A COMPARISON OF MAIZE AND MOLASSES SUPPLEMENTS FED TO FRIESIAN YEARLINGS GRAZING AN IRRIGATED GRASS PASTURE IN THE TROPICS

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SUMMARY

Forty-two Friesian steers, on average eight months old and 128 kg live weight, grazed Setaria anceps cv. Kazungula pastures for nine months at a stocking rate of 12 animals/ha. Pastures were irrigated and fertilized with 730 kg urea, 490 kg superphosphate and 120 kg muriate of potash/ha/annum. Urea was applied in equal monthly applications. Steers were provided with equivalent amounts of dry matter as maize or molasses. Levels of supplementation were 0, 0.5, 1.0 and 1.5 kg/day for maize and 0.6, 1.2 and 1.8 kg/day for molasses. Mono ammonium phosphate (MAP) was added to molasses at 1% of the supplement. Supplements were group fed to treatment replicates of three animals.

Supplementation increased liveweight gains. Over the nine months there was no significant difference in response between the two supplements and the relationship between liveweight gain (Y, kg/day) and the four dry matter levels of supplementation (X, kg/day) was described by the pooled linear regression equation: $Y = 0.439 + 0.128\ (\pm\ 0.021)\ X$; $RSD = \pm\ 0.063$.

INTRODUCTION

Growth rates of dairy replacement heifers on tropical pastures in Queensland are generally low, and provision of high energy supplements is usually necessary to enable heifers to reach a desired mating weight by 15 months of age (Deans et al. 1976). Two such supplements available in Queensland are maize and molasses. In this experiment, eight-month-old Friesian steers were offered differing levels of maize or molasses as supplements to an irrigated, nitrogen-fertilized tropical grass pasture, to compare these supplements and to measure the response to supplement level at a moderately high stocking rate.

MATERIALS AND METHODS

The experiment was conducted at Ayr Research Station (latitude 19° 36'S, longitude 147° 23'E and altitude 10m), in a tropical coastal region with a predominantly summer rainfall (average 1092 mm per annum), 100 km south of Townsville, North Queensland. The experiment used a Kazungula Setaria (Setaria anceps cv, Kazungula) pasture set stocked at 12 animals per ha. Pasture was spray irrigated and fertilized with 730 kg urea, 490 kg superphosphate and 120 kg muriate of potash/ha/annum. Urea was applied in equal monthly applications.

Forty-two Friesian steers, on average eight months old and 128 kg live weight were stratified according to live weight and randomly allocated to treatments in a replicated randomized block design of seven treatments. The experiment incorporated a 3 x 2 factorial design to compare maize and molasses supplements at three dry matter (DM) levels. On an as fed basis, maize was fed at 0.5, 1.0 and 1.5 kg/head/day, and molasses at 0.6, 1.2 and 1.8 kg/head/day. Hammermilled Mono ammonium phosphate (MAP) was added to molasses supplements at 1% of the supplement.

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Animals in the seventh treatment received no supplement. Supplements were group fed to treatment replicates of three animals. As intake of molasses was slower than for grain, molasses was fed twice per week, and maize three times per week to achieve a similar day to day pattern of intake of supplement. To control internal parasites, all animals were drenched with 5ml levamisole at commencement and at two month intervals for the first six months of the experiment. Steers were dipped as necessary for tick control and routinely sprayed to control buffalo fly.

The experiment commenced on 17 May 1979 and terminated on 17 January 1980. Animals were weighed at entry and fortnightly throughout the experiment. Live weight and liveweight gains were analysed by analysis of variance. Relationships between growth rate and four levels of supplementation (0, 0.45, 0.9 and 1.35 kg DM/day) were examined by linear and quadratic regression. The quadratic component of the regression was not significant hence the linear regression only is presented. Pasture dry matter on offer was estimated monthly by mechanical harvesting with a reciprocating blade mower. Pasture was harvested from five random sites within each paddock and cut to approximately 3 cm above ground level.

RESULTS

Supplementation increased liveweight gain, and over the whole experiment, there was no difference in the response to supplement type, with average daily gains of 0.56 kg/day for animals given either maize or molasses. Liveweight gains increased with increased level of supplementation (Table 1). Growth rates were 0.41, 0.51, 0.57 and 0.60 kg/day for animals receiving 0, 0.45, 0.9 and 1.35 kg supplement DM/day as either maize or molasses. Response to level of supplementation as maize or molasses was described by the linear regression equation:

$$Y = 0.439 + 0.128X$$

$$SE_b = \pm 0.021 \ ; P < 0.01 \ ; RSD = \pm 0.063$$

Where Y = Average daily liveweight gain (kg/day)
and X = Level of supplementation (kg DM/day)

TABLE 1 Effect of maize or molasses supplementation on growth of yearling Friesians grazing irrigated tropical grass pastures

Treatment	Live weight (kg) 17.5.79	Live weight (kg) 17.1.80	Liveweight gain (kg/day) 17 May - 23 Aug	23 Aug - 17 Jan	17 May - 17 Jan
Nil	127	228	0.24	0.52	0.41
0.5 kg Maize	125	254	0.56	0.50	0.53
1.0 kg Maize	131	269	0.53	0.59	0.56
1.5 kg Maize	131	279	0.51	0.66	0.60
0.6 kg Molasses	124	246	0.40	0.57	0.50
1.2 kg Molasses	128	269	0.44	0.66	0.57
1.8 kg Molasses	129	275	0.46	0.69	0.60
LSD 5%	7.3	26.5	0.142	0.220	0.089

After 35 weeks with supplementation final live weights were 228, 250, 269 and 277 kg for animals receiving 0, 0.45, 0.9 and 1.35 kg supplement DM respectively as either maize or molasses.

The stocking rate of 12 yearlings/ha resulted in a high level of pasture utilization in all treatments. The amount of pasture on offer per unit of animal liveweight was initially increased by giving supplements. With time, supplemented animals became considerably heavier than control animals ($P<0.01$) and the amount of pasture on offer per unit of animal liveweight was reduced at moderate levels of supplementation. Initially the dominant influence on pasture on offer was the level of supplementation. Subsequently, the changes in intake accompanying increased size of supplemented animals had a greater effect (fig. 1.)

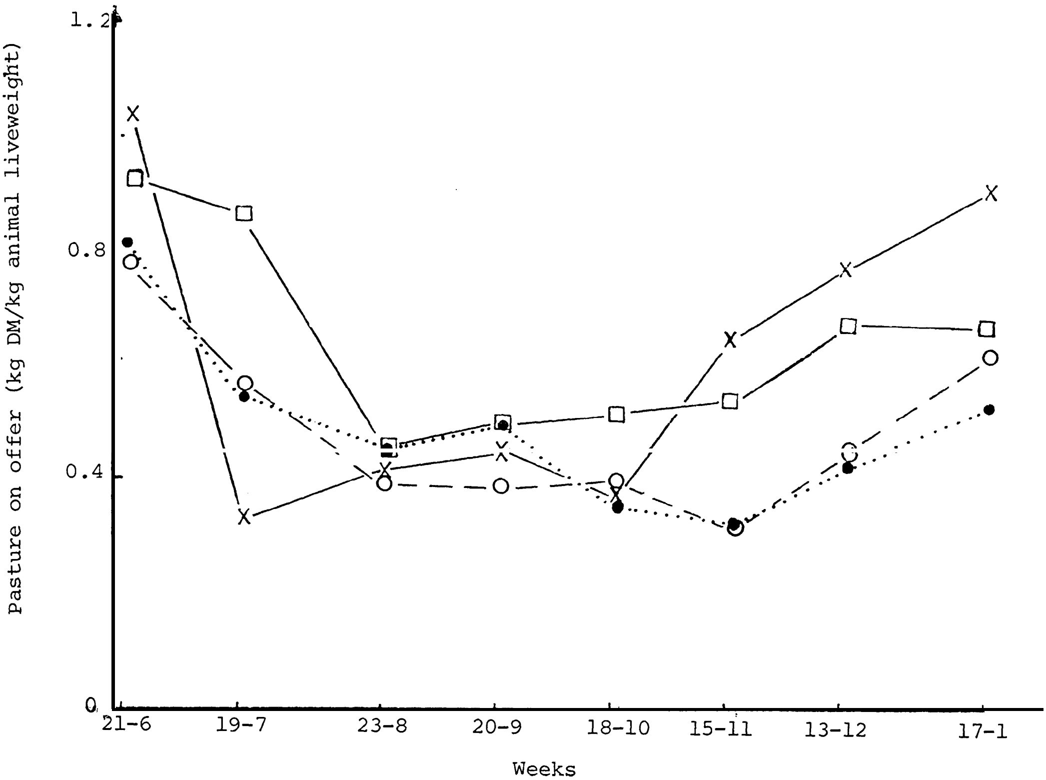

Fig. 1. Effect of supplementation on changes with time of the ratio of pasture dry matter on offer to animal live weight (X, no supplement; ● , 0.45 kg/d; O, 0.9 kg/d; □ , 1.35 kg/d).

DISCUSSION

When fed at the same dry matter levels, growth rates were similar for animals fed either maize or molasses. Our results show that these supplements will be equivalent in supporting liveweight gains when fed in the ratio 1.2 molasses : 1.0 maize. A similar relationship was obtained by Cowan and Davison (1978) using supplements to increase milk production of dairy cows. These authors fed supplements in the ratio of 1.3 : 1.0.

Linear regression adequately described the response to supplementation within the levels examined. From this equation it was estimated that supplements were used with an energetic efficiency of 10 MJ ME for each additional MJ ME as liveweight gain. This would suggest considerable substitution of concentrate for pasture occurred. At the highest level fed, concentrates initially would have provided an estimated 38% of total ration dry matter (A.R.C. 1980) and it is possible these animals were not consuming sufficient protein to utilize ME intake efficiently. This may explain the lack of response to the higher levels of energy supplementation in the initial period. With increasing size of the animals, concentrate would reduce to about 28% of total ration dry matter in the second period. The favourable response to supplements in this period indicates that the protein intake from pasture was adequate to utilize the additional energy supplied by supplements. It has been suggested that molasses should not be fed at levels above 25% of total ration dry matter (Lofgreen and Otagaki 1960). In our experiment, no health or metabolic problems due to supplement level were observed.

The stocking rate of 12 yearlings/ha permitted a high level of pasture utilization without adversely affecting liveweight gains in spring and early summer. This stocking rate would be too high for adequate growth of these animals later in the season (Deans et al. 1976). Our experiment indicates the complexity of relationships among supplementation, pasture availability and animal liveweight gains. Initially liveweight gains of supplemented animals reflected the increased energy intake because of supplementation and the increased amount of pasture on offer. However with time supplemented animals became heavier than unsupplemented animals and after about three months the estimated intake of pasture by groups given a moderate level of supplementation was in excess of that for the smaller unsupplemented animals (Fig 1). Consequently there was a greater amount of pasture available to control animals and the response to supplementation was reduced.

Friesian steers were used in this experiment. It is suggested that growth responses of steers and heifers would be similar. At the stocking rate used animals in all supplemented treatments were able to reach or exceed 250 kg live weight after 35 weeks. Friesian Heifers would cycle at about this live weight (Joubert 1963) and at medium and high levels of supplementation, heifers would reach the desired joining weight of 270 kg at 16 months of age. Without supplements, the animals weighed 228 kg after 35 weeks and heifers would not reach joining weight until well beyond 16 months of age.

Maize and molasses will increase growth of dairy yearlings, though a protein supplement may be beneficial to young animals. These energy supplements will allow animals to achieve desired growth rates when maintained at high stocking rates on irrigated tropical grass pastures. Maize and molasses gave similar liveweight responses when fed at similar dry matter levels, and at moderate levels of supplementation this response is linear. For most Queensland dairy farms, molasses is a cheaper source of energy than grain so use of molasses will reduce calf rearing costs.

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