RICE POLISHINGS AS A SUPPLEMENT IN SUGAR CANE DIETS FOR FATTENING CATTLE: EFFECT OF DIFFERENT COMBINATIONS WITH BLOOD MEAL

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60 Zebu steers of 263 kg initial weight and 2 years of age were used to evaluate high (336 g/d) or low (176) levels of supplementary, protein in a diet based on sugar cane and molasses/urea. the two levels were obtained by combining rice polishings and blood meal so that the latter provided 100, 86 and 71% of the supplementary protein at the high level and 100, 75 and 56% at the low level. The levels of rice polishings were 0, 400, and 800 g/d with blood meal at 420 and 200, 360 and 160, 300 and 100 g/d for the 3 levels of rice polishings respectively. There was a positive response in animal performance according to level of rice polishings and a depressing effect due to the blood meal. The multiple regressions relating daily gain in live weight (Z = g/d), consumption index (Z_2 = kg/100 kg LW) and feed conversion (Z_3 = kg DM/kg gain) were: Z_1 = 245 + .409X -.044Y; Z_2= 1.886 + .00028X + .00020Y; and Z_3 = 21.3 - .012X + .0051Y, where X = rice polishing and Y = blood meal (g/d). It is concluded that blood meal has no nutritive value in diets based on sugar cane and molasses/urea when it is the only protein source or even combined with a high quality protein such as that in rice polishings.

Key words: Cattle, sugar cane, molasses/urea, rice polishings, blood meal

Rice polishings is the supplement which so far has given the most consistent results in ruminant diets based on sugar cane and urea (Preston et al 1976; Lopez et al 1976). It is thought that this material perhaps acts as a source both of protected (or by-pass) protein, as well as glucogenic precursors, since it has an excellent amino acid balance and a high content of starch (Leng and Preston 1976). In contrast, pure protein sources such as meat and bone meal (Preston and Bonaspetti 1976; Silvestre et al 1977) and blood meal (Alvarez et al 1974) have been ineffective with sugar cane/urea diets.

If the principal deficiency of these latter supplements is a source of glucogenic precursors (i.e. starch), then it should be possible to use them in combination with or partial substitution of rice polishings.

The objective of this experiment was to examine the effect on growing steers when different amounts of blood meal were used in partial substitution of rice polishings in diets based on sugar cane and molasses/urea.

Materials and Methods

Treatments and Design: six treatments were compared. They consisted of levels of rice polishings of 0, 400 and 800 g/d with 420 and 220 g/d of blood meal for the first,

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360 and 160 for the second and 300 and 100 for the highest level of rice polishings. These treatments represented a high level of supplementary protein (336 g/d) and a lower level (176). At the high protein level, blood meal accounted for 100, 86 and 71% of the total protein while at the low level it represented 100, 75 and 55%. There was one group of 10 animals on each treatment.

Procedure: 60 Zebu steers of initial weight 263 kg and 2 years of age were housed in open paved corrals measuring 19 x 4 m. The sugar cane was given twice daily at 10.00 and at 14:30 with approximately 70% of the total ration given in the morning and the rest in the afternoon. They had free access to a solution of molasses/urea (100 g urea 100 water and 800 g final molasses of 88° Brix) and to a mixture of minerals (50% salt 47% rock phosphate and 3% trace minerals). The rice polishings and the blood meal were mixed together and given as the first feed in the morning 1 hr prior to offering the sugar cane. The experiment lasted 112 days and was carried out at the end of the rainy season.

Results and Discussion

Table 1:
Mean values for change in live weight and feed intake

Rice polishings, g/d	0		400		800	
Blood meal, g/d	420	220	360	160	300	100
Live weight, g/d						
Initial	225	260	271	262	268	265
Final	282	284	320	308	336	334
Daily gain	331	242	392	380	555	583
DM intake, kg/d	5.68	5.41	6.48	6.31	7.30	7.15
Consumption index[1]	2.01	1.90	2.03	2.05	2.17	2.14
Feed conversion[2]	24.59	22.35	16.53	16.60	13.15	12.26

[1] Daily DM (kg)/100 kg LW
[2] DM intake/gain in LW

Mean values for the different parameters of animal performance and diet composition are summarised in tables 1 and 2 . The statistical analyses were done by multiple regression, using as independent variables the levels of rice polishings (X = g/d) and of blood meal (Y = g/d). The equations indicate most of the animal response could be attributed to the level of rice polishings, while the effect of blood meal was small and negative. In other words, increasing the level of rice polishings in the ration led to a linear increase in animal performance while increasing the level of blood meal caused a reduction in performance (figures 1, 2 and 3).

Table 2:
Diet parameters according to combined effect of rice polishings and blood meal

Rice polishings, g/d	0		400		800	
Blood meal g/d	420	220	360	160	300	100
Intake, Kg/d						
Fresh cane	15.86	17.28	17.47	18.68	19.89	19.32
Final molasses	2.39	1.97	2.67	2.32	2.75	2.82
Consumed daily						
Ratio cane:molasses	2.06:1	2.79:1	2.03:1	2.51:1	2.26:1	2.0:1
N x 6.25, % in DM	20.49	15.83	19.44	15.79	17.55	16.00
N in DM, %	3.27	2.53	3.11	2.52	2.80	2.56
NPN, g/d	19.29	16.33	18.89	16.89	17.16	18.01
Plant N, g/d	13.50	8.98	12.22	8.37	10.93	7.59
N total, g/d	32.79	25.31	31.11	25.26	28.09	25.60
Urea in DM, g/kg	45.44	35.97	41.15	36.81	37.4	39.24

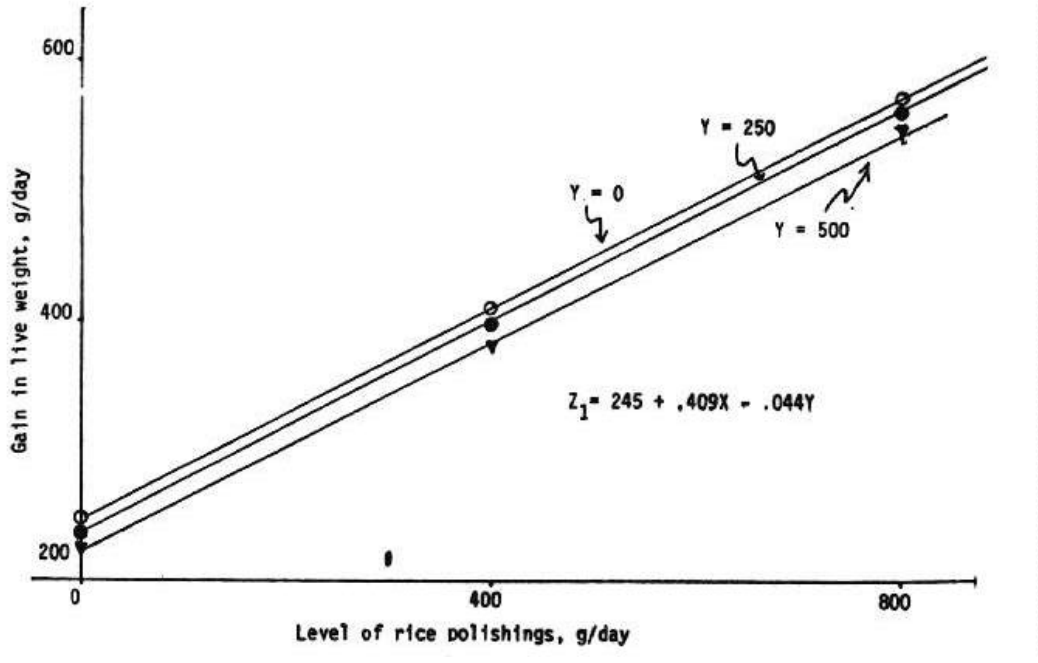

Figure 1:
Effect of rice polishings in combination with blood meal on live weight gain

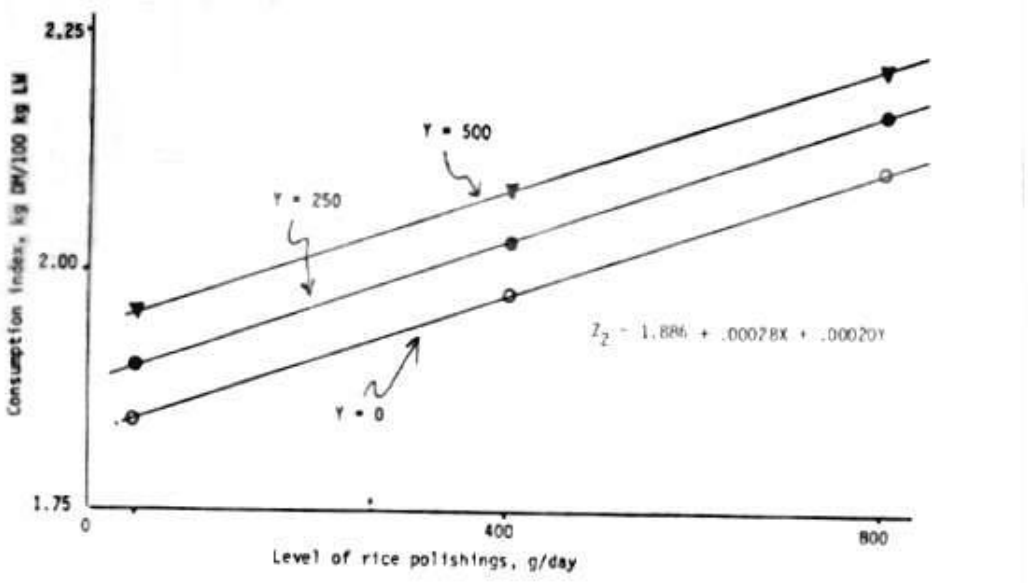

Figure 2:
Effect of rice polishings in combination with blood meal on voluntary feed consumption index

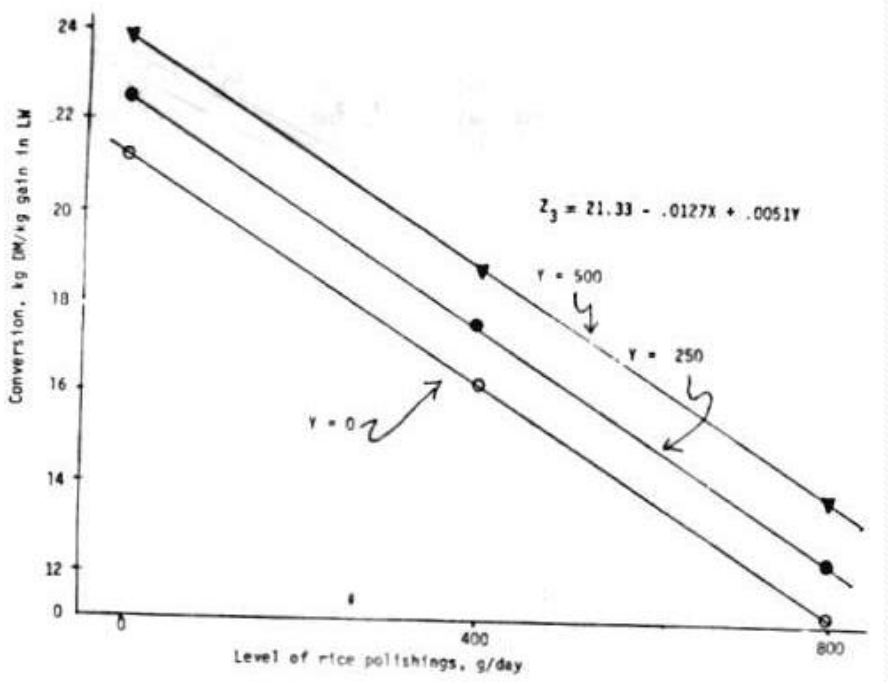

Figure 3:
Effect of rice polishings in combination with blood meal on conversion

These findings agree with results of previous experiments in which there has always been a linear response to rice polishings in sugar cane/urea rations (Preston et al 1976; López et al 1976), while the effect of blood meal has been to reduce voluntary intake without affecting live weight gain (Alvarez et al 1974).

It is difficult to explain the negative results due to feeding of blood meal, especially as this effect was independent of the level of rice polishings. This substance is of variable quality and is very much affected by the method of manufacture. The amino acids that it, contains are imbalanced; it is particularly low in methionine and isoleucine, while there is an excessive amount of leucine. Thus the overall biological value is low, and digestibility can be low also depending on the degree of heat treatment it receives during its manufacture. Its main virtue is considered to lie in its content of lysine.

The poor results with blood meal can perhaps be related to the imbalance of amino acids and particularly the deficiency of methionine which is considered to be the first limiting amino acid in diets based on sugar cane and non-protein nitrogen.

Conclusions

Blood meal appears to have no value whatsoever as a protein supplement in ruminant diets based on sugar cane and urea, either used alone or in combination with rice polishings.

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