the cane stalk after harvesting, before they were chopped and fed. In the early part of the trial the leucaena forage had a low average nitrogen content due to a long cutting interval and consequently the presence of a considerable amount of woody stems and branches. The relatively poor quality of the poultry litter was probably due to exposure to rain and an excessive period of storage before use. Mean values for daily liveweight gain on the individual treatments, together with overall means for the principal treatment effects are given in Table 2. The analysis of variance of these data is shown in Table 3, and comparative values for the different treatments are illustrated graphically in Figure 1.

Table 2:
Average liveweight gains for the individual treatments and principal effects

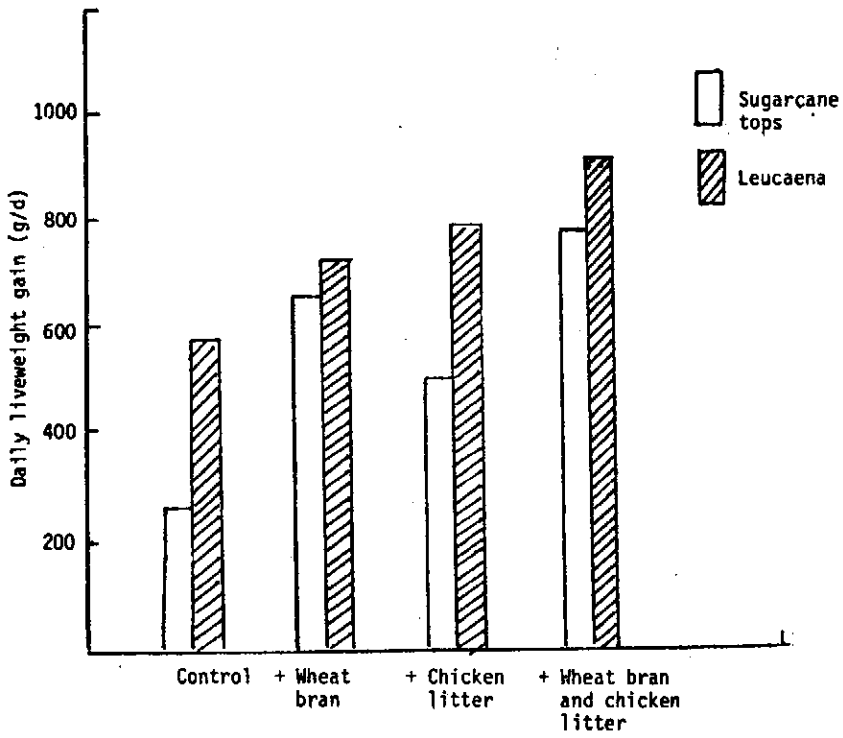
	Control	Wheat bran	Chicken litter	Chicken litter + wheat bran	Means
Sugarcane tops	241	661	502	772	543 ± 86
Leucaena	585	722	787	890	746 ± 48
Means	413 ± 134	690 ± 32	644 ± 86	830 ± 64	

Table 3:
Analysis of variance for the daily liveweight gains

Sources of variation	Sum of squares	Degrees of freedom	Mean squares	"F"	Probability
Total	13.66	15			
Individual treatments	11.24	7	1.605	5.3	.02
Leucaena/ sugarcane tops	3.29	1	3.29	10.5	.01
Supplements	7.00	3	2.33	7.7	.01
Leucaena x supplements	1.038	3	.35	1.1	.40
Error	2.43	8	.304		

The leucaena forage promoted consistently better liveweight gains than the sugarcane tops, the effect being most noticeable in the absence of wheat bran. The results for the control treatments where the molasses

Figure 1:
Comparison of liveweight gains between treatments



/urea was supplemented only with the forage source were particularly interesting in that liveweight gains were more than doubled as a result of using leucaena rather than sugarcane tops (585 vs 241 g/d). Although the best result was obtained on the leucaena diet in the presence of both poultry litter and wheat bran (890 g/d), probably the most interesting results from the economical stand point were those obtained on the leucaena alone (585 g/d) or when supplemented with poultry litter (787 g/d).

The data for voluntary feed intake and feed conversion (Table 4) show a number of inconsistencies. However there was an obvious increase in total intake of dry matter for the treatments including wheat bran and/or poultry litter as compared with the control irrespective of the forage source. Feed conversions on all the luecaena treatments were consistently better than those for the treatments with sugarcane tops.

Discussion

The consistently high level of animal performance on the leucaena forage treatments, especially those not including a conventional protein

Table 4:
Mean values for daily feed intake and feed conversion

	Control	Wheat bran	Chicken litter	Chicken litter + wheat bran
Leucaena				
Intake, kg/d				
Molasses	4.48	4.11	5.78	4.83
Leucaena	5.19	5.66	5.33	5.22
Wheat bran	-	0.980	-	0.965
Chicken litter	-	-	1.15	1.15
Total DM	5.20	5.92	7.39	7.40
Feed conversion[1]	8.96	8.14	9.29	7.93
Sugarcane tops				
Intake, kg/d				
Molasses	4.19	4.75	4.30	4.78
Sugarcane tops	6.32	7.36	6.06	5.98
Wheat bran	-	1.00	-	1.00
Chicken litter	-	-	0.995	1.24
Total DM	5.10	6.70	5.99	7.47
Feed conversion[1]	-	10.12	11.97	9.62

[1] kg DM/kg liveweight gain

supplement (wheat bran in this experiment) supports other findings in the literature where leucaena was included as the only supplement to a molasses/urea diet (Hulman et al 1978), or where other high quality protein rich forages had been used (Ffoulkes and Preston 1978; Meyreles and Preston 1982a). The specific finding of the experiment of better results with leucaena compared to sugarcane tops is also in agreement with those reported by Salais et al (1977), who used a mixture of leucaena and Bermuda grass forage, and compared this with whole sugarcane or sugarcane tops in a molasses/urea-based diet.

Particular attention is drawn to the two leucaena treatments in the present experiment employing no further supplements (control) and that where poultry litter was added. The rates of liveweight gain on these two treatments of 585 and 787 g/d respectively would be economically attractive in many situations in the tropics.

As in other papers in this series there was a consistent improvement in animal performance due to the inclusion of poultry litter in the diet, either as the only supplement, or when combined with a conventional protein source. The fact that these responses were obtained in the presence of adequate amount of fermentable nitrogen from the urea, supports an earlier

conclusion that poultry litter provides nutritional factors in molasses - based diets other than its content of fermentable nitrogen (Meyreles and Preston 1982a, 1982b).

Conclusions

The results of this experiment lend support to the general belief that *Leucaena leucocephala* has an important role to play in the tropics as a source of protein, and that in molasses/urea-based diets in particular, it is an effective source of both good quality roughage and protein.

The findings also confirm that poultry litter is a particularly valuable additive in molasses-based diets when only poor quality forage, such as sugarcane tops, is available.

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