A supplement experiment done between 1977 and 1979 compared the liveweight response to either restricted *Leucaena* grazing or urea-molasses blocks in cattle that grazed unsupplemented speargrass (*Heteropogon contortus*) from nine months to thirty months of age.

The mean cumulative liveweight gain of unsupplemented cattle was 141.5 kg/head; when supplemented with urea-molasses or given access to *Leucaena* the final liveweights were increased ($P<0.05$) by 36.5 and 84.7 kg/head compared to unsupplemented cattle. When *Leucaena* and urea-molasses were fed together a further gain in final weight of 7.8 kg/head was not statistically significant.

There was no evidence to advocate the use of urea-molasses supplement with *Leucaena* to increase final liveweight at 30 months old.

**INTRODUCTION**

The low protein content of native pasture in the speargrass region of south east Queensland in winter causes liveweight loss in weaners and provides only maintenance in older cattle. Because of this growth limitation cattle under three years old will not fatten. If the nitrogen deficiency in winter is reduced the age of turn-off may be hastened. This may be achieved by a non-protein-nitrogen supplement (Coombe & Tribe 1962; Winks et al. 1979; Graham 1977); or by over-sowing native pasture with a legume (Tothill 1974; Lowe et al. 1977; Shaw 1978; Bowen & Rickert 1979). Experiments have been carried out also with the browse legume *Leucaena leucocephala* (Blunt & Jones 1977; Falvey 1976; Donaldson et al. 1979).

In the Central Burnett Region of south east Queensland, however, dry springs severely curtailed *Leucaena* leaf regrowth and increased leaf fall so that the liveweight response to the legume was reduced (Foster & Blight - unpublished work). In a dry period, therefore, urea-molasses supplement may be more appropriate than legume; but, little comparative data is available from the literature. In this paper the seasonal and cumulative liveweight responses to supplementation with either urea-molasses or *Leucaena* and to feeding both these supplements are compared in cattle that grazed native pasture from weaning to 30 months old.

**EXPERIMENTAL RESOURCE AND METHOD**

The experiment was carried out at Brian Pastures Research Station, Gayndah. Twelve paddocks of native pasture each 3.2 ha in size were used; in six there was an 0.8 ha area of *Leucaena* below which there was an under storey of green panic (*Panicum maximum* var. *trichoglume* cv. Petrie). Each *Leucaena* area was fenced into four equal subplots.

In June 1977, 32 Hereford weaners were allocated by stratified randomisation on the basis of liveweight into each of eight paddocks (Stocking rate = 1.25

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* Department of Primary Industries, "Brian Pastures", Gayndah, Qld. 4625.
** Department of Primary Industries, Rockhampton, Qld. 4700.
beasts/ha). The four treatments, (i) speargrass grazing only (NP), (ii) speargrass and provision of urea-molasses block (NP + U/M), (iii) speargrass with Leucaena grazing (NP + L), and (iv) speargrass with urea-molasses and Leucaena (NP + L + U/M) were replicated twice. The cattle continued to graze in their paddocks until February 1978. Then, to allow for their increased nutritional requirement as two year old cattle, the stocking rate was reduced to 0.6 beast/ha utilising the additional four paddocks. The animals were randomly re-allocated into the relevant treatment paddocks.

The urea-molasses blocks contained 10.5% urea, 73.8% molasses solids and a mixture of minerals and trace elements. Each Leucaena sub-plot was grazed rotationally for seven days in 1977 and for 14 days in 1978, allowing a regrowth period of 21 days and 42 days respectively between successive grazings. In 1977 the period of supplementation was from 20 June to 24 November and in 1978 from 6 June to 28 November. During the post-supplement period all four treatment groups remained in their individual paddocks and without access to supplements. The cattle were weighed full every 14 days in 1977-78 and in 1978-79 were weighed every 28 days.

Analysis of variance was used to test for differences amongst the four treatments using an error term estimated from animal variation; the main effect of sex was isolated from error. Treatment means were compared by the protected LSD procedure (See Table 1).

**RESULTS**

Average daily weight changes of cattle are given in Table 1.

### TABLE 1 Seasonal average daily weight change (kg/day) of cattle during the supplement and post-supplement period

<table>
<thead>
<tr>
<th>Animal Class</th>
<th>Year</th>
<th>Treatment</th>
<th>Winter*</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling cattle</td>
<td>1977/78</td>
<td>NP</td>
<td>-.230 c</td>
<td>-.105 b</td>
<td>.361 b</td>
</tr>
<tr>
<td>(9mth-18mth)</td>
<td></td>
<td>NP+U/M</td>
<td>-.158 c</td>
<td>.023 a</td>
<td>.443 ab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NP+L</td>
<td>.099 b</td>
<td>.023 a</td>
<td>.387 b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NP+L+U/M</td>
<td>.194 a</td>
<td>.005 a</td>
<td>.520 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED (P=0.05)</td>
<td>.088</td>
<td>.082</td>
<td>.092</td>
</tr>
<tr>
<td>Two Year old cattle</td>
<td>1978/79</td>
<td>NP</td>
<td>.018 c</td>
<td>.623 b</td>
<td>.480 a</td>
</tr>
<tr>
<td>(21mth-30mth)</td>
<td></td>
<td>NP+U/M</td>
<td>.242 b</td>
<td>.615 b</td>
<td>.520 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NP+L</td>
<td>.544 a</td>
<td>.982 a</td>
<td>.273 b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NP+L+U/M</td>
<td>.490 a</td>
<td>.874 a</td>
<td>.312 b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED (P=0.05)</td>
<td>.141</td>
<td>.109</td>
<td>.130</td>
</tr>
</tbody>
</table>

Means in columns within experiments with different superscripts differ significantly (P<0.05).

* Winter was that period when the mean screen temperature was below 10°C; when the growth of speargrass was dormant; when unsupplemented weaners lost liveweight and two year old cattle barely maintained weight.

In 1977 urea-molasses blocks provided in winter reduced liveweight loss in weaners although a level of significance was not quite reached (P>0.05). However, if the liveweight responses to the four supplement treatments are analysed for main effects the mean effect of urea-molasses is then shown to be significant (P<0.05). The dietary intake of unsupplemented two year old cattle in winter approximated their maintenance requirement and the provision of urea-molasses significantly increased their growth rate (P<0.05). The winter liveweight response
of both weaner and two year old cattle with restricted Leucaena grazing was twice as great (P<0.05) compared with urea-molasses supplemented cattle. In weaners this liveweight response was doubled again (P<0.05) when both Leucaena and urea-molasses supplement were provided; but, there was no additional response in two year old cattle (N.S.) (Table 1).

The first 56 days of spring 1977 were dry and during this time unsupplemented yearlings lost weight (-9.6 kg/head), a loss not significantly different (N.S.) from either the Leucaena (-7.1 kg/head) or Leucaena + urea-molasses replicates (-10.8 kg/head). By comparison urea-molasses supplement significantly reduced the mean liveweight loss to -0.6 kg/head (P<0.05). In the 45 days following drought breaking rain on 8 November Leucaena & Leucaena + urea-molasses replicates gained 8.8 and 11.1 kg/head respectively compared to a gain of only 2.3 kg/head by the urea-molasses and unsupplemented groups. Over the total spring period of 101 days, however, the mean liveweight response to each of the three supplemented treatments was not significantly different (P>0.05) (Table 1).

In the previous spring (1976) rainfall was above average and the mean daily liveweight response of Leucaena replicates was 141.5 kg/head compared to 426 kg/head by unsupplemented yearlings (P<0.05) (Foster & Blight - unpublished work). The 1976 result is more typical of the liveweight response to Leucaena expected in a normal spring.

In the post-supplement summer period following the 1977 spring drought the liveweight gain of yearlings supplemented with Leucaena or urea-molasses was not significantly different (P>0.05) compared to unsupplemented yearlings; but, was significantly better (P<0.05) in yearlings previously supplemented with both Leucaena and urea-molasses.

Nine month old cattle grazing unsupplemented speargrass until 30 months old gained 141.5 kg/head. When the cattle were supplemented with a urea-molasses block or given access to Leucaena the liveweight gains were significantly increased (P<0.05) by 36.7 and 94.7 kg/head respectively compared with the unsupplemented cattle. This response to Leucaena alone was further increased by 7.8 kg/head when both Leucaena and a urea-molasses supplement were provided; however, this advantage was not statistically significant (P>0.05).

DISCUSSION

Leucaena has a short retention time in the rumen and is degraded slowly, only 16% protein being lost in the first 12 hours (Ali & Stobbs 1980). The increased flow of undegraded Leucaena protein into the post-ruminal tract stimulates dietary intake, probably due to a reflex increase in rumen volume (Groves & Williams 1977; Egan 1980); the flow rate being augmented by the roughage characteristics of Leucaena which increase rumen motility (Alvarez et al. 1977). The legume also augments the more limited amino-acid spectrum provided by bacterial protein (See Kellaway & Liebholz 1981). When Leucaena was withdrawn from the diet at the end of an average spring season the marked drop in growth rate was probably due to a reduced dietary intake. The growth rate of cattle previously supplemented with urea-molasses was not depressed in the post-supplement period. This post-supplement depression in the mean liveweight gain of Leucaena replicates did not affect the overall superiority of their final liveweight at 30 months old compared to the final mean liveweight of the urea-molasses group (P<0.05). A reason is not evident to account for the superior liveweight gain of weaners in winter when supplemented with both Leucaena and urea-molasses or for the superior performance of this treatment group in the post-supplement period.

We conclude from this study that the browse legume Leucaena leucocephala was superior to urea-molasses blocks as a supplement to promote the growth of...
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young cattle grazing speargrass. There was no evidence to advocate the use of urea-molasses supplement with Leucaena to further increase final liveweight at 30 months old.

ACKNOWLEDGEMENTS

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REFERENCES