

FATTENING CATTLE WITH MOLASSES/UREA: EFFECTS OF DIFFERENT UREA LEVELS¹

R Silvestre, N A MacLeod² and T R Preston³

Centro Dominicano de Investigación Pecuaria con Caña de Azúcar, CEAGANA, Santo Domingo, R D

24 Zebu bulls were used to determine the optimum concentration of urea in liquid molasses when this was given free choice in combination with restricted quantities of forage (equal parts of whole sugar cane and grass mainly *Brachyaria* and *Pangola* sp). The forage level was 2% of live weight (DM basis). A protein rich meal was given at the rate of 500 g/d together with minerals. Daily intake of urea increased linearly with increasing concentration of urea in molasses, the daily intake of the latter being fairly constant at approximately 2 kg/d. Rate of live weight gain increased with increasing urea concentration in molasses reaching a maximum at 30 g urea/kg of molasses mixture. There were indications that animal performance was beginning to deteriorate with urea concentrations above 30 g/kg. There were no problems of urea toxicity on any of the treatments.

Key words: Cattle, molasses/urea, growth

In the intensive system of cattle fattening based on molasses (see Preston 1972) developed in Cuba, the cattle are induced to consume large quantities of molasses by restricting the intake of fresh forage. Because of the low N content of molasses (about 0.5%), it is necessary to supplement this with additional amounts of fermentable N to satisfy the requirements of the rumen microorganisms. A level of 2.5% urea has been used based on the theoretical requirements of microorganisms in terms of the availability of fermentable carbohydrates (Hume et al 1970). However, no experiments have been reported in which the optimum urea level has been determined by actual feeding trials. Silvestre et al (1977) compared different levels of urea in molasses when chopped sugar cane was also freely available (not restricted as is customary in the molasses fattening system). It was found that, as the urea concentration in the molasses was increased there was a reduction in the intake of sugar cane. Best animal performance was in the range of 5 to 10% urea in the molasses. The objective of the present experiment was to obtain information on the nature of animal response to different levels of urea in liquid molasses when this was offered on a free-choice basis to supplement restricted amounts of forage.

¹ This work was supported in part with funds provided by the Organization of American States through the project Fondo Mar del Plato

² On secondment from Rowett Research Institute, Aberdeen, Scotland

³ Scientific adviser to CEAGANA partially financed through the UNPP/FAO project DOM/71/504

Material and Methods

Treatments Design and Animals: The treatments consisted of 8 levels of urea in molasses (0, 10, 20, 25, 30, 35 and 45 g/kg of mixture), There were three animals per treatment group and one replication giving a total of 24 animals in the experiment.

Diets: The forage source was a mixture (equal parts fresh basis) of whole sugar cane and grass (principally Pangola and Brachiarya sp). The level was controlled at 2% of live weight (DM basis) for the combined forage sources. Both forages were chopped in a forage harvester (Model Gehl CB600). All animals received a daily supplement of 500 g of a protein rich meal (see table 1);60 g/d of a mixture of salt and dicalcium phosphate.

From 27/6/77 to 2/7 the animals received 500 g/d meat meal; from 3/7 to 13/7 no supplement; from 14/7 to 31/7 they received soybean meal; and from 1/8 to 25/9 again meat meal, In total the time spent on meat meal was 68% on soybean meal 20% and without supplement 12%,

Procedure: The animals were housed in groups of three in pens (3 x 3 m) with slatted floors situated in an open-sided building. The experiment lasted 91 days and began on 27 June 1977.

Measurements: Live weight was determined at 14 day intervals rates of gain were calculated from the regression of live weight on time on experiment. Feed intakes were recorded daily.

Table 7:
Mean values (one group of 3 animals per treatment) for animal performance and feed intake

	Urea in molasses, g/kg								x + SE
	0	10	20	25	30	35	40	45	
Live weight, kg									
Initial	197	193	198	197	190	188	190	182	
Final	199	214	230	234	257	211	239	217	
Daily gain g/d	23	234	350	412	734	288	542	390	371.63±74.43
Feed intake. kg/d									
forage	16.46	15.48	15.38	14.28	15.58	15.42	18.94	17.02	16.13+4.9
Molasses	2.60	2.56	2.45	3.18	2.87	2.14	2.49	3.18	2.68+1.3
Supplement	.5	.5	.5	.5	.5	.5	.5	.5	
Urea	0	.026	.050	.082	.089	.078	.104	.150	.072+0.17
Total DM	6.08	5.96	5.77	6.10	6.16	5.55	6.68	6.81	6.14+1.5
Consumption index ¹	3.07	2.93	2.70	2.83	2.76	2.76	3.11	3.41	2.95+0.05
Conversion ²	—	25.47	16.49	14.81	8.19	19.27	12.32	17.42	15.31+2.04

¹ Kg DM/100 kg LW

² DM intake/gain in LW

Results and Discussion

Mean values for animal performance and feed intake are given in table 1. Figures 1 and 2 show the relationship between daily live weight gain and intake of urea as independent variables, when the dependent variable is the urea concentration of molasses. Figures 3 relates daily live weight gain with daily intake of urea.

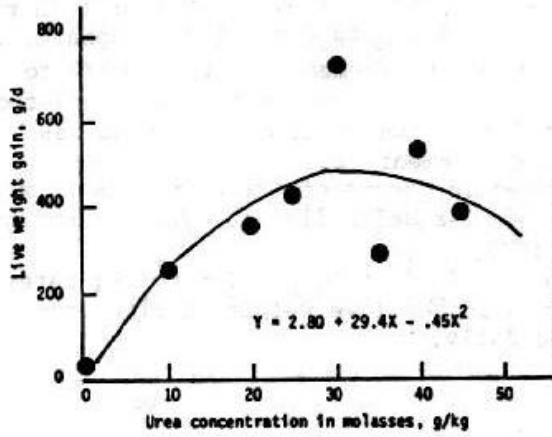


Figure 1:
Relationship between live weight gain and urea concentration in molasses

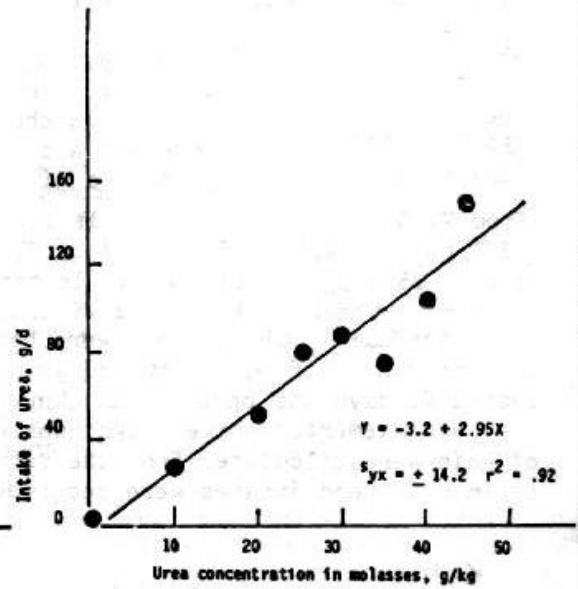


Figure 2:
Relationship between daily urea intake and urea concentration in molasses

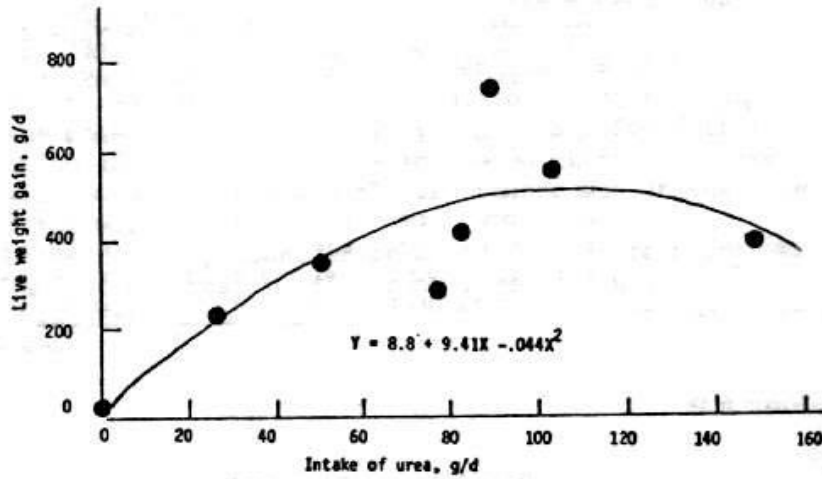


Figure 3:
Relationship between daily live weight gain and urea intake per day

The results for the lower concentrations of urea (up to 30 g/kg of molasses mixture) are consistent and show a positive linear relationship between urea concentration (x) and daily intake of urea and live weight gain. These data indicate that the factor determining, in large part, the rate of growth was the intake of urea and that this was controlled by the concentration present in the molasses. There were indications that the response to concentrations of urea in molasses beyond 30 g/kg were curvilinear, however, the variability in the results at this end of the scale preclude firm conclusions being reached.

In general, these practical findings confirm the theoretical calculation that the optimum urea content in molasses fed with restricted forage should be about 30 g/kg. However, more work must be carried out at levels of forage more restricted than those used in this experiment (the normal allowance of forage in the molasses fattening programme is only 3% (fresh basis) of live weight), and with increased replication in order to define more accurately animal response at urea concentrations above 30 g/kg,

References

- Hume I D, Moir R J & Summers M 1970 Synthesis of microbial protein in the rumen I influence of level of nitrogen intake *Austral J Agric Res* 21: 283-296
- Preston T R 1972 Molasses as a feed for cattle *Wld Rev Nutr Diet* (ed G H Bourne) Karger: Basle
- Silvestre, MacLeod N A & Preston T R 1977 Voluntary intake and live weight gain of cattle given chopped sugar cane and solutions of molasses containing different concentration of urea *Trop Anim Prod* 2: 1-12

Received 15 December 1977