LEUCAENA LEUCOCEPHALA AS A SOURCE OF PROTEIN FOR GROWING ANIMALS FED WHOLE SUGAR CANE AND UREA[1]

B Hulman and T R Preston[2]

Ministry of Agriculture and Natural Resources and the Environment Reduit, Mauritius

9 individually fed Simmental x Friesian bulls of about 70 kg liveweight were used in a 98 day trial to compare 3 levels of fresh leucaena (1, 2 or 3% liveweight) as a supplement to ad libitum chopped sugar cane containing 3% urea in the dry matter. Growth rates were low: 0.064 0.105 and 0.197 kg/d for the I, 2 and 3% leucaena levels respectively. The leucaena forage significantly increased the total dry matter intake ($r^2 = 0.65$) and the growth rates ($r^2 = 0.75$). Sugar cane intake was depressed at the highest level of leucaena.

Key words: sugar cane, protein supplementation, Leucaena leucocephela, young bulls

The legume, *Leucaena leucocephala* appears to be a suitable source of protein and roughage for ruminants in the tropics when it is fed in con junction with pasture (Alvarez et al 1978; Saucedo et al 1980) or molasses (Hulman et al 1978). Hulman (1978) showed that growing cattle fed molasses/urea ad libitum and having access to a pasture of leucaena for 8 h daily, did not need any supplementation of groundnut cake to grow at 0.6 to 0.7 kg /d. In a further trial it appeared that for growing animals fed molasses/ urea ad libitum, the optimum level of fresh leucaena might be beyond 3% of liveweight (Hulman 1978). Later, Hulman et al (1978) reported that for growing bulls fed ad libitum molasses/urea, the optimum level of fresh leucaena for liveweight gains of 0.8 kg/d was 2% of liveweight and that leucaena was a better source of protein than groundnut cake. The present study was therefore undertaken to determine the effect of increasing levels of leucaena in a basal diet of chopped whole sugar cane.

Materials and Methods

A randomized block design with 3 replicates was used to compare 3 dietary levels of fresh leucaena (1, 2 or 3% of liveweight) which were supplements to a basal diet of ad libitum chopped whole sugar cane containing urea at 3% of the cane dry matter (DM).

9 individually-fed Simmental x Friesian bulls of about 70 kg were randomly allocated to the treatments. The trial, which was conducted at the Richebien Livestock Breeding Station, lasted for 98 days excluding the 16 days during which the animals underwent a period of adaptation to the experimental diets.

Leucaena was cut daily from established hedges on the breeding station and the length was about 45 cm from the growing tip. Whole sugar cane was chopped and the required amount of urea dissolved in an equal amount of warm water. The urea

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[2] *Consultant to the Project MAR/75/004*

solution was then sprayed on the chopped cane and mixed before feeding. The cane and the leucaena were analysed for crude protein, crude fibre and ether extract content . The animals were weighed weekly and leucaena feeding was adjusted accordingly. Refusals were weighed daily. The animals had free access to minerals and water.

Statistical analysis of the data was done according to the method outlined by Snedecor and Cochran (1969).

Results and Discussions

The animals were in good health for the duration of the trial. There was little variation in the nutritive values of both whole sugar cane and leucaena (Table 1).

Table 1:

Nutritive values of whole sugar cane (chopped) and leucaena (% DM $\bar{x} \pm$ SE)

	Dry matter	Crude protein	Crude fibre	Ether extract
Chopped whole sugar cane	32.7 ± 1.2	3.17 ± 0.18	26.2 ± 0.7	0.9 ± 0.07
Leucaena	29.2 ± 0.9	24.0 ± 0.4	21.7 ± 0.7	2.1 ± 0.09

There was a significant ($P < 0,05$) difference in growth rates (Table 2) between the treatments,but there were no significant differences between the treatments, 1% and

Table 2:

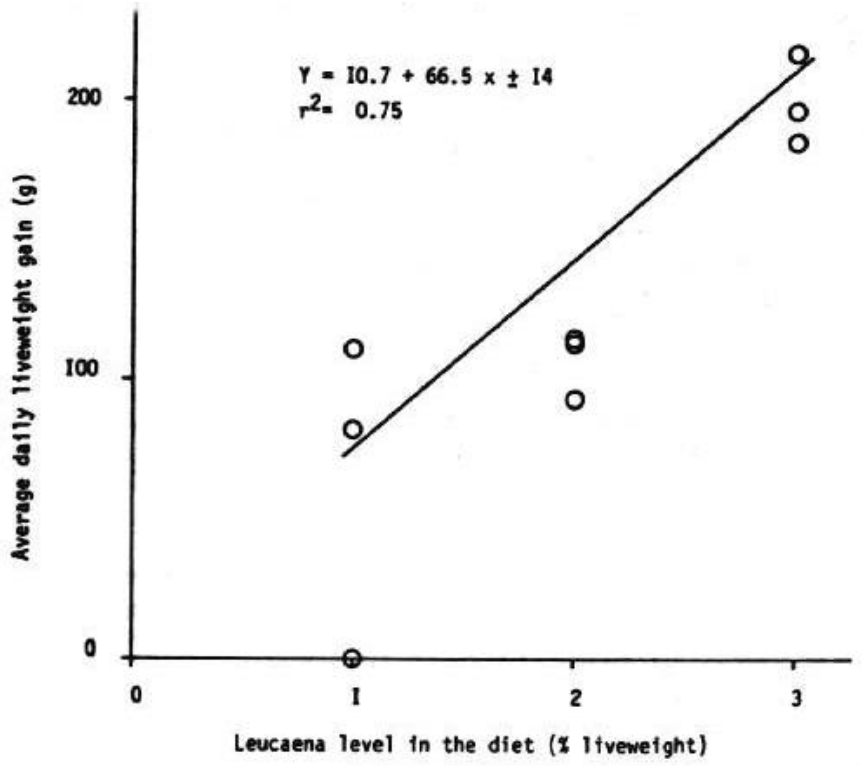
Liveweight gains and feed intakes of bulls receiving different levels of leucaena in a basal diet of sugar cane

	Levels of leucaena % bodyweight			SE and diff.
	1	2	3	
No. of animals	3	3	3	
Initial weight (kg)	74.3	68.0	66.3	
Final weight (kg)	80.7	78.3	85.7	
Average daily gain (kg)	0.064	0.105	0.197	± 0.03*
DM intake (kg/d)				
Total	1.74	1.92	2.08	± 0.07*
From sugar cane	1.53	1.52	1.44	± 0.04
From leucaena	0.21	0.40	0.64	± 0.04**
/100 kg liveweight	2.3	2.6	2.7	± 0.07**

*P < 0.05
**P < 0.01

2% level of leucaena. However, the gains (0.064 to 0.197 kg/d) were low. There was a linear response of liveweight gains to levels of leucaena (r^2 = 0.75) (Figure 1) and leucaena did not depress intake (2.3 to 2.7 kg DM/100 kg liveweight) (Figure 2).

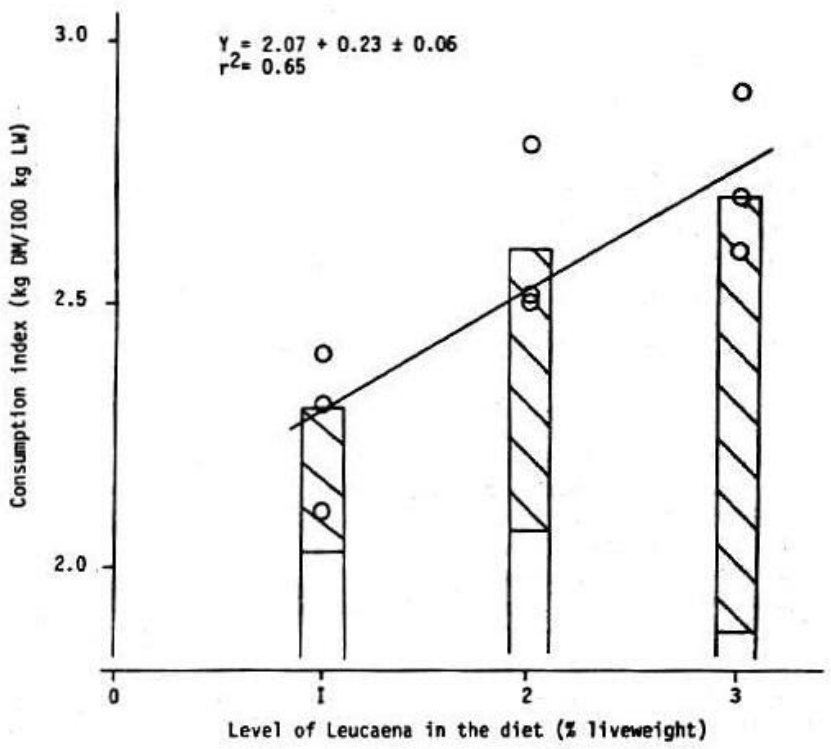
Figure 1:
The response in terms of Liveweight gain to the level of leucaena in the diet of young bulls



The rate of liveweight gain achieved even on the highest leucaena level was low (200 g/d) although voluntary intake was of a normal magnitude (2.7% liveweight). This indicates that the poor animal response wee due either to low digestibility or to inefficient use of the end products of digestion. The results are similar to those reported by Meyreles et al (1977) for cassava tops added to sugar cane.

The very low degradation rate of the sugar cane fibre (Santana and Hovell 1979 a,b) appears to offset the advantages of the leucaena as a combined roughage and protein source owing to the increase in fibre in the rumen,.

Figure 2:
Relative feed intake (kg DM/100 kg LW) with increasing dietary levels of leucaena. Histogram shows mean relative intake (kg DM/100 kg LW) of sugar cane and leucaena



References

Alvarez F J, Wilson A & Preston T R 1978 Leucaena leucocephala as a protein supplement for duel purpose milk and weaned calf production on sugar cane based diets: comparison with rice polishings Tropical Animal Production 3:51-53

Hulman B 1978 Leucaena leucocephala as a source M Phil thesis University of Reading of protein and roughage for growing cattle

Hulman B, Owen E & Preston T R 1978 Comparison of Leucaena leucocephala and groundnut cake as protein sources for beef cattle fed ad libitum molasses/urea in Mauritius Tropical Animal Production 3:1-8

Meyreles Luz, MacLeod N A & Preston T R 1977 Cassava forage as a protein supplement in sugar cane diets for cattle. effect of different levels on growth and rumen fermentation Tropical Animal Production 2:73-80

Santana A & Hovell F D DeB 1979(a) The effect of Sodium hydroxide treatment on derinded sugar cane on the rate of rumen degradation of the fibre using the in vivo nylon bag technique Tropical Animal production 6:794-195 (abs)

Santana A & Hovell P D DeB 1979(b) Rumen degradation rate of fibre from low and high sucrose sugar cane Tropical Animal Production 4:195 (abs)

Saucedo G, Alvarez F J, Jimenez N & Arriaga A 1980 Leucaena leucocephala as a supplement for milk production on tropical pastures with dual purpose cattle Tropical Animal Production

Snedecor G U & Cochran U G 1969 Statistical methods 6th Edition Iowas University Press Ames Iowa USA

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