PROTEIN SUPPLEMENTATION AND GROWTH ENHANCER STRATEGIES IN SUCCESSIVE YEARS TO MAXIMISE GROWTH OF BRAHMAN CROSS STEERS GRAZING SOWN GRASS PASTURES ON BRIGALOW LANDS

I. D. LOXTONA, R. G. HOLROYDB, G. W. BLIGHTC, T. A. JAMESC, T. J. MULLINSc and M. R. JEFFERYD

A. Qld Dept Primary Industries, Box 6014, Rockhampton Mail Centre, Qld 4702.
B. Qld Dept Primary Industries, Brisbane, Qld 4000.
C. Qld Dept Primary Industries, Animal Research Institute, Yeerongpilly, Qld 4105.
D. Qld Dept Primary Industries, Brigalow Research Station, Theodore, Qld 4719.
E. Qld Dept Primary Industries, Barcaldine, Qld 4725.

SUMMARY

A strategy comprising a winter/spring protein supplement, rumen modifier and hormonal growth promotant (Compudose 400) was used in either the first year (T1), second year (T2), or in both years (T1+2) following weaning in Brahman cross steers as a means of increasing liveweight gain up to 2.5 years of age. T2 produced the heaviest final liveweight (544.7 kg) and highest overall liveweight gain (366.7 kg), but these were not significantly different from T1 (538.6 kg; 360.9 kg), or T1+2 (528.7 kg; 349.3 kg). However, final liveweight and overall liveweight gains of T1 and T2 but not T1+2 were significantly greater than for untreated (C) steers (504.9 kg; 325.2 kg, both \( P < 0.05 \)). Regardless of the strategy imposed, liveweight and liveweight gain were enhanced, however final liveweights in each treatment were below the preferred minimum target liveweight (570-580 kg) for premium export markets. Treatment in both years gave no benefit over treatment in 1 year only.

Keywords: supplements, growth enhancers, Brahman cross.

INTRODUCTION

In northern Australia there is a trend towards the production of export beef from younger animals, with a proposed optimum turnoff age of 2.5 years. The minimum hot standard carcass weight proposed for premium markets at this turnoff age is 300 kg (570–580 kg liveweight). Annual liveweight gains of 190 kg (0.52 kg/head.day) or more between weaning and turnoff are required to meet these market specifications. The Brigalow region of central and southern Queensland produces approximately 43% of Queensland's beef (J. Clewett pers. comm.). Mean annual liveweight gains of steers grazing sown grass pastures in this region range from 160-180 kg (Walker et al. 1987; Loxton et al. 1991).

The winter–spring is usually a period of poor animal liveweight gain in the Brigalow region relative to the summer period because of frost and dry weather. Liveweight gains over winter–spring fall in the range of 35 to 100 kg depending on the season, approximately 46–65% of summer gains (Loxton et al. 1991; Mayer et al. 1972). In an average season this converts to around 65 kg, which is lower than the 75 kg winter–spring target gain considered necessary to achieve at least 190 kg liveweight gain annually.

Loxton et al. (1991) have shown that a strategy comprising protein supplements, rumen modifier and a long term hormonal growth promotant (HGP), or a HGP alone imposed during the winter–spring following weaning, will boost postweaning growth and produce mean annual liveweight gains of 190–200 kg in steers grazing sown grass pastures. The initial studies by Loxton et al. (1991) looked only at responses to treatment in the first year postweaning. The experiment in this paper investigated the effect of the supplementation and HGP strategy in either the first or second or both years post weaning in an effort to reduce turnoff age of Brahman cross steers (50–75% Brahman).

MATERIALS AND METHODS

In August 1989 at Brigalow Research Station, Theodore, Queensland, 120 Brahman crossbred weaners (approximate age 8 months) weighing 179.1 ± 4.4 kg (± s.d.) were randomly allocated by stratified randomisation, based on their fasted liveweight to 4 treatments: C, control — pasture only; T1, pasture + Compudose 400 (Elanco Products Australia) in August 1989 and a supplement of 500 g/head.day cottonseed meal and 2 g/head.day Avotan (Cyanamid, Australia) fed for 94 days from August to November 1989; T2, pasture + Compudose 400 in July 1990 and a supplement of 1 kg/head.day cottonseed meal and 2 g/head.day Avotan fed for 135 days from July to November 1990; T1+2, combination of T1 and T2.

The 4 treatments were replicated in 3 blocks in a randomised block layout of 12 paddocks. In year 1
Table 1. Mean liveweights (LW) and liveweights changes (kg) in year 2 of steers untreated (control) or treated with protein supplement, rumen modifier and hormonal growth promotant in the first year (T1), second year (T2) or both years (T1+2) of the experiment.

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<tbody>
<tr>
<td>Control</td>
<td>388.2b</td>
<td>44.6b</td>
<td>575b</td>
<td>123.5b</td>
<td>372.5b</td>
<td>504.6b</td>
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<tr>
<td>T1</td>
<td>411.3a</td>
<td>43.7a</td>
<td>26.6b</td>
<td>137.2b</td>
<td>305.2b</td>
<td>548.6a</td>
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<tr>
<td>T2</td>
<td>374.4b</td>
<td>43.7a</td>
<td>26.6b</td>
<td>137.2b</td>
<td>305.2b</td>
<td>548.6a</td>
</tr>
<tr>
<td>T1+2</td>
<td>398.2a</td>
<td>42.1a</td>
<td>23.6b</td>
<td>139.5b</td>
<td>374.5a</td>
<td>524.9a</td>
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<td>l.s.d. (P = 0.05)</td>
<td>15.0</td>
<td></td>
<td>4.1</td>
<td></td>
<td></td>
<td>26.2</td>
</tr>
</tbody>
</table>

(August 1989 to July 1990) there were 10 animals per paddock. At allocation, 3 animals per paddock were assigned to be removed at the end of year 1, allowing a reduction in the stocking pressure as animal liveweights increased. This left 7 animals per paddock in year 2 (July 1990 to June 1991).

The pastures grazed were predominantly buffel (Cenchrus ciliaris) and Rhodes (Chloris gayana) grasses with some green panic (Panicum maximum vgr. trichophillum) grass. Suppements were persesed as a dry mix 2 or 3 times a week. From August 1989 to July 1990, the stocking rate was 1.67 steer/ha. In July 1990 this was reduced to 1.3 steer/ha. Following cessation of supplementation in November 1990, all steers were re-ran together (1 steer/5.3–6.3 ha) until June 1991. Rainfall over the year 1 (1989 supplementation period above was average (265.8 mm), but below average (66.8 mm) over the year 2 (July 1990 to June 1991) supplementation period.

Analysis of variance (ANOVA) was used to test treatment effects in each year. In year 1, there were only 2 distinct treatments, C and T1, as the C and T2 groups were the experimental controls and the T1 and T1+2 groups received the supplement plus HGP treatment; so the ANOVA model was for a randomised block design with 2 treatments in 3 blocks with 2 replicates per block. In year 2 ANOVA model was for a randomised block with 4 treatments replicated in 3 blocks. The paddock was the experimental unit in these ANOVA models.

RESULTS

In year 1, treated groups gained significantly (P < 0.05) more liveweight over the supplementation period than untreated groups (70.8 v. 46.9 kg, l.s.d. (P = 0.05) = 5.3) but not in the post supplementation period (109.3 v. 149.8 kg, l.s.d. (P = 0.05) = 5.3). This effect was reflected in significantly higher (P < 0.05) annual liveweight gains (220.1 v. 368.8 kg, l.s.d. (P = 0.05) = 12.0) and liveweight in July 1990 (391.1 v. 375.9 kg, l.s.d. (P = 0.05) = 11.5) compared with C. In year 2, treatments T2 and T1+2 gained more weight than C during the supplementation period (Table 1), these differences being significant only for T2 (P < 0.05). In the same period, C gained significantly more weight than T1 (P < 0.05). In the post supplementation period, T1 and T2 had significantly higher gains than C or T1+2 (both P < 0.02).

The total gain in year 2 was significantly higher in T2 than in any other treatment (P < 0.00), with the gains in remaining treatments being similar (Table 1). Final liveweights and overall (over 2 years) liveweight gain for T1 and T2 were significantly greater (both P < 0.05) than for C with T1+2 intermediate.

DISCUSSION

Regardless of the strategy, whether in the first or second or both years postweaning, liveweights and liveweight gain were enhanced by the provision of protein supplements and growth enhancers. While all treatments improved liveweight at 2.5 years of age, animals were still below the target liveweight of 570–580 kg needed for the current chilled beef ‘fuller’ product required for the Japanese frozen market. However, more steers were suitable for treatments T1 and T2 for another Japanese frozen market, the chilled beef ‘3 cut’ product. This also attracts a premium price over the manufacturing market, albeit at a lower premium than the chilled beef ‘fuller’ product. The actual proportions of
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