POSTWEANING PERFORMANCE OF BRAHMAN, BRAFORD, AND AFRICANDER F₁ STEERS IN THE SUBTROPICS AND CENTRAL WESTERN PLAINS OF NSW

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SUMMARY
Postweaning liveweights at different ages of 200 steers of Brahman x Hereford (B x H), Africander x Hereford (Af x H), and Braford x Hereford (Bf x H) steers were evaluated in three environments of NSW. Genotype differences were significant for liveweight at all ages. The B x H genotype was significantly heavier from Af x H and Bf x H and average daily gain was also higher. The location of property where the steers were grown postweaning also had a significant effect on liveweight for all ages (except 7 and 32 months) and on average daily gain. The genotype x location interaction was significant only for liveweights at 23-25 months of age; it was non-significant for average daily gain. Sire within genotype x location was a significant source of variation for liveweights after 15 months of age and for average daily gain at 7-27 and 7-46 months of age. In view of these results, B x H steers are likely to be more productive for growth traits than Af x H and Bf x H steers when grown in a range of environments in NSW.

Keywords: Genotype, growth, Bos indicus, Bos taurus.

INTRODUCTION
The subtropics of New South Wales provide an environment which is less favourable for beef cattle production than that of temperate regions (Cohen and O’Brien 1974). Traditionally this region has been used for breeding Hereford store weaner cattle which have been sold to temperate areas for growing and finishing. However beef production in the subtropics can be enhanced by improving nutrition through pasture improvement (Cohen 1978) or strategic supplementation with byepass protein meal (Hennessy and Williamson 1988). The results of beef breeding research at Grafton Research Station (Barlow and O’Neill 1980; Darnell et al. 1987; Hearnshaw et al. 1994) demonstrated that the use of first-cross (F₁) genotypes can also significantly increase production. F₁ Brahman x Hereford (B x H) cattle were less sensitive to environmental variation than Herefords and other crosses and increased their advantage as nutritional quality declined. Alternatives to the use of the Brahman (Bos indicus) breed have also been sought by the cattle industry for reasons associated with coat colour, temperament and fertility in second and later generations. This paper compares F₁ B x H steers with Africander x Hereford (Af x H) and Braford x Hereford (Bf x H) steers for liveweights and average daily gain (ADG) from weaning to slaughter in subtropical and temperate environments of NSW. The preweaning performance of these steers was reported by Hearnshaw et al. (1995).
MATERIALS AND METHODS
Hereford cows, grazing subtropical pastures near Ballina in NSW, were mated in Spring to Brahman, Africander and Braford semen and sires from 1977 to 1979. Calves born in the three seasons were weaned in Autumn at approximately eight months of age (Heamshaw et al. 1995). The weaner steers (two per sire) were then transferred to three different locations; those weaned in 1979 were sent to improved, grass-clover pastures near Mallanganee (North coast, NSW); those weaned in 1980 were grown on temperate pastures near Nevertire (Central Western Plains, NSW) and those weaned in 1981 were grazed on unimproved, low quality, subtropical pastures near Grafton. In each location, the steers were managed as a single commercial herd with all animals treated alike and were weighed regularly every two months. All steers in each group were slaughtered when the B x H group had an average fat depth of 6 mm at the 12/13th rib. Steers at Mallanganee, Nevertire and Grafton were slaughtered at 44, 28 and 54 months of age, respectively.

Liveweights from weaning to slaughter, (maximum of 35 records), and ADG between selected weights were analysed. The number of steers by location was 74, 74 and 52, at Mallanganee, Nevertire and Grafton and by genotype was 62, 68 and 70 for Af x H, Bf x H and B x H, respectively. The data were analysed by least squares using the General Linear Model (GLM) procedure in SAS (1988). The model included the fixed effects of genotype, location (confounded with year of birth) and genotype x location interaction. Sire nested within genotype x location was fitted as a random effect, while age (days) was used as a covariate for liveweight only. Location was removed from the models for weights and ADG after 51 months of age, as only steers at Grafton had records. The genotype, location and genotype x location interaction terms were tested against the sire(genotype x location) mean square (MS) and all other effects were tested against the error MS. Differences between least square means of traits which showed significant (P < 0.05) effects are discussed.

RESULTS AND DISCUSSION
Genotype effect. Genotype differences were significant for liveweight at all ages with B x H steers being heaviest among the three genotypes. The genotype effect was also significant for ADG at different ages (Table 1). Mean ADG for B x H was 362 g, 320 g and 299 g for 7-27, 7-46 months and 7-53 months of age, respectively. Similarly, the ADG for Af x H and Bf x H were 308 g and 300 g (7-27 months); 278 g and 264 g (7-46 months) and 263 g and 257 g (7-53 months), respectively. B x H steers had about 7-12% higher postweaning liveweights at all the ages and 14-17% higher average daily gain than Af x H and Bf x H. These results show a trend consistent with, but greater in magnitude than those of Heamshaw et al. (1995), where F1 B x H calves had 5% higher weaning weight and 6-8% higher preweaning growth rate than F1 Bf x H and Af x H calves. Since postweaning traits are less dependent on maternal traits (straightbred dams) than preweaning traits, the larger advantage shown by this study is not unexpected.

Location effect. Postweaning location of steers significantly affected liveweight at all ages except those at 7 and 32 months. Steers at Nevertire were generally heavier than those at Mallanganee,
which were heavier than those at Grafton. The steers at Nevertire had higher ADG from 7-27 months of age (512 g/day) than steers raised at Mallanganee (258 g/day) and Grafton (198 g/day). Similarly, the ADG of steers grown at Mallanganee (341 g/day) was higher than steers grown at Grafton (233 g/day) from 7-46 months of age. The growth differences reported here for location are affected by the climatic region, the season, and the pasture species grazed on the property.

Table 1. Least square means and standard errors for liveweight and average daily gain (ADG) of three genotypes of steers at selected ages

<table>
<thead>
<tr>
<th>Trait</th>
<th>B x H</th>
<th>B x H</th>
<th>A x H</th>
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<tbody>
<tr>
<td>Liveweight (Kg)</td>
<td></td>
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<tr>
<td>7 months of age</td>
<td>193.9 ± 2.9a</td>
<td>183.6 ± 2.9b</td>
<td>181.6 ± 3.2b</td>
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<tr>
<td>27 months of age</td>
<td>404.4 ± 3.5a</td>
<td>359.1 ± 4.2b</td>
<td>359.9 ± 3.9b</td>
</tr>
<tr>
<td>46 months of age</td>
<td>558.0 ± 5.7a</td>
<td>477.8 ± 6.8b</td>
<td>498.1 ± 6.3c</td>
</tr>
<tr>
<td>53 months of age</td>
<td>594.6 ± 8.4a</td>
<td>530.7 ± 8.0b</td>
<td>554.5 ± 10.5b</td>
</tr>
<tr>
<td>ADG (g/day)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-27 months of age</td>
<td>362.0 ± 5.0a</td>
<td>300.0 ± 5.0b</td>
<td>308.0 ± 5.0b</td>
</tr>
<tr>
<td>7-46 months of age</td>
<td>320.0 ± 4.0a</td>
<td>264.0 ± 4.0b</td>
<td>278.0 ± 4.0c</td>
</tr>
<tr>
<td>7-53 months of age</td>
<td>299.0 ± 6.0a</td>
<td>257.0 ± 6.0b</td>
<td>263.0 ± 7.0b</td>
</tr>
</tbody>
</table>

Means in the same row with the same superscripts do not differ significantly.

Genotype x location interaction effect. The genotype x location interaction effect was not significant for ADG nor for liveweights, except those at 25 months of age when rankings of A x H and B x H differed for the three locations (Fig. 1). The B x H steers were relatively heavier than A x H at 25 months of age as the quality of the environment improved. Postweaning environment has also previously been reported to influence the significance and direction of the genetic effect (Arthur et al. 1994).

Other effects. Age as a covariate was significant for liveweights at all ages. Sire within genotype x location was a significant source of variation for liveweights at all ages except those for between 7 and 15 months; and was significant for ADG from 7-27 and 7-46 months of age. This occurred even though there was only an average of 2 progeny per sire per location. However, the fact that most sires were used in only one mating year, and that year of birth was confounded with postweaning location, probably explains the significance of this factor. Jenkins et al. (1991) also reported that sire within breed was a highly significant source of variation for 200 days weight and weight at later ages.
Figure 1. Effect of genotype and location on liveweight at 25 months of age.

The results of this study reveal that F, B x H steers had about 7-12\% higher postweaning liveweight and 14-17\% higher average daily gain than F, Af x H and Bf x H steers when grown in three different locations/environments in NSW. If a crossbreeding program using \textit{Bos indicus} and \textit{Bos taurus} steers is to be adopted in NSW, firstcross B x H steers are suggested for maximising growth instead of Af x H or Bf x H. The advantage of using B x H is likely to be greater in subtropical than in temperate environments.

REFERENCES


