

Beef bulls for dairy herds

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Introduction

The use of beef bulls over dairy cows is an activity that has varied in popularity over the years. The use of beef bulls was once widespread, and then curtailed in response to increased calving difficulty as the beef breeds made genetic improvement for growth and concurrently increased birth weight. The contribution of calf sales to overall farm income on a dairy farm is relatively small, but in an environment of uncertain milk prices, other options for generating income become increasingly important. Producing beef-cross dairy calves for sale as feeder calves instead of Jersey-sired calves destined for the processing at 4 days of age is one such means of generating additional income. Furthermore, there is interest from both the dairy industry and consumer markets in reducing the proportion of surplus calves processed at 4 days of age, and the use of beef bulls is one way of doing this.

The use of beef bulls creates some risks, however, particularly around calving difficulty, and the selection of appropriate bulls is critical to the success of such programmes. The aim of this experiment was to explore the performance of beef bulls of a range of estimated breeding values (EBV) to determine appropriate bull types for use in dairy herds.

Materials and methods

This experiment was conducted with approval from the Massey University Animal Ethics Committee. Angus and Hereford bulls were used over the dairy herd at Limestone Downs in Port Waikato for two seasons. The cows in this herd were predominantly “crossbred” (Holstein Friesian/Jersey crosses). Cows in the milking herd were inseminated with semen from 31 Angus and 34 Hereford bulls. Semen was assigned to cows at random. Bulls were selected on the basis of EBVs for birth weight, gestation length and 600-day weight. The bull team included a range of EBVs for each trait (Table 1).

Table 1. Estimated breeding values for birth weight, gestation length and 600-day weight of Hereford and Angus bulls used over the milking herd. Values are presented as absolute values and percentile bands within breed.

	Mean EBV	EBV range	Percentile band
Angus			
Birth weight	2.7 kg	0.1 to 5.5 kg	0-80 th
Gestation length	-5.7 d	-10.4 to -0.3 d	0-99 th
600-day weight	99 kg	60 to 134 kg	1-99 th
Hereford			
Birth weight	2.1 kg	-2.0 to 5.3 kg	0-75 th
Gestation length	-1.5 d	-8.8 to 3.7 d	0-100 th
600-day weight	72 kg	34 to 116 kg	0-100 th

The 15-month-old heifers were assigned to one of three groups, balanced for live weight, and each group was joined with either Angus, Hereford or Jersey bulls. Angus and Hereford bulls were selected to be in the lightest 15% of breed for birth weight, whereas Jersey bulls were breed average for live weight and gestation length (birth weight EBVs are not available for dairy breeds).

Calves were moved to the rearing shed and weighed within 24 hours of birth. Assistance at calving was recorded as unassisted, assisted with normal presentation, or assisted with malpresentation. Malpresented calves were excluded from the analysis of calving difficulty. Calves were parentage verified using DNA analysis, and gestation length was calculated as birth date less insemination date for calves bred via artificial breeding. Angus- and Hereford-sired calves were reared on an allowance of 4 L milk per calf per day until weaning at a minimum live weight of 85 kg. Age and live weight at weaning were recorded. Jersey-sired calves were removed from the experiment after birth weight was recorded.

Calves were moved to the Limestone Downs sheep and beef farm after weaning, where they are currently being reared and will be finished at 2 years of age. Calves from the first cohort have been weighed at 200 and 400 days of age.

Results and discussion

Calves born to multiparous cows

Male calves born from the mixed-aged cows weighed 38.0 ± 0.3 kg and female calves weighed 35.5 ± 0.3 kg at birth. This compared with 31.7 kg and 34.5 kg reported for female calves born to crossbred cows sired by crossbred or Holstein Friesian bulls, respectively (Hickson et al. 2016). Calving difficulty was 0.83% for Angus-sired calves and 0.58% for Hereford-sired calves (excluding malpresentations). There was a strong relationship between sire EBV for birth weight and mean birth weight of the progeny group (Figure 1), indicating that selecting sires for birthweight EBV would reliably reduce the birth weight of calves.

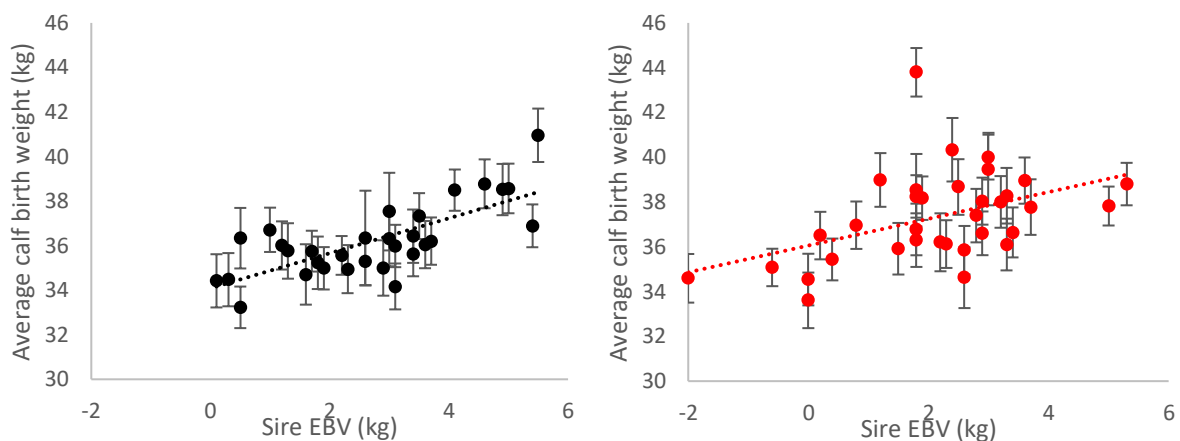


Figure 1. Mean birth weight of the progeny group relative to sire EBV for birth weight for Angus (black, left) and Hereford (red, right) bulls. The regression coefficient was 0.78 kg bwt/kg EBV for Angus and 0.60 kg bwt/kg EBV for Hereford, similar to the theoretical expectation of 0.5 kg bwt/kg EBV.

Similar results were observed for gestation length, whereby a reduction in EBV resulted in a reduction in progeny group mean gestation length of 0.36 days for Angus and 0.82 days for Hereford bulls.

A “weaning age” trait was created to compare calf performance to sire 200-day weight EBV, because all calves were weaned at a fixed weight rather than a fixed age. There was a significant relationship here also, such that sires with greater EBVs for 200-day weight (weaning weight in a beef system) produced calves that reached the minimum weaning weight earlier. Interestingly, when actual 200-day weight was compared with sire EBV, there was no relationship between progeny group mean and sire EBV. This is likely because calves from the lower-EBV sires were fed milk for longer, increasing their growth relative to higher EBV sires. By 400-days of age, a relationship of 0.2 kg live weight per kg 400-day weight EBV existed, indicating that the growth EBVs were predictive of growth potential of the calves.

The majority of sires used over the milking cows in this experiment were at or below breed average for birth weight, and this criteria resulted in very little calving difficulty. The breed average birth weight is lower for Angus than for Hereford sires, indicating that an appropriate threshold for birth weight EBV of Angus bulls is likely to be at a greater EBV than for Hereford bulls (to result in similar sized calves). Selecting sires for decreased gestation length EBV resulted in shorter gestations and subsequently, greater days in milk. Growth EBVs were also predictive of performance. The appropriate combination of EBVs will depend on the relative value of these traits to the dairy farmer; however, if the goal is to produce calves that have a value greater than the bobby calf, growth rate traits should be considered so as to produce calves that perform in a beef finishing system.

Calves born to primiparous heifers

In the first year, Hereford bulls had a mean birth weight EBV of 1.1 kg and were in the lightest 10% of breed, whilst Angus bulls had a mean birth weight EBV of 0.7 kg and were in the lightest 5% of the breed. Hereford-sired calves were heavier than Angus-sired and Jersey-sired calves, and required more assistance (Table 2). The bull selection criteria for year two was revised to restrict the birth weight of the Hereford bulls to the lightest 5% of breed and resulted in calves of similar birth weight and rate of assistance to the Angus bulls (Table 2). In both years, the Jersey-sired calves were lightest and required no assistance at birth. Beef-cross calves were sold as 100 kg weaners for \$500/head after \$180/head rearing costs, compared with bobby calves, which were worth an average of \$22/head at 4 days of age. Further research is underway to determine the impact of bull choice on cow performance during lactation.

Table 2. Birth weight, assistance rate and age at weaning of calves sired by Angus, Hereford or Jersey bulls in the two years of the experiment.

	Angus	Hereford	Jersey
Year 1			
Birth weight EBV (kg)	-0.1 to 1.8	0.2 to 1.7	-
Birth weight (kg)	33.8	36.1	29.2
Assistance (%)	4	12	0
Weaning age (d)	81	79	-
Year 2			
Birth weight EBV (kg)	0.7 to 1.4	-1.4 to 0.6	-
Birth weight (kg)	35.1	35.2	31.3
Assistance (%)	4	4	0
Weaning age (d)	84	85	

Dairy heifers could be mated to Angus or Hereford bulls provided that the heifers are well grown and the bulls selected are within the lightest 5% of breed for birth weight. There is likely to be a small incidence of dystocia, and so farmers should be aware of appropriate criteria for provision of assistance.

Conclusions

Angus and Hereford bulls in the lightest 50% of breed for birth weight EBV produced calves that were easily born from multiparous cows. Progeny performance reflected sire EBV, so farmers can use EBVs to get the types of calves they want from beef bulls. There are some exceptionally high-performing beef bulls available, which could be used via artificial breeding in dairy herds to generate surplus calves of high value. Using beef bulls over 15-month-old heifers requires very low-birthweight bulls and well grown heifers, and is likely to result in a small increase in assisted calving.

Acknowledgements

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References

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