GROWTH OF FATTENING CATTLE GIVEN CHOPPED SUGAR CANE SUPPLEMENTED WITH DIFFERENT LEVELS OF WHEAT BRAN

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Thirty-six Zebu bulls of about 200 kg, and two years old, housed in pens of three animals, were given chopped whole sugar cane plus urea/ammonium sulphate and 0, 200, 400, 800, 1200 or 1600 g/d wheat bran as supplement. Two pens were allocated to each treatment, and the growth trial lasted 83 days. There was a clear growth response to the wheat bran given by Y = 54 + 0.231X (SE of slope = 0.021, r^2= 0.93) when Y = rate of live weight gain, and X = rate of supplementation with wheat bran. Supplementation was without effect on the voluntary intake of cane which is in contrast to previously reported work using rice polishings as supplement. It is concluded that it is important to arrive at a fuller understanding of the action of these supplements with sugar cane, since the low growth rates obtained with unsupplemented cane are not commercially viable.

It has been generally found that in order to obtain satisfactory growth on sugar cane diets, some form of supplementation is necessary (Preston 1977) Of the various supplements used, rice polishings have given by far the best results (Preston et al 1976; Lopez et al 1976; Lopez and Preston 1977), the response seeming almost synergistic (Ferreiro et al 1977). Wheat bran is produced by the flour milling industry, and generally contains very similar levels of starch and protein (though less oil) as does rice polishings, The objective of the experiment reported here was to measure the response of growing cattle to wheat bran supplemented onto a sugar cane diet. A provisional account of this experiment has already been given (Silvestre and Hovell 1978).

Materials and Methods

Animals, Treatments and Design: Thirty-six Zebu bulls of approximately 200 kg initial weight, and about two years old were used. The experiment was of random block design, the six treatments consisting of 0, 200, 400, 800, 1200 and 1600 g/d of wheat bran supplemented onto a basal diet of sugar cane plus urea and ammonium sulphate. Two pens of three animals were allocated to each of the treatments, which were thus replicated twice

Diets, Housing and Management: The basal diet consisted of whole sugar cane chopped with a Gehl forage harvester to pieces of up to about 2 cm in length. The sugar cane was supplemented with 9 g urea and 2.5 g ammonium sulphate per kg fresh cane, which was sprinkled onto the top of the cane as an aqueous solution. The animals also received 60 g/d of a 50:50 mixture of dicalcium phosphate and sodium chloride. They were housed in slatted floor pens in an open sided covered yard, and were fed once daily with the fresh chopped cane, the previous days refusals being removed and weighed. The wheat bran was fed immediately after the cane and on top of it.

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Measurements: All animals were weighed once fortnightly. Feed intake was determined daily, the Brix° (by refractometer) and dry matter of the cane on five days a week. The growths of the individual animals was taken to be the slope of the linear regression of live weight on time. The data were analysed using the pens as replicates except for growth rate for which animals were considered as replicates (this method gave the larger standard error). The between pen, within pen interaction components of the variation were not significant statistically.

Table 1:
The effect of wheatbran on the growth and feed intake of Zebu bulls fed chopped sugar cane for 83 days

	Wheat bran supplementation, kg/d[1]						
	0.0	0.2	0.4	0.8	1.2	1.6	SEx
Live weight kg							
Initial	225	190	180	236	188	231	-
Final	230	198	195	257	214	268	-
Daily gain, g/d	62	87	170	245	307	444	51
Food intake, kg/d							
Fresh chopped cane	113.0	12.4	13.0	13.9	12.9	13.5	0.21
Total dry matter (DM)	3.39	3.37	3.67	4.24	4.35	4.85	0.24
Food conversion[2]	54.7	38.7	21.6	17.3	14.2	10.9	6.94
Consumption index[3]	1.49	1.74	1.96	1.72	2.16	1.94	0.10

[1] Fresh weight: wheat bran 87% DM, sugar cane (average) 25.3% DM, 11.4 Brix (by refractometer)
[2] kg DM intake (DMI) per kg live weight gain
[3] kg DMI per 100 kg live weight

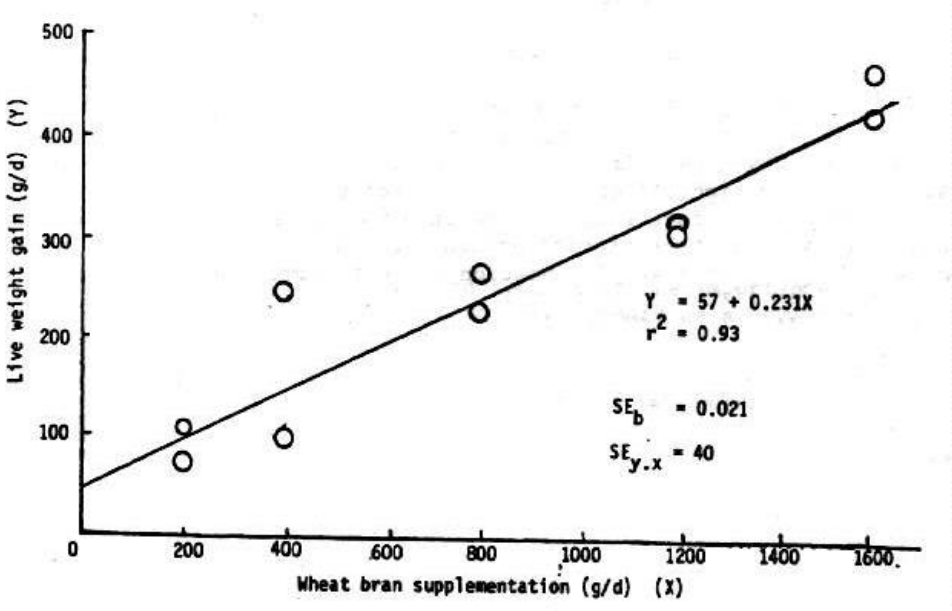
Results and Discussion

Food consumption and the growth of the animals is shown by Table 1. There was a clear and linear growth response to increasing levels of wheat bran which was given by the equation (Figure 1):

$$Y = 57 + 0.231X \qquad (SEb = \pm 0.021)$$

when Y is the rate of animal growth (live weight gain), and X is the rate of wheat bran supplementation (fresh weight). Thus the growth response was 231 ± 21 g live weight gain per kg wheat bran, a food conversion efficiency of 4.3:1. This response bears no relation to that found with rice polishings in Mexico as is shown by Table 2. This table clearly demonstrates the synergistic effect found with rice polishings which was to stimulate the voluntary intake of the other dietary components offered ad libitum - cane consumption being increased by about 20% per kg supplement, and molasses

Figure 1 :
The growth response of Zebu bulls given wheat bran as a supplement to chopped whole sugar cane



intake by about 40%. In contrast, in our experiment, wheat bran was without effect on cane intake (Tables 1 and 2). The tendency for there to be a small increase in the feed consumption index with increasing levels of wheat bran (Table 1) was almost entirely due to the additional dry matter intake attributable to the wheat bran. The improvement in conversion efficiency (Table 1) can probably be largely explained by the additional energy provided by the wheat bran. The very dramatic effect is simply due to the fact that the control group made very poor growth, and were thus very close to maintenance. Increments of energy intake above this resulted in growth, and hence

Table 2:
The effect of the supplementation of sugar cane diets with rice polishings or wheat bran on the animal growth response and voluntary food intake

Source	Supplement	Response per kg supplement				
		Animal growth (g)	Cane intake (kg DM) [1]	%	Molasses intake (kg DM)[1]	(%)
1) Lopez at al (1976)	Rice polishings	732+60	0.66+.09	19	.46 +.06	46
2) Preston et al (1976)	Rice polishings	581+42	0.81+.13	22	-	-
3) Lopez & Preston (1977)	Rice polishings	461+19	1.07+.19	23	.61 +.20	35
4) This experiment	Wheat bran	231+21	0.11+.07	3	-	-

[1] Assuming 28% DM for cane and 80% DM for molasses with sources1,2 and 3

an improvement in feed conversion efficiency which includes the maintenance component. The feed conversion efficiency of 4.3:1 for the wheat bran represents an efficiency above, and therefore corrected for, maintenance. This of course assumes that effects are simply additive, and that there was no interaction with the cane diet. It is probable that there was an interaction, in that the wheat bran also supplied protein, and there is evidence (Ruiz and Hovell unpublished observations) that supplementation of cane diets with wheat bran increases the amount of protein in the rumen fluid, and therefore, presumably passing to the abomasum. Why rice polishings have such a great effect is not known. Clearly an interaction effect is involved, for the effect is synergistic. An understanding of the factor or factors involved is important, for as was demonstrated with the use of rice polishings, the low growth rates obtained from cane diets without supplementation are not commercially viable.

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