PERFORMANCE OF FATTENING CATTLE ON IMMATURE OR MATURE SUGAR CANE

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Summary

Cane stalk from mature (14 months, 16.8 Brix, 28.3% DM) or immature cane (8 months, 9.7 Brix and 20.5% DM) was mixed with tops from the immature cane in the ratio 70:3C. The mixture was supplemented with urea/molasses (283 g urea/kg solution) sprayed over the cane at the rate of 50 ml/kg fresh cane. Rice polishings (1 kg/d) and free choice minerals were also given . There were 4 Zebu steers in individual pens in a completely roofed building on each treatment. The trial lasted 112 days and was carried out from May to August 1975 in what turned out to be a prolongation of the dry season. Rate of live weight gain and feed conversion were improved by almost 100% on mature as supposed to immature cane. There was a tendency for DM intake to be higher on the mature cane but the major difference in animal performance could be ascribed to improved feed utilization efficiency on the mature cane. Analysis of rumen fluid showed significantly higher proportions of butyric acid and less acetic acid in animals receiving the immature sugar cane. It is suggested that the superior performance of mature sugar cane is probably due to a higher content of soluble sugars in the dry matter.

Key words: Sugarcane, maturity, cattle

Introduction

The first large scale trial at this Centre on the utilization of sugar cane for fattening cattle (Preston et al 1975) was carried out between January and April 1974, a period which coincided with the normal dry season in that part of Mexico. Performance on the best treatment (896 g/d) was close to the genetic potential for the commercial Zebu cattle which were used (see Preston and Willis 1974). Results in the following 6 months wet season were quite the contrary, with animal performance little above maintenance (CIEG 1974).

Two factors were thought to have contributed to this poor animal response. One was the difficult environmental conditions in the fattening pens, which were almost continuously wet and deep in mud; the second was the fact that the sugar cane being used at that | time was mostly in the early stages of growth (between 6 and 8 months following the previous harvest).

The objective of the trial described here was to evaluate stage of maturity of sugar cane as a factor determining animal performance.

Materials and Methods

Treatments and Design:

The two treatments were immature cane stalk (8 months of age, average Brix 9.7 and average dry matter content 20.5) and mature cane stalk (14 months of age, Brix 16.8 and dry matter content 28.3). 4 animals in individual pens were allocated to each treatment according to a random block design with 4 replications.

Procedure:

The experiment began on 9 May 1975 and ended on 29 August. It was planned to have coincided with the wet season, but in fact 1975 was an extremely abnormal year and little or no rain fell during the whole of this period.

The animals were Zebu steers approximately one year of age weighing 200 kg and had been adapted to sugar cane rations for the previous 3 months. They were housed in individual 2 X 3 m pens with a cement floor and palm roof.

The variety of sugar cane was poj 2878. The mature cane was on average 14 months of age while the immature cane was only 8 months. The latter was maintained in active growth by application of irrigation.

For each type of cane, the tops were separated from the stalk and the final rations prepared by combining chopped tops from the immature cane with the stalk from the respective types of sugar cane in the ratio 30:70.

The sugar cane stalk and tops were processed in a high speed forage chopper to give a particle size between 5 and 10 mm for stalk, and 40 to 50 mm for tops. The sugar cane was supplemented with a solution of urea/molasses(283 g

urea, 208 g water and 817 g final molasses/litre of solution) which was sprayed over the sugar cane at the rate of 50 ml/kg of fresh cane. In addition, each animal received 1 kg/d of rice polishings and had free access to a mixture of rock phosphate, salt and trace minerals. The sugar cane was chopped and fed twice daily . The rice polishings were given in the morning as the first feed before the sugar cane was offered.

Table 1:
Mean values for feed intake, weight gain and conversion for bulls fed rations based on immature and mature sugarcane

	Immature	Mature	SE_x
No of animals	4	4	
Length of trial, d	112	112	
Live weight, kg			
Initial	214	210	
Final	244	268	
Daily gain	.27[a]	.525[b]	±.026
Intake, kg/d			
Fresh cane	13.8	12.4	
Rice polishings	1.0	1.0	
Final molasses	.56	.51	
Urea	.198	.178	
Minerals[1]	.056	.058	
Total DM	4.25	4.78	
Consumption index[2]	1.87	2.03	±.060
Conversion[3]	l9.4[a]	9.48[b]	±2.70
N in diet, g/kg DM	29.2	25.0	

[1] 50% rock phosphate, 35% salt 15% trace minerals

[2] $\frac{\text{100 kg DM/d}}{\text{kg LW}}$

[3] DM intake/gain in LW

ab Means (P<.05)

These tendencies in animal performance were reflected in the changes in Brix of the cane juice and in DM content of the cane stalk, both of which increased during the experiment for the young cane but fell for the mature cane (figure 1).

There were differences in the rumen fermentation pattern. Molar proportion of butyric acid was higher on young cane than with mature cane, acetic acid was less, but there were no differences in propionic acid.

Rumen fermentation:

At the end of the experiment, samples of rumen fluid were taken from each animal with a stomach tube before and approximately 3 hr after the first feed. These samples were preserved with concentrated sulphuric acid for subsequent analysis for molar proportions of volatile fatty acids (VFA).

Measurements :

The animals were weighed at intervals of 14 days and feed consumption recorded daily. The molar proportions of VFA were determined according to the method described by Gonzalez and MacLeod (1976). Periodical analyses were made of the Brix in the juice of the cane stalk and also the dry matter (DM) content of the combined stalk and tops given in each ration.

Results and Discussion

Mean values for feed intake and animal performance are given in table 1. The data for molar proportions of VFA are given in table 2. Changes in the Brix of the juice and in stalk DM content of the two types of cane are set out in figure 1 while figure 2 shows changes in the voluntary intake of fresh cane and in cumulative live weight gain during the experiment.

Over the trial as a whole there was a significant difference ($P < .03$) in daily live weight gain in favour of the cattle fed stalk from mature cane. The data for feed conversion were particularly striking, with values (DM basis) of',l9.4 and 9.48 for young an] mature cane respectively. The cumulative weight gain during the progress of the trial showed little variation in the case of the mature cane while on the young cane there was a tendency ($r2 = .29$) to increase as the trial progressed (figure 2).

Table 2:
Rumen fermentations based on mature and immature sugarcane stalk

	Before feeding		After feeding	
	Immature	Mature	Immature	Mature
pH	6.8	7.25	6.9	6.6
Molar % VFA				
			a	b
Acetic	70.5 ± 2.25	72.3± .65	57.8±.40	62.6±.35
Propionic	17.1 ± .85	19.1±1.6	25.4±1.7	24.1±.80
			c	d
Butyric	12.5 ±1.7	10.7±.90	16.9 ±1.4	13.4± 1.2

ab Differ at P <.01

cd Differ at P < .18

Conclusions

Despite the limited number of animals used in the trial, caused by the difficulty in maintaining adequate quantities of actively growing young cane in the abnormal dry season conditions, there can be no question about the superiority of mature as compared with immature cane stalk in terms of feeding value for cattle. These data support the observations made under practical conditions the previous year, and are further confirmed by the analytical data reported by Banda and Valdez (1976), which indicated superior in vitro digestibility and reduced concentration of cell wall components in 16 months as opposed to 8 months old sugar cane.

Figure 1:
Changes in dry matter and Brix in mature (•) and immature (◦) sugar cane stalk during the trial (9 May-29 August)

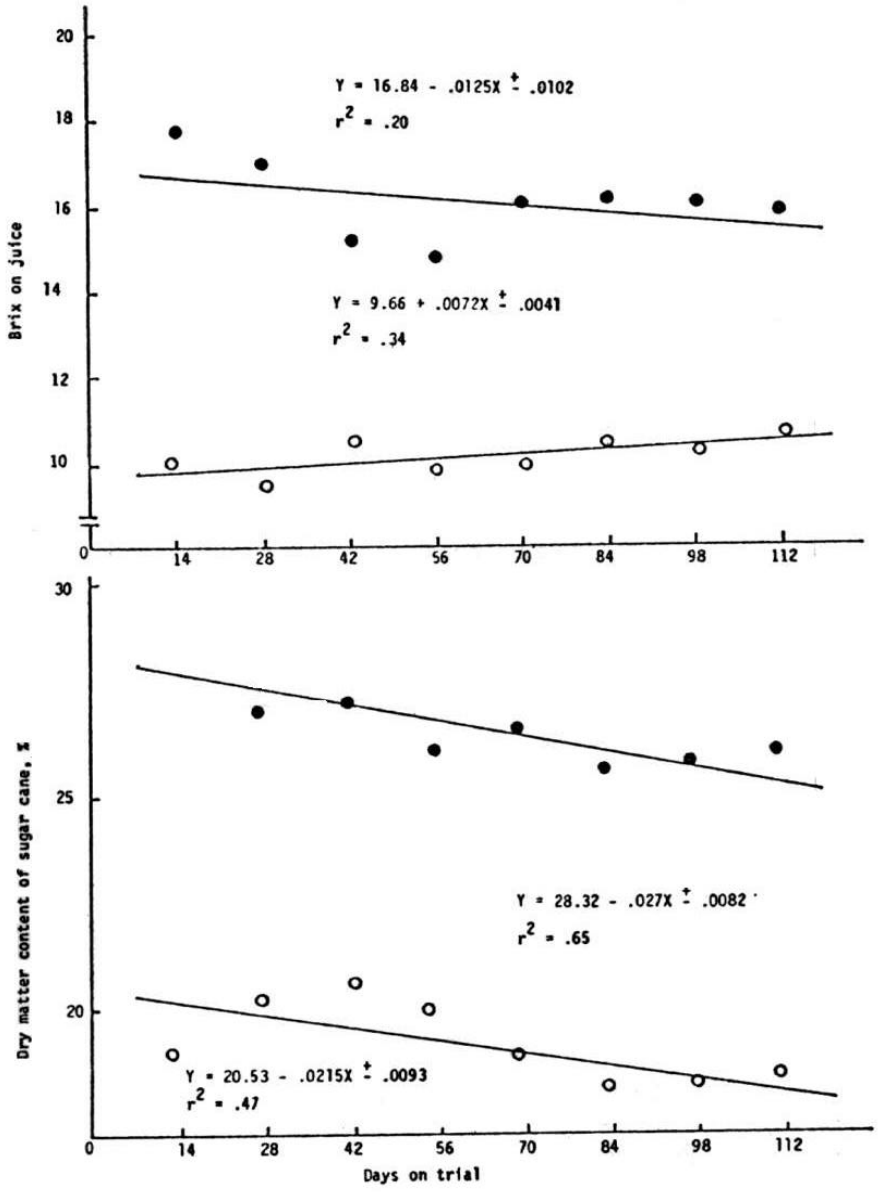
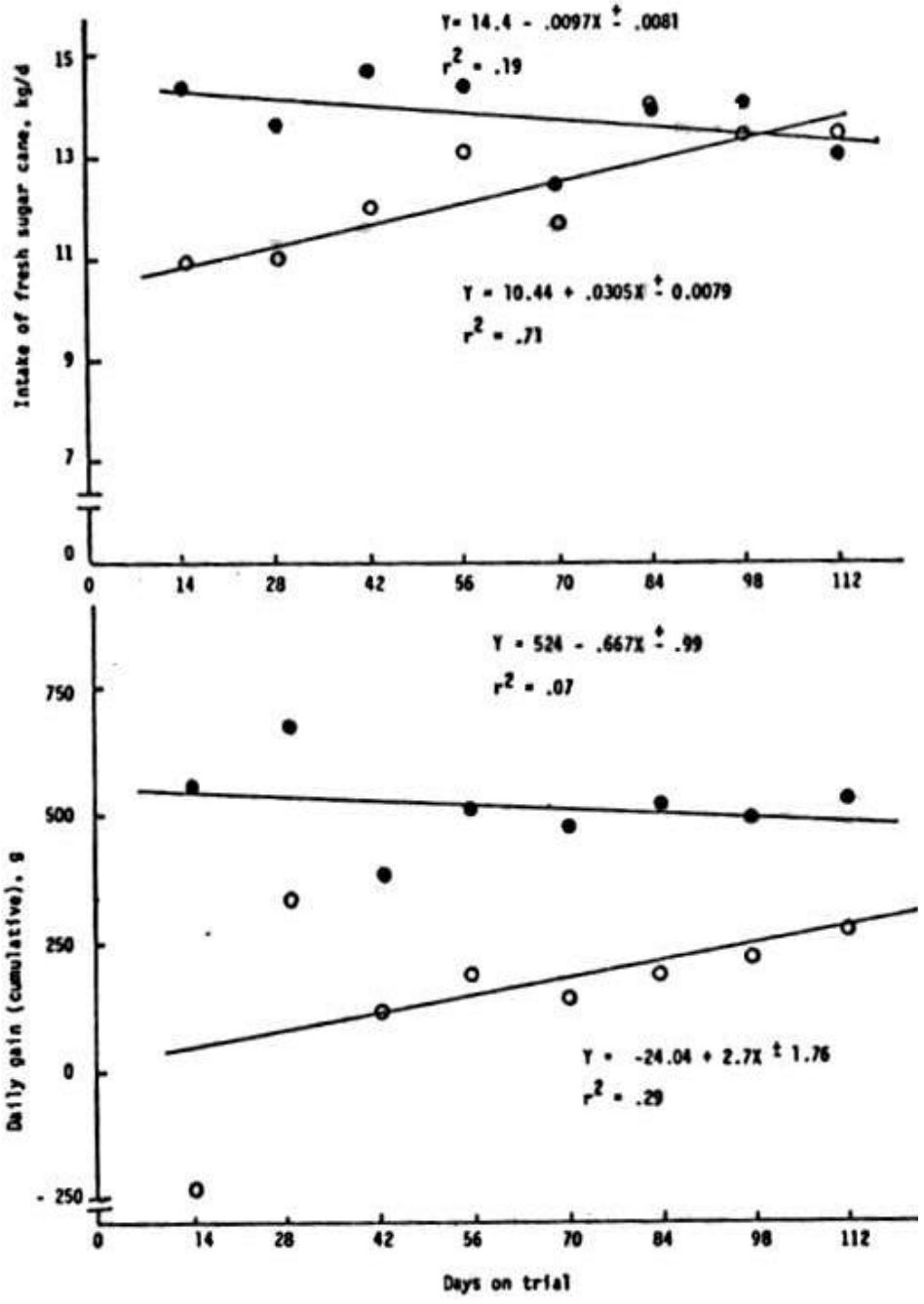


Figure 2:
Cumulative daily weight gain and intake of fresh cane for mature (•) and immature (○) cane stalk treatments.



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