CASSAVA FORAGE AS A FIBRE AND PROTEIN SUPPLEMENT IN MOLASSES BASED DIETS: EFFECT OF LEVEL OF FORAGE AND SUPPLEMENTATION WITH SOYBEAN MEAL[1]

Angela Fernandez and T R Preston[2]

CDIPCA, CEAGANA, Santo Domingo, Dominican Republic

Eighteen Zebu bulls in groups of three were used in a 2 x 3 factorial design to study the effect of level 1 of cassava forage (2, 3 or 4% of liveweight fresh basis) with or without the addition of 200 g/d of soybean meal. The experimental period was 105 days, but the results were only analysed during the last 70 days as the first 35 days were apparently required to adapt the animals to the diet. In the absence of soybean meal there was a linear improvement in live weight gain (from 367 to 908 g/d) as cassava forage level was increased; feed conversion rate was also improved from 10.7 to 5 61 kg DM/kg gain. In the presence of soybean meal, live weight K d was not related to forage level (range in live weight gain 607 to 710 g/d) and feed conversion rate became worse as forage level increased (from 5.34 to 7.17). It is concluded that cattle can be fattened economically on a molasses/ urea based diet using cassava forage as the only source of fibre and protein.

Key words: Cattle, molasses, urea, cassava forage, growth, feed conversion

One of the principal problems that has faced cattle producers in developing countries in the tropics is to obtain a protein supplement. This is particularly important on diets based on sugar cane and molasses for which protein is one of the first limiting factors. The difficulty of obtaining protein supplements is because in many cases these products have to be imported which results in physical scarcity and high cost.

For this reason we are investigating the use of protein rich forages which can be produced by the cattleman on his own farm.

Materials and Methods

Treatments, Animals and Design: The treatments in a factorial design 2 x 3 were levels of cassava forage of 2, 3 and 4% of live weight (fresh basis) with or without the addition of 200 g/d of soybean meal. There was one group on each treatment and three animals in each of the treatment groups. Zebu bulls of average initial weight of 170 kg were used. They were approximately 2 years of age at the beginning of the experiment. The length of the trial was 105 days.

Diets: The cassava forage was from the variety Zenon which was cut at between 3 and 4 months, and consisted of the aerial part of the plant cut at approximately 30 cm above ground level. The forage was chopped immediately after it was harvested and given in one single feed in the morning. The molasses/urea was given on a free choice basis in a separate feeder. All the animals were given an average of 60 g/d of a mixture of salt and dicalcium phosphate (50/50 w/w).

Measurements: The animals were weighed at intervals of 7 days and the rates of live weight gain determined by the linear regression of weight against time.

---

[1] This work was supported in part by funds provided by the Organisation of American States through the project Fondo Mar del Plato

[2] Consultant to the OAS project

Results

Mean values for feed intake and changes in live weight are given in Tables 1 and 2. These data relate to the experimental period 35 - 105 days; data recorded during the adaptation period 0 - 35 days were eliminated from this analysis. The regressions of mean live weight (for each treatment group) against time on experiment (days) are

Table 1:
Mean values for live weight change and feed intake for Zebu bulls fed molasses/urea, cassava forage and soybean meal (70 days; 3 bulls per treatment)

Soybean meal g/d	0			200		
Cassava forage, % of LW	2	3	4	2	3	4
Live weight, kg						
Initial	167	170	163	159	180	170
Final	192	200	220	208	222	221
Daily gain	.367	.472	.908	.694	.607	.710
Feed intake, kg/d						
Cassava forage	3.70	5.50	7.35	3.65	5.58	7.2
Molasses	3.78	3.61	4.29	3.65	3.55	4.25
Soybean meal	-	-	-	.20	.20	.20
Dry matter	3.86	4.13	5.09	3.74	4.10	5.02
Voluntary consumption index[1]	2.14	2.23	2.66	2.04	2.04	2.57
Conversion[2]	10.7	8.78	5.61	5.34	6.83	7.17

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

Table 2:
Effect of level of cassava forage and of soybean meal on feed intake and conversion of bulls given a molasses based diet: mean values for main treatment effects

	Effect of cassava, % LW				Effect of soybean meal, g/d		
	2	3	4	SE/P [1]	0	200	SE/P
Intake, kg/d							
Molasses	3.72	3.58	4.27	.02/.004	3.08	3.62	.019/.11
Total DM	3.80	4.12	5.06	.022/.001	4.36	4.32	.018/.10
Conversion	8.02	7.81	6.39	1.73/.79	8.36	6.45	1.41/.44

[1]SE = ± SEx; P = Probability of "F" test

shown graphically in Figures 1 and 2 for the treatments without and with soybean respectively. Figure 3 shows the relationships between the level of cassava forage in the ration and daily live weight gain and feed conversion.

The data in Figures 1 and 2 show that there was an obvious adaptation period of about 35 days, during which there was little or no gain in weight, and that subsequently growth rates were very consistent. This period of adaptation on a diet of molasses, urea and cassava forage is similar to what was reported previously (Fernandez et al 1977). There was no evidence that this adaptation period was

Figure 1: Growth curves of Zebu bulls fed a molasses - based diet and different levels of fresh cassava forage (•2%,◦ 3%, △ 4% of live weight) in the absence of soybean meal

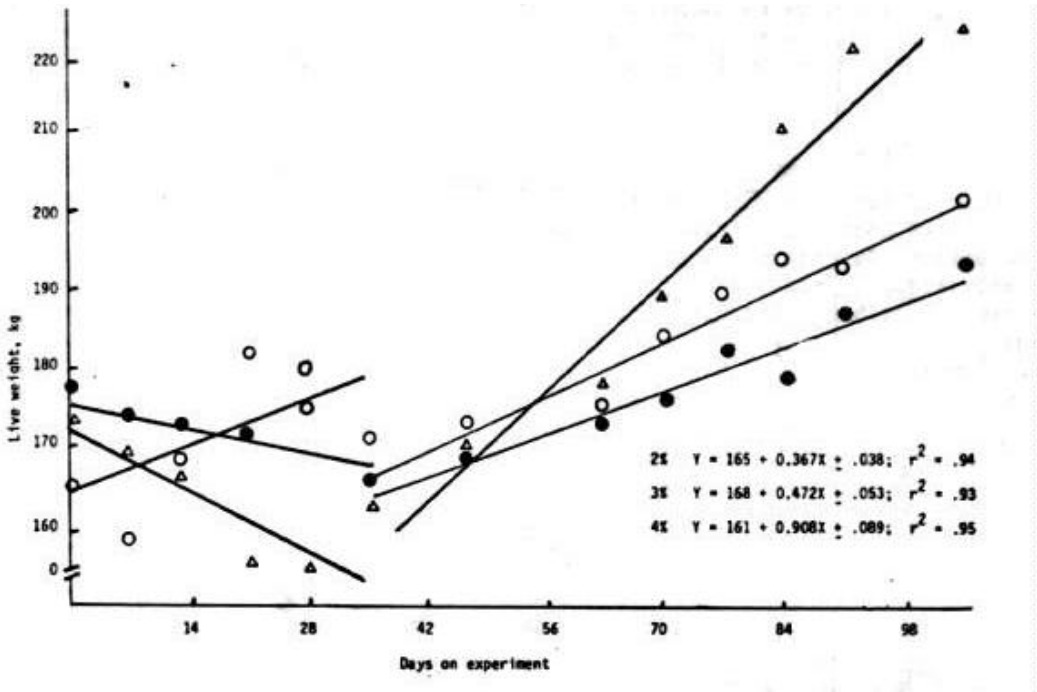


Figure 2:
Growth curves of Zebu bulls fed a molasses based diet and different levels of fresh cassava forage (•2%,◦ 3%, △ 4% of live weight) in the presence of soybean meal)

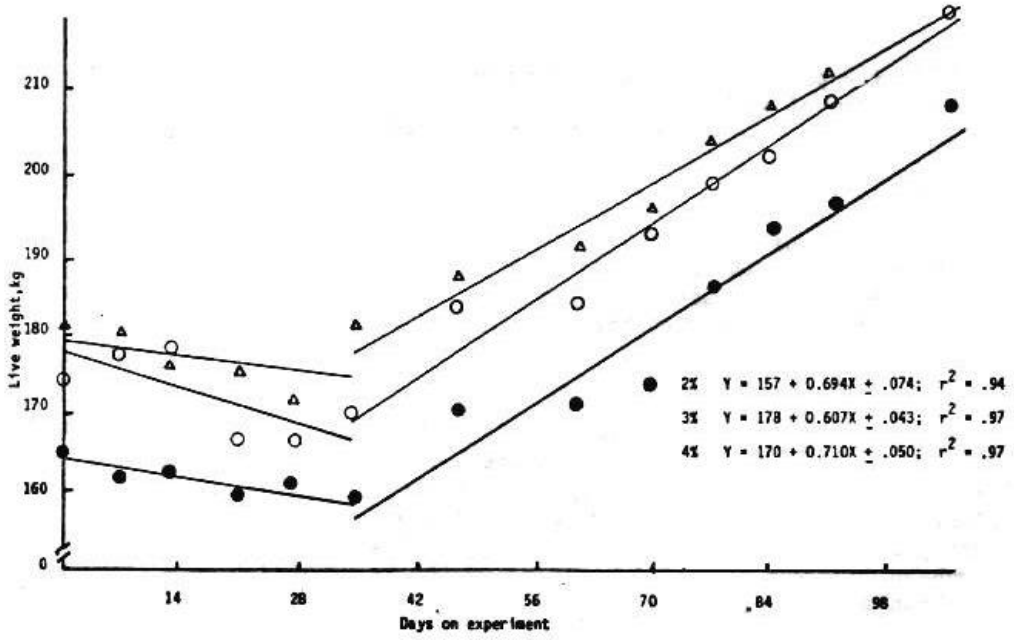
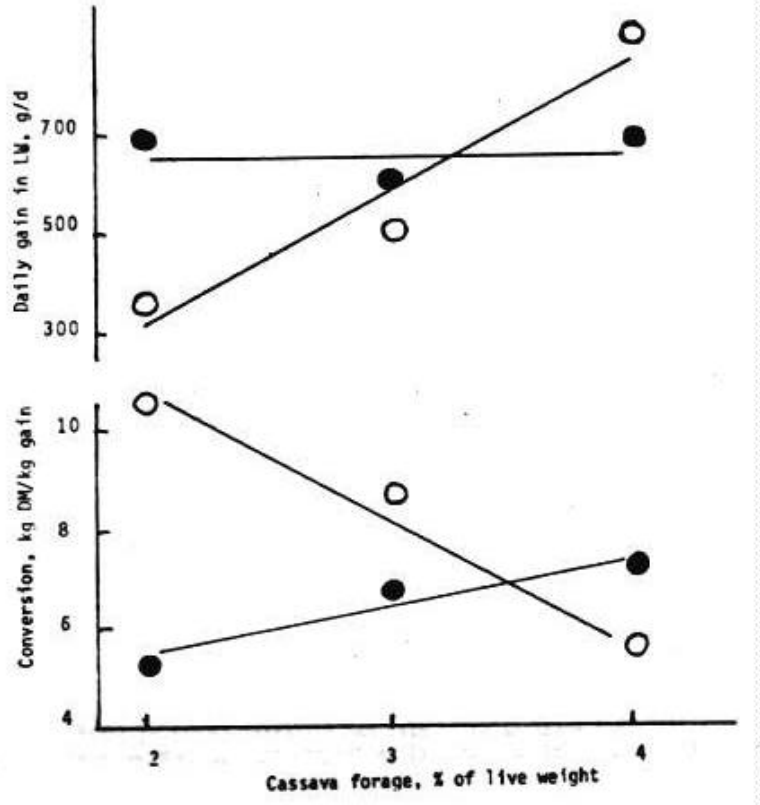


Figure 3:
Effect of cassava forage, with (•) or without (○) soybean, on growth rate and feed conversion of bulls fed molasses/urea (difference between slopes significant at P<.14 for gain and P<.02 for conversion)



affected by providing additional protein supplement in the form of soybean meal.

The response to the level of cassava forage varied according to soybean supplementation. In the absence of soybean meal, there was a positive linear relationship between the level of forage and both live weight gain and feed conversion; in the presence of soybean meal the level of cassava forage had no effect on rate of live weight gain but feed conversion rate became worse as the level of cassava forage was increased. Daily DM intake increased linearly with level of cassava forage and this effect was similar in the presence or absence of the soybean supplement.

Discussion

The results of this experiment would seem to indicate that the base level of cassava forage (2% of body weight, fresh basis) was sufficient to provide the roughage characteristics needed in a molasses diet, but that the higher level of 4% of live weight was necessary in order to provide sufficient protein. The daily intake of protein (assuming all the N in the cassava forage and in the soybean meal was of protein origin) on the 4% cassava forage level without soybean meal was 270 g/d and on the 2% level with soybean meal was 210 g/d,

The improvement in feed conversion rate as cassava forage level was increased, in the absence of soybean meal, obviously reflected the effect of better protein nutrition, and the improved live weight gain that this caused. The deterioration in feed conversion with increase in cassava forage level, in the presence of soybean meal, presumably was due to a dilution of the energy status of the diet as a result of the substitution of molasses by cassava forage.

Conclusions

The results of this experiment, together with those reported previously by Fernandez et al (1977), indicate that it is possible to fatten cattle on a basal diet of molasses/urea supplemented only with a protein rich forage such as the aerial part of the cassava plant. In view of the high productivity of the cassava plant cut repeatedly for forage under tropical conditions (Meyreles et al 1977), this feeding system offers very considerable economies over the traditional molasses based programme as was developed in Cuba (Preston 1972) and which required supplementation with an imported protein concentrate in the form of fish meal

We wish to thank Manuel de Js Peralta and his assistants.

References

Fernandez A, MacLeod N A & Preston T R 1977 Cassava forage as a combined source of protein for cattle fed on molasses/urea Tropical Animal Production 2:195-199

Meyreles L, MacLeod N A & Preston T R 1977 Cassava forage as a source of forage protein: effect of population density and age at cutting Tropical Animal Production 2:18-26

Preston T R 1972 Molasses as a feed for cattle World Review Nutrition Dietetics (ed C H Bourne) Karger Basle

Received 15 September 1978