THE EFFECT OF VITAMINS OF THE B COMPLEX ON THE GROWTH OF ZEBU BULLS FED CHOPPED SUGAR CANE

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24 Zebu bulls of about 170 kg and two years old were allocated to one of four diets for a period of 77 days. The diets were (A) Control: chopped whole cane plus 600 g/d meat and bone meal; (B) as A, but with 300 g/d yeast substituted for an equal quantity of meat and bone meal; and © and (D), which were as A, but the animals were given a B-vitamin complex concentrate either by intramuscular injection (C), or orally (D). Because of supply problems it was necessary to change the protein supplement from meat and bone meal to extracted soya-bean after 40 days on the diets. There were no differences between treatments either before or after the supplement change. Average growth rates were 323, 332, 213 and 238 ± 41 g/d for treatments A to D respectively. There were no differences between treatments in food consumption which averaged 12.4 kg fresh chopped whole cane/d. It was concluded that growing cattle given chopped sugar cane have no requirement for B-vitamins above those provided by 600 g/d meat and bone meal or 600 g/d soya-bean meal.

Key words: Sugar cane, cattle, fattening, B-vitamins

Deficiencies of vitamins of the B complex are not normally found in ruminants, and it is generally considered that the rumen microorganisms synthesize sufficient for the host animals requirements (Hungate 1966; ARC 1965), although it is not known to what extent the animal depends on the vitamins supplied by the diet to supplement synthesis by the rumen microorganisms. There is some evidence that with purified diets in which all the nitrogen is supplied in the inorganic form, that symptoms of a deficiency of vitamins of the B complex can occur (Naga et al 1975).

Sugar cane is an energy source low in proteins, lipids and other nutrients. It is therefore necessary to supplement it with non-protein nitrogen in order to provide almost all the nitrogen required by the rumen microorganisms. In the knowledge of the results of Naga et al (1975), we need to know whether it is also necessary to supplement sugar cane diets with the B-vitamins.

Lora and MacLeod (1976) were unable to find a growth response to the B-vitamins by animals given a diet based on sugar cane and molasses/urea at 5%. In their experiment the B-vitamins were either injected or given orally. However, their diets included a supplementation of 650 g/d of cotton seed meal which would contain some B-vitamins.

In the experiment to be reported here the objective was to see whether there would be a response to additional B-vitamins when the source of supplementary protein in the cane diet was meat and bone meal, and (later on) soya-bean meal.

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Materials and Methods

Treatments, Animals and Design: The four dietary treatments were:

(A) Chopped whole sugar cane ad libitum (plus a solution, in water, of urea and ammonium sulphate to give 9 g and 2.5 g/kg fresh cane respectively) supplemented with 600 g/d of meat and bone meal.

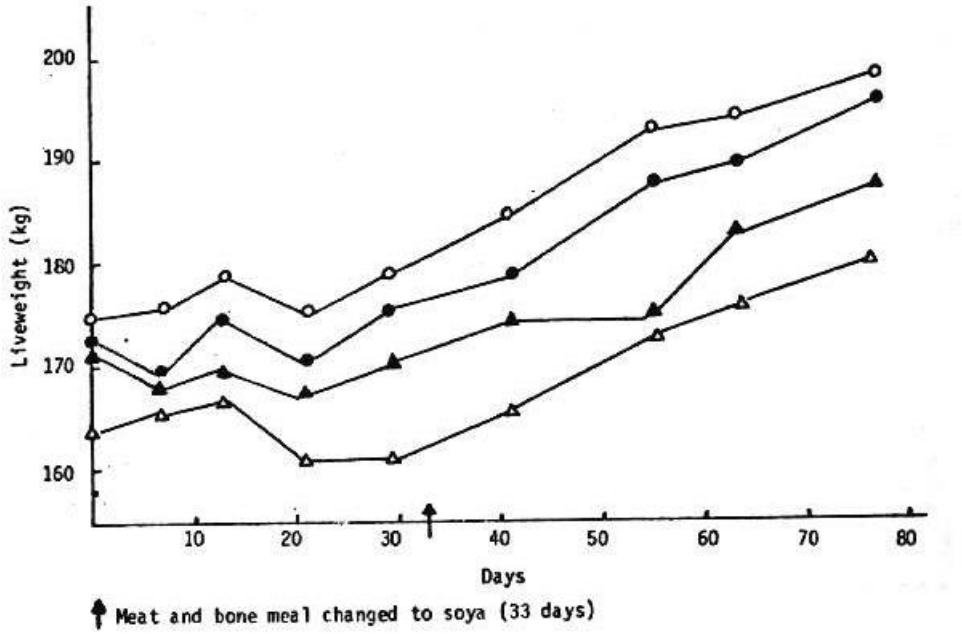
(B) The basal diet, (A), but with 300 g/d of bread yeast substituted for 300 g of the meat and bone meal.

(C) The basal diet, (A), plus an injection once weekly of a B-vitamin complex (see Table 1).

(D) The basal diet, (A), supplemented with the same vitamins given orally (daily).

It had been intended to complete the experiment using meat and bone meal as the protein supplement. Unfortunately, it was necessary to change this to soya-bean meal (extracted) after 33 days, and the trial was completed with this supplement. 24 Zebu bulls, of approximately 2 years old and weighing about 170 kg were divided into 8 groups of 3 animals which were allocated at random to the dietary treatments. They were then given an adaption period of one week before the growth trial was started. The experiment was thus of randomized block design replicated twice.

Figure 1:
The growth of Zebu bulls given chopped whole sugar cane and meat and bone meal (○) supplemented with yeast (•) or B-vitamins either injected (△) or orally (▲)



Measurements and Statistical Analysis: The animals were fed once dally and were weighed weekly during the first month of the experiment and once fortnightly thereafter. Feed refusals were taken daily, and the experiment lasted for 77 days. The rate of gain of the animals was calculated using the linear regression of liveweight on time, and then analysed as a randomized block.(Animals were taken as replicates).

Results and Discussion

The food intake and the rate of growth of the animals is summarised by Table 1. There was no evidence of any response to the B-vitamins, no matter whether they were given orally or as an intramuscular injection.

Table 1:
Effect of supplementation of sugar cane with 8 vitamins on liveweight gain and voluntary food intake of Zebu bulls grown for 77 days

Treatment	A	B	C	D	SEx
Form of B-vitamin supplement	Control	Yeast	Injected	Oral	
Initial weight (kg)	171	173	164	172	-
Liveweight gain (g/d),	323	332	213	238	41
Consumption (kg/d) (fresh basis)					
Chopped whole cane	12.6	12.2	12.2	12.1	-
Meat and bone meal [1]	0.60	0.30	0.60	0.60	-
Bread yeast	-	0.30	-	-	-
Urea	0.11	0.11	0.11	0.11	-
Ammonium sulphate	0.03	0.03	0.03	0.03	-
Minerals[2]	0.06	0.06	0.06	0.06	-
Total DM (kg/d)	3.92	3.78	3.89	3.85	-
B -vitamin concentrate[3]	-	-	1 ml/week	0.33 ml/d	-
Consumption Index[4]	2.05	2.07	2.23	2.10	0.08
Feed Conversion[5]	12.1	11.4	13.6	16.2	2.2

[1] This was changed to an equal amount of extracted soya-bean meal after 33 days on the experiment

[2] 1:1 mixture of dicalcium phosphate and salt

[3] Containing 33,300 iu B1; 15 mg Folic Acid; 50 ug B12; 0.5 mg Riboflavin. 2 mgPyridoxine chloride; 10 mg Calcium pantothenate and 150 mg Niacin

[4] kg dry matter intake (DMI) per 100 kg liveweight

[5] kg DMI per kg liveweight gain

Most of the growth was made in the last 44 days of the experiment as is shown by Figure 1. Therefore the experiment was re-analysed for animal growth. The treatment means (± SE) for liveweight gains in this second period were: 423, 475, 422 and 377 ± 71 g/d for the Control, Yeast, Oral and Injected B-vitamin treatments respectively. It is interesting that the growth of the animals appeared to begin shortly after the supplement was changed to soya-bean meal. It has been observed elsewhere (Preston and Bonaspetti 1975) that the growth response to meat and bone meal by cane fed animals is very poor, and the change in growth rate observed may have been due to the change in supplement. It can not be attributed to the additional B-vitamins provided by the soya, since there was no effect of yeast or B-vitamin supplementation in the first four weeks of the experiment (effectively five weeks on the diet, if the week of adaptation is included).

It is therefore concluded that growing cattle given a diet of chopped sugar cane have no need for supplemental B-vitamins above those provided by 600 g/d of meat and bone meal or 600 g/d of extracted soya-bean meal.

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