THE VALUE OF ON-FARM PERFORMANCE SELECTION OF ANGUS AND HEREFORD BULLS

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SUMMARY

Over the period 1969-72, 90 Angus and Hereford bulls were progeny tested in an experimental 800-cow herd of Angus and Hereford cattle at the Waikite Lands and Survey Block. About half of the bulls were purchased from a wide range of commercial sources but without performance records, the remainder being fully recorded animals from the Waikite and Waikeria research herds. Whereas the purchased bulls were heavier than Waikite bulls at joining at 2¼ years of age, the progeny of both Waikeria-bred and Waikite-bred bulls were superior for growth performance to those of purchased bulls. This advantage was 4 to 9 kg liveweight at weaning and 6 to 19 kg carcass weight for 20-month steers. The implications of these results to both stud breeders and commercial beef farmers are discussed.

INTRODUCTION

THE first beef cattle recording was initiated in co-operating commercial herds in 1956 by workers at Ruakura Animal Research Station (Brumby *et al.*, 1962). In 1963 the New Zealand Meat Producers Board and the New Zealand Wool Board introduced the Beef Cattle Weight Gain Performance Recording Scheme developed in collaboration with the Ruakura workers as part of the Sheep and Beef Cattle Survey (Cairney and Magnusson, 1970).

A revised and expanded national beef recording service, Beef-Plan, was introduced in 1973 (Everitt, 1974).

Very little information is available on the extent to which performance records are actually being used in selecting animals. There is need for a clear-cut demonstration of the benefits that can be obtained from performance recording and subsequent use of this information in selection decisions.

This paper investigates the value of on-farm performance selection for growth with Angus and Hereford cattle.

MATERIALS AND METHODS

The experimental programme to be discussed was initiated at Waikite, a Lands and Survey block 30 km south of Rotorua, in

1968. The primary objectives of the breeding studies are to demonstrate the effectiveness of growth performance selection in Angus and Hereford cattle, to compare the productivity of the two breeds, and to assess the possible advantages of crosses between them. Further details of this experiment are given by Carter and Cox (1973), and Baker *et al.* (1974, 1975).

This paper reports results from the four calf crops born between 1969 and 1972. The sources of bulls are shown in Table 1. The "purchased" bulls were drawn from a total of about 250 acquired each year by the Lands and Survey Department's Rotorua district at about 20 months of age from a wide range of Angus and Hereford breeders throughout the North Island. Those used at Waikite were chosen by the purchasing officer as above average on visual assessment of merit, with the specification that a wide range of breeders and blood lines be represented. Prior liveweight information was not available on the bulls.

The Waikite bulls were bred on the property and performance recorded for growth to either 14 or 20 months of age and then picked on this basis after correcting for age of dam and date of birth. Thus the selection criterion was weight-for-age and not weight gain. As well as using the top performance-recorded "home-bred" bulls (indicated by a "+" in Table 1) a few bulls of only average or below average performance ranking were included (indicated by "av" in Table 1). The five "Waikeria" bulls were from an experimental Angus herd which has been selected for growth performance since 1963 (Carter, 1971), themselves ranked high on adjusted yearling liveweight. A new set of bulls was used each year apart from those repeated to act as referee sires. A total of five Angus and six Hereford bulls had two consecutive tests over the period 1969-72. Calf weights were recorded at 4- to 6-weekly intervals from birth to about 15 months of age for both males and females while steers were weighed regularly up to slaughter at about 20 months of age when carcass weights and grades were recorded. Average progeny ages were 150 days at weaning, 380 days for "yearling" weights, and 621 days for steer carcass weights. All bulls were weighed at the time of joining.

The least squares model used for each year's data included the effects of sire breed (2 classes), age of dam (4), sex (2), line (2), dam breed (2), regression on birthday, the interactions of sire breed × dam breed and of sex by line and sires nested within sire breed — see Baker *et al.* (1975). The two lines in this study were a crossbreeding line (4 years' data) with purebred

TABLE 1: PROGENY PERFORMANCE OF PERFORMANCE TESTED WAIKERIA- AND WAIKITE-BRED BULLS AND BULLS PURCHASED FROM THE INDUSTRY FOR SOME GROWTH TRAITS (kg)

	Bulls			*Progeny Performance (male and female progeny)*			
Source	*Nos.*	*2-year-old wt*	*Av. No. of Progeny*	*Birth Wt*	*Weaning Wt*	*Yearling Wt*	*Steer Carcass Wt*
Angus bulls:							
Waikeria (+)	5	609	19	28.4	153	207	189
Waikite (+)	12	509	18	26.1	148	201	180
Waikite (av)	5	426	16	27.2	146	192	171
Purchased	29	535	18	26.9	144	192	170
Hereford bulls:							
Waikite (+)	10	515	17	27.9	153	204	181
Waikite (av)	4	481	13	27.0	147	199	180
Purchased	25	589	17	27.7	149	198	175

and reciprocal crossbred heifer and steer calves and a selection line (3 years' data) with purebred Angus or Hereford heifers and bulls. The same sires were used over both lines in the first three years. Since each bull was mated to a representative sample of both Angus and Hereford cows, sire group means are based on both purebred and crossbred calves. Two preferentially treated Waikite bulls which had been purchased *in utero* were excluded from the present study.

Sire group means from the least squares analyses were first classified by the categories shown in Table 1 on a within-year basis and unweighted means computed. After correcting for the year effects weighted category means were calculated across years to obtain the values shown in Table 1.

RESULTS

The results are shown separately for Angus and Hereford bulls in Table 1. Bulls purchased from the industry were heavier when joined at 2¼ years of age than homebred Waikite bulls, reflecting the more favourable conditions under which they were reared. The average superiority in growth performance of progeny of the home-bred over the purchased bulls amply demonstrates the inadequacy of absolute liveweights as indicators of genetic merit for growth. Progeny of high-ranking home-bred Waikite bulls (+) were heavier than those of the purchased sires by 4 kg liveweight at weaning and 6 to 10 kg carcass weight for the 20-month steers; they were also heavier at all ages than those sired by contemporary bulls with only average (av) performance rankings. The Waikeria bulls left heavier progeny than either the Waikite-bred or purchased Angus bulls, suggesting that selection in this herd has been successful.

Differences in carcass weight between progeny of bulls of the various groups were of similar magnitude to differences in yearling weights. To date, no important differences between sources of bulls have been detected for carcass grade, dressing-out percentage, eye muscle area, or fat measurements over the loin eye muscle.

DISCUSSION

These results illustrate quite clearly the advantages to be gained from the use of bulls which have shown superior growth performance within a large group of contemporary and similarly-managed animals.

Carter (1971) and Baker *et al.* (1975) have shown at Waikeria and Waikite, respectively, that bulls ranking highest on on-farm performance tests (weight-for-age) are also among the top bracket on subsequent progeny test.

Their results and those in this paper indicate that there is no need for breeders to progeny test bulls for natural service in the industry. A properly run performance test, giving all animals *equal opportunity* from an early age, will identify genetically superior animals. On-farm liveweight recording provides such a test. However, there is a strong case for progeny testing a bull, if it is to be made widely available through artificial breeding (AB).

These results have important implications for both stud breeders and commercial beef farmers.

In 1972 there were about 325 herds in the Weight Recording Scheme, representing about 25% of all stud breeders. It is hoped that more stud breeders will be encouraged to performance record their herds and use the records in their selection decisions. While it is important that any bull is structurally sound as well as having a high performance ranking for growth, attention to type or "fancy" points will be of little benefit in helping long-term genetic improvement.

Some comment on the choice of bulls purchased from the industry for this programme is important. The annual batches of bulls were picked by Lands and Survey Department personnel mainly on traditional type and conformation attributes and were not the highest priced run bulls available over the period 1968-71. But Dalton and Gibson (1974) have shown that there is a poor relationship between price paid for a bull and its subsequent progeny test ranking for growth.

The breeding programme at Waikite was modified in 1972 and now includes a progeny test comparison of Waikite-bred performance tested Angus bulls and industry performance tested bulls. Preliminary results from those comparisons indicate that progeny growth performance of the former is superior to that of the latter.

There is little incentive for stud breeders to record performance data if these data are ignored by buyers of their bulls. Thus commercial farmers must also be encouraged to ask for and use performance records when they are buying bulls.

For commercial beef farmers there is a case for suggesting that they breed their own bulls, using BeefPlan to do most of the paper work for them. Alternatively they could consider using

semen from some of the superior performance or progeny tested bulls now available, in an AB programme. This does involve a certain amount of additional work during the mating period but does permit the commercial farmer access to superior genetic material which he might not be able to afford otherwise.

Finally, it appears timely to suggest that breed societies consider opening their registered herd books to non-registered animals of proven superior performance. This is not uncommon in many of the breed societies in Europe. Not only can animals enter the herd book if shown to have superior performance, but registered animals in many cases must maintain some prescribed level of performance to retain their place. Certainly it was found at Waikite that non-registered animals could be identified from a large commercial herd which could produce heavier progeny than those from a fairly large sample of bulls bred in the stud industry. It would therefore appear that traditional methods of stud breeding, based largely on pedigree and eye appraisal, may not be meeting modern requirements. It seems reasonable to conclude that there is a lot of good genetic material in the non-registered cattle populations of New Zealand which could and should be exploited for the good of the national improvement of our stock.

ACKNOWLEDGEMENTS

The co-operation of the Lands and Survey Department, Rotorua, and the particular assistance of R. Bedford (Farm Manager) and farm staff at Waikite are gratefully acknowledged.

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