THE GROWTH RATES OF BULLS AND STEERS UNDER GRAZING CONDITIONS IN DIFFERENT SEASONS AND YEARS

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SUMMARY

The pre- and post-weaning growth rates of pasture-fed bulls and steers born in spring and autumn were examined in a number of years. The growth advantages of bulls over steers were small and variable until bulls reached puberty and steers entered the “fattening phase”. Beyond that point, the available evidence all suggests that bulls will out-grow steers by a nutritionally-dependent margin of up to 20 per cent.

INTRODUCTION

Bull beef production has become increasingly important in continental Europe (Rhodes 1978), largely in response to increasing demand for leaner meat and through widespread recognition of the fact that bulls grow faster and more efficiently than steers when well-fed.

In temperate Australia where pasture dry matter availability, digestibility and protein content vary markedly, bulls have out-grown steers in most, but not all, trials, Mickan et al. (1981) have recently reported growth advantages of bulls over steers which were highly variable and not necessarily related to plane of nutrition as previously suggested by Price and Yeates (1971).

The present study examines pre- and post-weaning growth in bulls and steers in a pasture system that exhibited marked seasonal and yearly variations in productivity.

MATERIALS AND METHODS

Poll Hereford male calves born in spring 1975, 1976 and 1978 or autumn 1975 and 1976 (Table 1) were raised on natural pastures on the Kirby Research Station of the University of New England. All calves were from the one breeding herd and were born over six-week periods within seasons and years. They were allocated to bull or steer groups by stratified randomisation on 120-day weights, at which age steers were surgically castrated and bulls hemicastrated (Price and Yeates 1971). All calves were weaned at a mean age of 200 days and each birth group was thereafter set-stocked together at 0.6 animal/hectare. Liveweights were recorded directly off pasture at approximately six weekly intervals from 4-12 months of age in all groups and from 4-16 months of age for those born in autumn 1975 and spring 1978.

Regression analyses and tests for homogeneity of slope were used to examine possible animal, season, sex and year influences on growth rates.

RESULTS

The growth rates of spring born calves were similar for all years within sex groups. The variability between years for both bulls and steers was greater in autumn-born than in spring-born groups (P < 0.001).

As seasonal effects were relatively homogenous for both sexes a comparison of bull and steer growth rates within seasons was performed. This showed no
significant differences in the growth rates of bulls and steers up to 200 or 365
days of age in any season. Although, with the exception of the 1976 autumn born
animals, bulls had consistently greater growth rates than steers by a margin of up
to 6 per cent (Table 1). The mean live weights of bulls at 365 days of age are
given in Table 1 to indicate the large variation in weight attained during the
period of measurement.

**TABLE 1** Growth rates from birth to 365 days of bulls and steers born in autumn
(A) or spring (S)

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<tr>
<td>Bulls (kg/day)</td>
<td>0.43</td>
<td>0.63</td>
<td>0.67</td>
<td>0.83</td>
<td>0.84</td>
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<tr>
<td>s.d.</td>
<td>0.07</td>
<td>0.11</td>
<td>0.08</td>
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<tr>
<td>n</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>10</td>
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<tr>
<td>Steers (kg/day)</td>
<td>0.41</td>
<td>0.62</td>
<td>0.69</td>
<td>0.82</td>
<td>0.79</td>
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<tr>
<td>s.d.</td>
<td>0.08</td>
<td>0.11</td>
<td>0.10</td>
<td>0.07</td>
<td>0.06</td>
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<tr>
<td>n</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>7</td>
<td>9</td>
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<tr>
<td>% advantage of bulls</td>
<td>4.9</td>
<td>1.8</td>
<td>-0.02</td>
<td>1.2</td>
<td>6.3</td>
</tr>
<tr>
<td>Mean bull live weight at 365 days (kg)</td>
<td>186</td>
<td>256</td>
<td>281</td>
<td>324</td>
<td>341</td>
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Bulls had significantly ($P < 0.001$) greater post-weaning growth rates than
steers in the 1975 autumn born herd and in the 1978 spring born herd (0.53 vs 0.45
kg/d and 0.71 vs 0.56 kg/d respectively). The relative advantage of bulls over
steers was greater for the 1978 born animals (26.8%) than for the 1975 born
(17.7%) with a significant year by 'sex' interaction ($P < 0.01$). The growth
curves for these two herds are shown in Fig. 1, the divergence between bull and
steer live weights being apparent once the animals had reached approximtely 250
kg liveweight.

![Fig. 1 Live weight changes of grazing bulls and steers in 1975 and 1978](image)
DISCUSSION

The data presented indicate that bulls and steers grazed at pasture on the New England Tablelands of NSW can be expected to grow at quite variable rates in different seasons and years. The growth rates observed (0.40 to 0.80 kg/d) cover the normal commercial range of growth rates and confirm the commercial practice of raising spring rather than autumn born calves. The advantage of spring born over autumn born calves was consistent both for overall growth rate and also for within group variation. The production of more uniform and younger spring born animals has obvious economic advantages in terms of sale yard presentation as well as in feed cost saving.

Conflicting opinions exist regarding the factors which influence the relative growth rates of bulls and steers under pasture conditions. Price and Yeates (1971) considered nutritional level to be a major factor whereas both Kellaway (1971) and Mickan et al. (1981) found the bull/steer growth differential to be highly variable and not necessarily related to the level of nutrition. In many grazing experiments conducted to compare the relative growth rates of bulls and steers the difference between the "sexes" has been confounded by the effects of seasonal change in pasture production (nutrition level) and/or the effects of stocking rate as well as in some cases the attainment of puberty by the bulls. At the same time numbers of animals have been small (<5) and the time period over which growth rates have been determined has varied markedly. The present growth rate data, recorded over a minimum of seven months, and covering a wide range in mean growth rates (as dictated by season of birth or year) provide a possible basis upon which some of the conflicting opinions can be reconciled.

"Up to 250 kg live weight (a mean 375 ± 96 days of age for these groups) our results indicate only a small (0-6 per cent) advantage of bull growth rate over steers; a finding consistent with other reports for young animals grown at pasture (Watson 1969, Price and Yeates 1971), or grain fed (Wilson et al. 1974). Our results also fail to reveal any season or year (i.e., nutritional) interaction with the growth rate differential between bulls and steers.

"Beyond 250 kg live weight; a weight close to that at which Hereford males reach puberty (Stewart et al. 1980) and also at which Hereford steers reach the beginning of the fattening phase of carcass development (Berg and Butterfield 1976) there were significant growth advantages in favour of bulls. Our results (17-26%) agree closely with earlier reports of postweaning growth rate advantages of grazing bulls over steers (Kellaway and Gaden 1970, Price and Yeates 1971). The significant interaction between herd and the "sex" effect on growth rate post-weaning in this present study is consistent with the reports of Price and Yeates (1971) but not with that of Kellaway (1971) or Mickan et al. (1981). In both of the latter studies however, either the period of comparison was short (<2 months) and/or the difference in growth rates attained by nutritional manipulation were small (<0.3 kg/day) and similar to the variation existing within groups.

Further studies would seem appropriate to clarify the physiological mechanisms which contribute to the "sex x nutrition" interaction but it is suggested that economically important differences in growth rate between bulls and steers are dependent on changes associated with puberty in bulls and possibly with steers entering the "fattening phase" of growth. If accepted this suggestion would require the conclusions of Kellaway (1971) and Mickan et al. (1981) that "the difference in growth rate of bulls and steers under grazing conditions is very variable and not necessarily related to plane of nutrition" to be modified slightly by adding "in lightweight (<250 kg) animals". Conversely, the conclusion of Price and Yeates (1971) that "the growth differential between bulls and steers is related to plane of nutrition" needs to be confined to heavier (>250 kg) animals.
For beef producers retaining animals to 15-18 months of age with growth rates exceeding 0.5 kg/day, the use of bulls rather than steers could increase growth rates by 10-20 per cent. The magnitude of this increase will be dependent on the level of nutrition given in the postweaning (>250 kg live weight) growth period but should result in an additional 20-60 kg live weight per animal at slaughter.

ACKNOWLEDGEMENTS

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REFERENCES


