Dairy crossbreeding alternatives to improve New Zealand beef production

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Abstract

Beef production in New Zealand could be increased by developing farming systems that profitably utilise heifer and bull calves which would otherwise be slaughtered soon after birth. Evaluation of a once-bred heifer cattle policy over 3 years at Massey University showed that target weights to achieve acceptable calving percentages and final carcass weights can be achieved under pasture feeding. Piedmontese and Belgian Blue sires used over Friesian cows produced bull calves that did not grow significantly faster than straight Friesian animals, but had higher dressing out (57.8 vs 54.0, P<0.05) and meat yield percentages (76.0 vs 75.7 vs 73.2 for Piedmontese, Belgian Blue and Friesian, respectively). Both the once-bred heifer and the exotic x bull beef production systems earned greater returns than traditional beef cattle policies at 1992 costs and prices, and could be easily implemented by New Zealand beef producers.

Keywords dairy beef, exotic sires, once-bred heifer

Experimental

Once-bred heifer systems

The once-bred heifer (OBH) system involves the purchase of heifers (dairy or beef type at 4 days to 15 months of age) for heifer beef production (Morris et al. 1991). The heifers are mated at 15 months of age to a beef breed sire. They are sold prior to the eruption of their fourth pair of permanent incisor teeth (which typically occurs at 37 months but may be as early as 30 months of age) so that carcasses are classified as 'heifer,' which normally provides a higher return than cow beef. The progeny of the heifer can either be sold as weaners or retained for finishing.

Evaluation of the OBH system for New Zealand pastoral conditions commenced at Massey University’s Ruminant Research Unit in 1989 with the purchase of 50 Hereford x Friesian (HxF) heifers at 14 months of age (255 kg liveweight (LW)) and the same number of 4 month old HxF calves (120 kg LW). The following year 25 HxF and 25 Simmental x Friesian (SxF) 4 month old calves were purchased at 103 kg and 111 kg average LW, respectively. The programme continued in 1991 with the purchase of 25 Hereford x Jersey (HxJ) and 25 HxF calves at 4 days of age. The objectives of the research programme are to develop the management system required to achieve specified target liveweights under pasture feeding (Figure 1) and to evaluate the suitability of different dairy heifer crosses for OBH beef production.

Figure 1 Liveweight gain profile to achieve target weights in a once-bred heifer beef production system.
Liveweights of all animals were recorded at monthly intervals and, at slaughter, carcass weight information, including meat composition data, were obtained. At 15 months of age heifers randomly selected for the OBH system were inseminated to terminal sires selected for ease of calving and meat production using the New Zealand Dairy Board “Genomate” synchronisation programme to terminal sires selected for ease of calving and meat production (Jellie 1991). Breeds of sires used include Charolais and Limousin, and Angus in 1988, and 1989 and 1990 respectively. In 1988 a comparison was made between mated and non-mated heifers for liveweight gain, carcass weight and financial returns, while in 1989 the comparison was made between early weaned (day 90 of lactation) and late weaned (150 days) heifers in a once-bred system.

Heavily muscled exotic cross bull beef production

The introduction into New Zealand of the double-muscled or heavily muscled breeds (Piedmontese and Belgian Blue) has increased the choice of beef terminal sires available to farmers. However, little is known about how these breeds perform under New Zealand pastoral conditions. Traditionally, farmers have used Friesians for the production of lean manufacturing beef but the heavily-muscled breeds may also be well-suited to this role.

The liveweight gains of Friesian (F), Piedmontese x Friesian (PxF) and Belgian Blue x Friesian (BBxF) (n=30/group) bulls were recorded from arrival at the Massey University Tuapaka Bull Beef Unit at 4 months of age (November 1990) until their slaughter at 15-20 months. The bulls were farmed under the management system described by McRae (1987), except for a 6 week period when a sub-sample of 10 bulls from each breed/cross were grazed separately to record grazing behaviour and herbage intake as reported by Morris et al. (1992). The bulls were weighed at approximately monthly intervals until the time of slaughter. Liveweights were recorded off pasture prior to trucking the day before slaughter. Groups of 30 animals (n = 10 per breed/cross) were slaughtered on three separate occasions (corresponding to 17.18 and 20 months of age). Individual hot carcass weights, from which the dressing out percentage of the bulls was calculated, were recorded at the export abattoir of Weddel-Feilding Ltd. The total weight of

<table>
<thead>
<tr>
<th>Breed cross</th>
<th>Mated</th>
<th>Non-mated</th>
</tr>
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<tbody>
<tr>
<td>HxF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HxF</td>
<td></td>
<td></td>
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<tr>
<td>HxF</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liveweight (kg)</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Mating (15 mo)</td>
<td>350</td>
<td>330</td>
</tr>
<tr>
<td>Two year (24 mo)</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Pre-slaughter (c.50 mo)</td>
<td>408</td>
<td>459</td>
</tr>
<tr>
<td>Carcass weight (kg)</td>
<td>244</td>
<td>220</td>
</tr>
<tr>
<td>Dressing out</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td>Calf weaning weight (kg)</td>
<td>207</td>
<td>175</td>
</tr>
<tr>
<td>Financial ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase price</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td>Heifer meat value</td>
<td>542</td>
<td>561</td>
</tr>
<tr>
<td>Weaner calf</td>
<td>405</td>
<td>350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breed cross</th>
<th>HxF</th>
<th>SxF</th>
</tr>
</thead>
<tbody>
<tr>
<td>HxF x Friesian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S x F Simmental x Friesian</td>
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</table>
Liveweights achieved over the three years of the trial differ significantly between policies in the amount of capital invested in livestock. Highest returns were easily achieved by bull beef policies and, in the case of exotic x bulls, these would have been improved (by $17/bull in the example) if their 2.65% higher meat yield had been fully rewarded in the beef schedule (McRae 1992). This indicates that

Results and discussion

Once-bred heifer beef production

Liveweights from weaning to slaughter, and the productivity of the dairy cross heifers used in the OBH experiments are summarised in Table 1.

The liveweights achieved over the three years of the trial with the different groups of heifers indicate that the target mating weight of 330 kg can be realised under pasture conditions (Fig. 1). To achieve this heifers need to average 0.55 kg/day from December to August and 0.9 kg/day from August until mating in November. Feeding to achieve 0.5 kg liveweight gain per day has been continued until the eighth month of gestation when allowances have been reduced to a maintenance level until calving. Carcass weights of the heifers haveranged from 21-244 kg at 32 months of age, with dressing out percentages being lower in once-calved than never-calved heifers, and higher in early weaned than late weaned heifers.

The low calving percentage from the 1988-born heifers reflects the use of only one cycle of artificial insemination, and in the 1989-born heifers there was a relatively high calf mortality rate of 20% due primarily to dystocia. Only two heifers have died from problems associated with dystocia since the research programme commenced. Calf birth weights averaged 37.42 kg across years and sire breeds. The incidence of dystocia was not influenced by the breed of sire. The levels of dystocia are unacceptable and investigations are currently being undertaken to minimise the problem viamanipulation of early- and mid-pregnancy feeding. Dystocia problems in OBH’s were also recorded under UK conditions by Lowman (1987), who subsequently adopted induction of calving to alleviate calving difficulties. Induction cost about $25/cow in 1992. This added expense is unlikely to be acceptable to most New Zealand beef cattle farmers.

Early weaning has improved heifer growth rates and hence carcass weight, but at the expense of calf liveweight gain (Khadem et al. 1993). However, this practice offers increased flexibility for selling both the heifer and the weaned calf if pasture supplies diminish over the summer months.

Exotic cross bull beef production

Liveweights, average rates of liveweight gain, carcass weights and meat yields of the three bull breed/cross are presented in Table 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Breed</th>
<th>PxF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liveweight (kg)</td>
<td>F</td>
<td>BBxF</td>
</tr>
<tr>
<td>at weaning (4 mo)</td>
<td>127</td>
<td>130</td>
</tr>
<tr>
<td>-yearling (12 mo)</td>
<td>334</td>
<td>333</td>
</tr>
<tr>
<td>- 15 mo</td>
<td>458</td>
<td>457</td>
</tr>
<tr>
<td>Slaughter Group 1</td>
<td>504</td>
<td>511</td>
</tr>
<tr>
<td>Group 2</td>
<td>18 mo</td>
<td>488</td>
</tr>
<tr>
<td>Group 3</td>
<td>20 mo</td>
<td>803</td>
</tr>
<tr>
<td>ADG (kg/d)</td>
<td>0.971</td>
<td>0.960</td>
</tr>
<tr>
<td>Carcass weight (kg)</td>
<td>285</td>
<td>303</td>
</tr>
<tr>
<td>- dressing-out (%)</td>
<td>54.0</td>
<td>56.7</td>
</tr>
<tr>
<td>- carcass meat yield (%)</td>
<td>73.2</td>
<td>75.7</td>
</tr>
</tbody>
</table>

Different superscript letters in the same row are significantly different at P<0.05.

Mean data for 10 animals/breed CROSS.
only a small premium can be paid on exotic sired dairy 
bull calves if they can only be grown as rapidly as 
straight Friesians. Once-bred heifer returns are sensitive 
to the calving percentage and 
final slaughter weights 
achieved (Parker 1991). but, even at 60% calf survival 
to sale, returns exceed those of the traditional heifer beef 
policy. In addition, the OBH option provides farmers 
with more alternatives including the sale of proven 
heifers for use in beef cow breeding herds.

Conclusion

The reported research with dairy-type cattle at Massey 
University has demonstrated the potential of these 
animals for beef production, and adds to the cvports of previous 
work on the use of dairy-type cattle as beef cows (Hight 
1969; Baker et al. 1981) and for beef production 
(McRae 1987). McRae (1992) suggested that the profitability of straight 
Friesian bull beef policies is likely to 
decrease in the future as the demand for replacements exceeds the dairy industry supply. The availability of 
dairy calves to sheep and cattle farmers can be increased 
by using beef sires, such as the heavily muscled breeds, 
over a larger proportion of non-Friesian dairy cows or, 
as is more likely, adopting new cattle policies (e.g. 
OBH) which utilise calves previously slaughtered at 
four days of age.

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