ACCOUNTING FOR DIFFERENCES IN GROWTH RATES BETWEEN HEREFORD AND SAHIWAL-HEREFORD CATTLE USED IN PASTURE STUDIES

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SUMMARY

Differences in liveweight gains of cattle are frequently used to compare productivity of pastures but results may be confounded by change in genotype of cattle. It is therefore often necessary to compare growth rates of different genotypes grazing similar forages in order to account for differences in growth rates of the genotypes on various forages.

Growth rates of 50 first generation 3/8 Sahiwal 5/8 Hereford (SaH) and 10 Hereford (H) steers were therefore compared over 16 months from weaning. Animals grazed a range of pastures and crops and were finished in a feedlot. Mean growth rates during 21 day periods varied from 0.00 to 1.30 kg/hd/d for SaH and -0.41 to 1.30 kg/hd/d for H. Growth rates (Average daily gain, ADG) of the two genotypes were linearly correlated ($P < 0.05$) by the following equation:

$$ADG\ (SaH) = 0.864 \times ADG\ (H) + 0.168 \quad R^2 = 0.81$$
$$(\pm 0.089)^* \qquad (\pm 0.050)^*$$

* Standard error

Growth rates of 64 SaH and 23 H heifers used to test the relationship lay within the 95% confidence limits for the regression, which can be used to compare results from experiments using the different genotypes.

INTRODUCTION

Hereford cattle were the traditional beef breed in central and south-east Queensland (Arbuckle 1955). bn "Brian Pastures" Pasture Research Station, Gayndah, south-east Queensland, Herefords have been used in experiments since 1955.

Producers in the region are converting to Zebu crossbred cattle because these cattle have faster growth rates than British breeds under grazing conditions in tropical and subtropical environments, resulting from greater tick resistance, heat tolerance and disease resistance, and lower maintenance requirements (Rudder 1978). The Hereford (H) herd at Brian Pastures has been converted to a 3/8 Sahiwal 5/8 Hereford (SaH) herd by crossing Hereford cows with 3/4 Sahiwal 1/4 Hereford bulls to produce first generation (G1) progeny which were subsequently inter-se mated.

Computer models have been set up to examine various pasture or management options (McKeon et al. 1980; Elder et al. 1980). Animal production data from pastures for use in such models or for direct comparison between or within experiments for different years may be confounded by change in genotype of cattle as well as variation in seasonal conditions. To enable allowance to be made for change in genotype, growth rates of H and first generation SaH cattle were compared on a range of forage types at Brian Pastures, south-east Queensland.

MATERIALS AND METHODS

Sixty weaner steers, 50 SaH and 10 H, were selected at random from the

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available station weaners. Mean weaning weights were 157 ± 3 kg (± SE) for first generation (G1) SaH and 160 ± 12 kg for H. Between May 1977 and June 1978, these steers grazed the following pastures:- N - fertilized green panic (*Panicum maximum* var. *trichoglume* cv. Petrie) from May to November; native pasture (*Heteropogon contortus*, *Bothriochloa bladhii* dominant) from December to late March; native pasture with *Leucaena leucocephala* from April to mid-May; stubble of grain sorghum (*Sorghum vulgare*) and *Lablab purpureus* till the end of June. The steers were finished in a feedlot on a 50:50 (w/w) ration of rolled sorghum grain and chaffed lablab hay from July to September.

Animals were weighed unfasted approximately every 21 days and average daily gains (ADG) calculated for each of 23 weighing periods. A linear regression model gave the line of best fit when relationships between the two genotypes were calculated.

Liveweight data from 64 SaH and 23 H heifers with mean initial liveweight 182 ± 3 kg and 205 ± 3 kg respectively were used to test the relationship. The heifers grazed together on both improved and native pastures between May 1976 and May 1977.

All cattle were vaccinated against tick fever at branding and drenched with anthelmintic both at weaning in May and later in November. Injections against blackleg and tetanus were given at weaning. Ticks were never noted on SaH steers and heifers, or on H steers. The H heifers were dipped to control ticks when they were present.

RESULTS AND DISCUSSION

Mean growth rates of steers during the different weighing periods varied from 0.00 to 1.30 kg/hd/d for SaH and -0.41 to 1.30 kg/hd/d for H. The growth rates of the two genotypes were significantly ($P < 0.05$) and linearly correlated (Fig. 1) by the following equation:

$$ADG\ (SaH) = \underset{(\pm\ 0.089)\ *}{0.864} \times ADG\ (H) + \underset{(\pm\ 0.050)\ *}{0.168} \qquad R^2 = 0.81$$

* Standard error

Figure 1 shows that the advantage to SaH was most pronounced when weight gains were low or negative. At higher rates of gain, the advantage to SaH diminished so that gains were similar for both genotypes at 1.3 kg/hd/d. This result concurs with the reports of Vercoe and Frisch (1974) who showed that animals with lower potential for growth (Brahman cross) performed better on a poor nutritional plane and worse on a high nutritional plane than animals with a high potential for growth (Hereford-Shorthorn cross).

Use of this relationship allows direct comparison of results from experiments using the different genotypes in different years. We consider that additional data are needed to test the relationship and emphasise that this relationship was calculated for G1 SaH and a different relationship might be needed for subsequent generations. Performance of both genotypes during the period under study should not have been markedly affected by pre-weaning factors such as dam age or age at weaning. Dam ages averaged five and eight years for SaH and H respectively, and are therefore unlikely to have affected growth rates at any time (Seifert et al. 1980). SaH steers averaged 232 days old at weaning and H steers 287 days, so effects of age at weaning on subsequent growth rates are only likely to have occurred in the three months post-weaning (Alexander and Beattle 1968), when only small weight gains were measured.

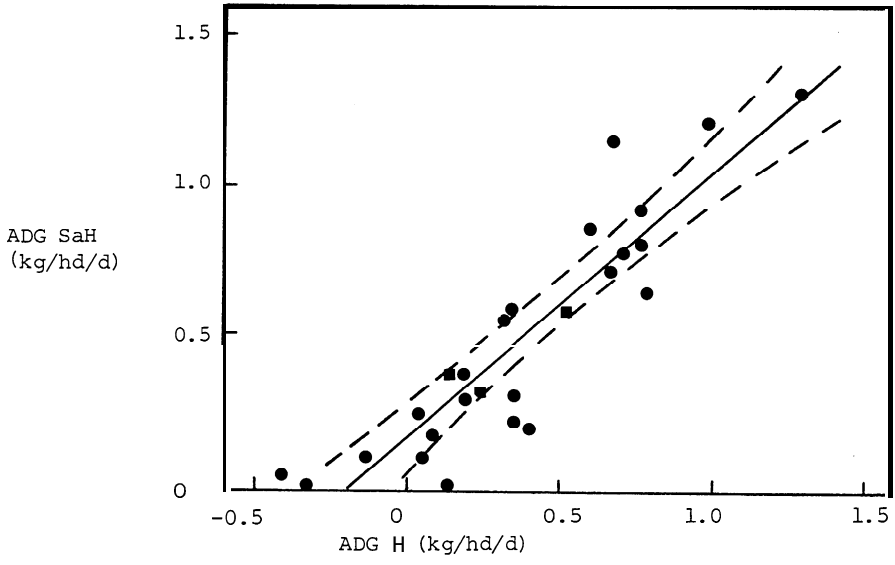

Fig. 1. Relationship between growth rates of Hereford (H) and first generation 3/8 Sahiwal 5/8 Hereford (SaH) steers (●) and heifers (■) showing 95% confidence limits for regression (---).

The fact that the three measurements made on the heifers lay within the 95% confidence limits for the regression tends to add credence to the relationship. However, there is no indication of how well the relationship would hold for other genotypes since responses of various genotypes to the environment could be expected to differ and hence produce different relationships.

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