LIVE WEIGHTS TO 18 MONTHS OF PROGENY SIRED BY COMMERCIALLY BRED AND RANDOMLY SELECTED BULLS

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SUMMARY

Live weights of progeny sired by eight industry bred Hereford bulls (CS) and by four bulls from research herds practising random selection (RS) were compared. At birth, progeny sired by CS bulls were 1.4 kg heavier ($P < 0.05$) than those sired by the RS bulls. Day of birth, percentage natural births and percentage survival from birth to weaning were similar for both sire origins.

Live weights at four, seven (weaning), 12 and 18 months favoured the RS sires progeny by two, six, eight and 22 kg respectively.
(Key words : Liveweight selection, bulls).

INTRODUCTION

There is a widespread belief in the beef industry that selection according to breed standards of excellence has improved productivity of cattle. Conversely, many scientists argue that little genetic improvement has occurred (for growth rate) because concentration on aesthetic traits, e.g., coat colour, breed type, pedigree, minor conformation points, has reduced the selection differential for liveweight for age to an insignificant level. There is a paucity of empirical evidence to support either opinion.

The purpose of this paper is to report preliminary results from an experiment that compares progeny sired by commercially bred bulls with those sired by bulls bred in a research herd in which random selection was practiced.

MATERIALS AND METHODS

Location

The experimental animals were reared at the Brigalow Research Station which is located at 24° 50'S and 149° 48'E, approximately 190 km south west of Rockhampton, Queensland. Predominant pasture species grazed by the breeding and growing herds were green panic (*Panicum* maximum var. trichoglume), buffel grass (Cenchrus ciliaris) and rhodes grass (Chloris gayana). These pastures grew on cracking clay and duplex soils in the Highworth land system (Speck et al. 1968). Average annual rainfall is 722 mm with approximately 70% falling during November to April, inclusive. Mean maximum and minimum ambient temperatures range from 33°C and 21 °C in January to 21 °C and 6°C in July. Other environmental constraints to animal performance include ecto- and endo parasitic burdens and bovine infections keratoconjunctivitis. (Turner 1975)

Animals and management

Eight Hereford bulls from three well recognised commercial studs (CS) and four Hereford-Shorthorn bulls (RS) from a randomly selected line maintained at the National Cattle Breeding Station, "Belmont", Rockhampton, Queensland, were represented over two calf crops. In 'each mating, a different set of bulls were

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used as follows: first calf crop: one CS (A), two CS (B), two RS; second crop: one CS (A), two CS (B), one CS (C) and two RS.

The CS bulls were reared and selected under stud management regimes that reduced environmental constraints, e.g., treatment for ecto- and endo parasitic burdens and supplementary feeding.. No liveweight data was available so that bulls were selected for purchase primarily according to apparent physical soundness and size. Average to above average prices were paid for the CS bulls indicating that they were representative of the bulls offered for sale.

The randomly selected line originated from industry bred Hereford and Shorthorn cows and bulls that were crossed and inter se joined to produce a Hereford X Shorthorn line (Anon 1976). Selection in this line was on a random basis from 1954 to 1975 and then from around the mean liveweight at weaning. By contrast with commercial practice, the management policy was minimum modification of the environment so that the animals were exposed to all environmental effects (Frisch 1981).

Hereford breeding cows were allocated to single sire groups at random within age and lactation status classes, and were joined for 10 weeks from c. December 10 each year. After joining, the breeders and their calves grazed in four randomly allocated management groups until late May when the calves were weaned. After c. 14 days feeding in yards to ensure separation from their dams, heifers and steers were drafted and grazed in two groups.

Statistical analyses

The data were analysed by the least squares method for unequal subclass numbers. The variance due to sires within lines was small and not significant. The experimental animals were therefore categorised according to sire into CS and RS. The model included sire origin, dam age, sex and, when two calf crops were combined, year of birth effects and all two way interactions. Live weights were adjusted to the average age of the calves at the particular observation.

Data was analysed to estimate the effect of sire line on:

(i) Day of birth, birthweight, natural or assisted birth and survival from calving to weaning. All animals from both calf crops were included in this subset,

(ii) Live weights at an average age of 126 days (four months) and 209 days (seven months, weaning) from two calf crops,

(iii) Live weights at average ages of 365 days (12 months) and 544 days (18 months) for the first calf crop only.

RESULTS

Day of birth, % natural births and % survival from birth to weaning were not significantly affected by either sire origin or year (table 1). Birth weight, however, was affected by sire origin ($P < 0.05$) and year ($P < 0.005$) but the interaction between the two was not significant.

Sire origin had no significant effect on live weights at four months of age, but by seven months, RS were 6 kg heavier ($P < 0.05$) than CS. The 1985 calf crop was heavier ($P < 0.05$) at four months but lighter ($P < 0.005$) at seven months

than the 1984 calf crop. There was no sire origin by year interaction at either age.

Table 1 The effect of sire origin and year on day of birth, birth weight, % natural births, % survival to weaning of calves born alive, and 4, 7, 12 and 18 month live weights

	Sire Origin		Year	
	Commercial (CS)	Random (RS)	1984	1985
Day of birth	Oct 18	Oct 16	Oct 19	Oct 15
No. of Animals	170	105	125	150
Birthweight (kg)	36.6	35.2	34.6	37.2
% Normal Births	98.3	97.7	99.4	96.6
% Survival to Weaning	99.2	99.8	99.1	99.9
No. of Animals	166	103	121	148
4 month liveweight (kg)	147	149	146	150
7 month liveweight (kg)	195	201	207	189
No. of Animals	70	44	114	-
12 month liveweight (kg)	227	235	231	-
18 month liveweight (kg)	312	334	323	-

In the 1984 calf crop, RS were 8 kg heavier ($P < 0.05$) at 12 months and 22 kg heavier ($P < 0.005$) at 18 months than CS.

DISCUSSION

Analyses of birth weights of the RS herd showed that birth weight did not change over the period from 1966 to 1982 (D.J.S. Hetzel pers. comm.). The 1.4 kg (3.9%) advantage in birth weight of the CS over the RS indicates that birth weight of the CS had probably increased over the past 16 or more years. In contrast to the differences at birth, by 18 months of age the RS were 22 kg (7%) heavier than the CS. Two year old liveweights of the RS herd increased by 0.99 ± 0.34 kg per head annually from 1966 to 1982 (D.J.S. Hetzel, pers. comm.) despite the fact that there was no intentional selection for any trait.

Seifert and Kennedy (1966) found very little difference (0.6 kg or 1.9%) between birth weights of Herefords and Shorthorns, and reciprocal Hereford x Shorthorns F_1 were only 3% heavier and F_2 5% heavier than the mid-parent mean. Lampkin and Kennedy (1965) concluded that there was no heterosis for growth between Herefords and Shorthorns. Therefore in our study it is unlikely that breed or heterosis was responsible for differences in growth between the two lines.

Seebeck (1977) found that temperate bred Herefords had lower growth than subtropically bred Herefords when compared in a subtropical environment. It is therefore probable that under the management at "Belmont", natural selection has resulted in a drift towards animals that are better adapted to the environment (Frisch 1981). The management regime under commercial stud conditions protects

animals from extremes in environmental contraints, and there is little chance for drift towards animals with better environmental adaptation.

Selection for increased liveweight for age has been associated with increased birth weights in most other studies (Baker and Morris 1984). By inference, therefore, we assume that some genetic gain for liveweight for age may have been made by the commercial breeders represented in this study, albeit very little.

Year effects were greater than sire origin effects for all traits indicating the relative importance of environmental effects.

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