

SUGAR CANE JUICE AS A SUBSTITUTE FOR MAIZE AND MOLASSES
IN DIETS FOR FATTENING PIGS

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Fattening pigs (from 40 to 100 kg) were fed a control diet of maize grain, molasses and protein supplement or sugar juice supplemented with the same protein concentrate. Live-weight gains were high on both treatments (991 and 894 g/d for juice and maize/molasses, respectively) while dry matter conversion was significantly better on the juice diet (3.36 vs 3.99). Dressing percent and muscle pH favoured slightly the cane juice treatments; fat thickness was in the normal range on both treatments (33-46 mm). Additional phosphorus had to be supplied on the cane juice treatment to correct an apparent deficiency the first weeks of the trial.

Key words: Pigs, cane juice, fattening, phosphorus, carcass quality

Pig feeds in the Dominican Republic Presently are based on imported ingredients, principally maize and soybean meal. These imports require foreign exchange, a commodity in very short supply due to the severe economic crisis affecting all of Latin America and the Caribbean. At the same time, the sugar industry is suffering different though related problems as a result of the low world price for sugar. This is especially serious for the Dominican Republic which sells the greater part of its production on the world market.

The experiment to be described is the first in a series designed to find alternative feedstuffs to substitute imported maize and to diversify the traditional sugar industry. It was decided to use sugar cane juice as the dietary source of energy in view of the encouraging results reported with this tropical feed resource both in Brazil (De Felicio and Spers 1973) and Mexico (Mena et al 1981).

Materials and Methods

Treatments, animals and design: Two energy sources were compared as basis of the diet for fattening pigs: (i) a mixture of maize grain and final molasses (control); and (ii) fresh sugar cane juice. In both treatments the protein supplement was a commercial mixture containing 40% protein. Sixteen crossbred (Yorkshire, Landrace and Duroc) castrated male pigs were used. Initial weight was 38-42 kg and age approximately 100 days. The pigs came from the Company's commercial herd. They were assigned to groups each of 4 animals in a random block design with two replicates.

Housing: The pigs were housed in an open shed thatched with palm leaves and with a concrete floor. Each pen (4 pigs) measured 2.6 x 2.5 m

Management:

Before being assigned to the experiment the pigs had been on a diet of maize, molasses and protein concentrate. The control diet was given as an homogeneous mixture and was prepared daily. The composition was 25% protein supplement, 50% maize and 25% final molasses, the concentration of molasses being increased in stages until it reached a level of 50% of the diet, substituting the maize. These dietary changes were made according to the mean liveweight of the animals (see Table 1). For the experimental treatment the cane juice was prepared twice daily and given ad libitum. The morning feed was given as a mixture with the protein supplement which was restricted according to the scale shown in Table 1. In the afternoon only juice was given.

Table 1:

Performance of pigs fed maize and molasses or sugar cane juice as energy source

	Maize/molasses	Juice	ES \bar{x}
Weight, kg			
Initial	42.6 \pm 4.7	38.6 \pm 5.9	
Final	102.5 \pm 4.6	100.1 \pm 2.8	
Increase	0.894 \pm .09	.991 \pm .06	
Intake, kg/d			
Maize	1.59		
Molasses	1.59		
Juice		11.7	
Protein supplement	1.06	.91	
Total DM	3.56	3.29	
Conversion	3.99	3.36	\pm .093/.04
Time, d	67 \pm 8.7	62 \pm 8.7	

Extraction of the juice: The sugar cane was a commercial variety which had been rejected as unsuitable for sugar manufacture. It was transported to the experimental site twice weekly (a distance of 16 km) and stored in the open but shaded under trees. The juice was extracted by passing the stalks once through a three roll mill (each roll had a diameter of 25 cm and was 34 cm long) powered by a 10 HP diesel engine. The capacity of the mill was approximately 1000 kg/h; the average rate of extraction of the juice was 46% (weight of juice as percent of the fresh weight of the cane stalks).

Slaughter procedure: The pigs were slaughtered when they reached approximately 100 kg liveweight. Dressing percent was measured on the warm carcass and after it had cooled (24 h at 4.4°C). Fat thickness was measured at the shoulder, the mid back and at the last lumbar vertebra. The eye muscle area was determined as the product of the length and depth. pH was determined on fresh muscle; the liver was also weighed.

Results

Health: The pigs fed the cane juice had a slight diarrhoea during the first week but the faeces soon returned to normal without any treatment. Subsequently, it was noted that the faeces from the juice fed pigs were drier than those from the pigs fed on cane juice displayed a marked weakening of the hind limbs. This appeared to be due to phosphorus deficiency since the animals promptly recovered when phosphoric acid was added to the diet (300 ml of 85% strength acid per 100 kg of juice).

Performance: Growth rates were extremely high on both treatments with no apparent differences between treatments. Dry matter intake was slightly less for the pigs fed juice, which when combined with the slightly faster weight gain (991 vs 894 g/d) led to a significantly better feed conversion ($P < .04$). There were no significant differences between treatments in carcass characteristics although both dressing percent and muscle pH favoured the cane juice treatment.

Table 2:
Carcass composition and characteristics of pigs fed maize and molasses or sugar cane juice

	Maize/molasses	juice
Yield, %		
Hot carcass	81.9 ± 1.3	83.5 ± 1.4
Cold carcass	80.0 ± 1.9	82.0 ± 1.9
L. dorsi area, cm ²	40.5 ± 4.0	40.2 ± 7.3
Muscle pH	5.6	5.5
fat thickness, mm		
Shoulder	46.0 ± 5.9	45.1 ± 9.3
Mid back	33.4 ± 2.2	33.2 ± 1.9
Hind limp	36.5 ± 5.0	35.4 ± 5.0
Liver, kg	1.74 ± .18	1.81 ± .26

Discussion

The levels of performance recorded in this experiment for the pigs fed on cane juice were better than reported previously by Mena et al (1981) both in liveweight gain (991 vs 704 g/d) and feed conversion (3.36 vs 3.42 kg DM/kg gain). The carcass data support the earlier findings of high dressing percent without excess fatness and with muscle pH at the lower end of the normal range.

Attention is drawn to the need to incorporate adequate amounts of phosphorus in cane juice diets. The fact that deficiency symptoms were not reported by Mena et al (1981) may be because these workers used fish meal as part of the protein supplement; also liveweight gain and therefore mineral requirements were less.

Conclusions

Sugar cane juice is an excellent energy source for pig feeding and can completely substitute cereal grains traditionally used in pig fattening. High rates of liveweight gain can be achieved on this feed without apparent deterioration in carcass quality.

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References

- De Felicio & Spers 1973 Estudo comparativo da substituição parcial e total do milho pelo caldo de cana em rações para suínos Brasileiro Indústria Animal SP 30:309-322
 Mena A, Elliott R & Presto T R 1981 Sugar cane juice as an energy source for pigs Tropical Animal Production 6:369-375

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