THE INFLUENCE OF FILIAL GENERATION OF SAHIWAL HEREFORD STEERS ON LIVE WEIGHT, LIVEWEIGHT GAIN, CARCASS WEIGHT AND FAT THICKNESS

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SUMMARY

Live weights from weaning to slaughter, carcass weight and fat thickness of first and second generation three-eights Sahiwal five-eighths Hereford steers from three successive calf crops were compared under a pasture and feedlot finishing regime.

The first generation steers overcame a 30 kg liveweight (16.7 percent) disadvantage at weaning (207d) to be 20 kg (4.8 percent) heavier at slaughter and produced 14 kg (6.4 percent) more carcass weight. Apparent differences in fat thickness were largely attributed to external influences.

INTRODUCTION

There is a lack of information on the comparative liveweight performance of first generation Bos indicus-Bos taurus crossbreds and second generation crossbreds produced by inter se joining first generation crossbreds. It is commonly assumed that there will be a marked decline in productivity from first to second generation as theoretically the heterosis of the first generation is halved in the second and subsequent generations. The decline in the second generation has been clearly shown for reproductive performance in Brahman-British crossbreds (Seifert and Kennedy 1972; Cartwright 1973) but published information concerning liveweight performance is not as consistent.

Comparative liveweight performance in U.S.A. trials showed a 4 to 6% advantage in weaning weights in second generation crossbreds, a 1% decline in post-weaning gain (Cartwright et al. 1964) and a 12% decline in 18 month live weight in second generation Brahman-Devon crossbreds (Crockett 1973). By comparison in Queensland, Seifert and Kennedy (1972) found no significant differences in live weights between first and second generation crossbreds at either weaning or 820 d live weight in either Africander-British or Brahman-British lines. This result was similar to that reported by Corlis et al. (1980) showing no significant differences in live weight from 6 to 38 months of age between lines of steers approximating first and second generation steers. However, a third report from Queensland implied a decline of 24% in post-weaning liveweight gain in second generation Sahiwal-Hereford crossbred heifers (Laing and Taylor 1982). The apparent conflict in results between the latter report and that of the other studies mentioned could be attributed to milking ability of the dams, since the Sahiwal is a milking zebu breed.

In this paper we report further on comparisons in performance between different generations of Sahiwal-Hereford cattle. Comparative live weights at several ages and carcass attributes at 705 d of age of first and second generation steers are presented.

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MATERIALS AND METHODS

The data used in this observation were collected from Brian Pastures Research Station, Gayndah, south-east Queensland (25°39'S, 151°45'E). Annual rainfall averages 736 mm, most of which falls in summer. Temperatures are frequently high in summer while severe frosts are often recorded in winter.

Three successive calf crops (1979 - 1981) of first generation (G1) and second generation (G2) steers were used in the experiment.

G1 steers were produced by joining three-quarter Sahiwal one-quarter Hereford bulls with Hereford cows to produce three-eighths Sahiwal five-eights Hereford crossbreds. G2 steers were the progeny of inter se joinings between the G1 progeny.

During the pre-weaning period the G1 steers were reared in 8, 5 and 2 separate paddocks while the G2 steers were reared in 3, 6 and 9 separate paddocks in 1979, 1980 and 1981 respectively. The steers then entered a cattle production system in which the reliability and success of combining various forages for relatively intense production were examined (Robbins and Bushel1 1984) but which also provided the opportunity for study of the effects of generation on cattle growth. At weaning the steers were randomly allocated within generation and weaning weight strata, to five groups that grazed nitrogen fertilized green panic (Fanicum maximum var trichoglume) pastures aged from one to five years. The steers grazed these pastures at 1 steer to 0.4 ha from June to November each year.

From December to March each year the steers grazed as one group on native pasture (Heteropogon contortus and Bothriochloa bladhii dominant) at one steer to 1.0 ha. From March to mid-April they were also given access to Leucaena leucocephala at 1 steer to 0.1 ha in addition to the native pasture while from mid-April to May the steers grazed crop residues (Lab lab purpureus cv Rongai or grain sorghum). From June to September the steers were fed al libitum on a ration of 50 to 70 percent milled sorghum grain with Lab lab chaff in a feed lot.

These data were analysed by the least squares method for unequal sub class numbers (Harvey 1960). Multiplicative dam age correction factors derived from Seifert et al. (1980) were used because G1 steers were from 3 to 10 y cows while the G2 steers were from 2 to 5 y old cows. These correction factors are similar to those used by National Beef Recording Scheme for dam age adjustment to weaning weight, but there is no comparable data at older ages.

RESULTS AND DISCUSSION

The effect of years and generation on live weight at 207 d of age (weaning) 603 d (end of grazing regime) and 705 d (slaughter) and on daily gain from 207 to 603 d and 603 to 705 d adjusted for dam age, age, day of birth and post weaning paddock are shown in Table 1. The average day of birth was October 13 ±30 d.

Year had a significant effect ($P<.005$) on liveweight performance at 207 d and 603 d and on both liveweight gains.

At weaning the G2 steers were 30 kg live weight or 16.7 percent heavier ($P<.005$) than the G1 steers. This result was expected considering the increased mothering ability of the G1 dams. Following weaning the G1 steers gained significantly ($P<.005$) more to overcome this disadvantage and be 2.4 percent heavier than the G2 steers at 603 d.

TABLE 1 Effect of year and generation on live weight and liveweight gain

Class	No.	Live weight (kg) at			Liveweight gain (kg/hd/d)	
		207 d	603 d	705 d	207 to 603 d	603 d to 705 d
Overall Means	163	195	341	428	0.47	0.85
Effect of Year						
1979	59	208	318	428	0.36	1.06
1980	60	191	343	433	0.46	0.82
1981	44	186	362	423	0.58	0.53
Effect of Generation						
G1	84	180	345	438	0.53	0.91
G2	79	210	337	418	0.41	0.79

The liveweight advantages at 207 d and 603 d were significantly different between years.

In the feedlot the G1 steers further increased their advantage over the G2 steers to be 4.8 percent heavier in slaughter live weight (705 d).

The beneficial effect of any compensatory growth of the G1 steers relative to the growth of the G2 steers should be minimised at this age and is unlikely to'have contributed greatly to the advantage to the G1 steers.

This advantage to the G1 steers was increased ($P<.005$) to 6.4 percent in carcass weight through increased ($P<.005$) dressing percentage (Table 2).

TABLE 2 Effect of generation on carcass weight, dressing percentage and fat thickness

Generation	No	Live weight at 705 d (kg)	Carcass Wt (kg)	Dressing (%)	Fat Thickness (mm)
G1	81	436	234	53.6	7.1
G2	74	418	220	52.7	5.5

Dam age-corrected carcass weight was calculated by applying actual dressing percentages to the dam age-corrected 705 d weight. Without dam age-correction the advantage to the G1 steers was 18 kg. The advantages in carcass weight and dressing percentage of the G1 steers were largely a reflection of their increased final weight.

The apparent advantage to the G1 steers in fat thickness is unlikely to be real because of the large variation within genotypes (c.v.% 24 - 30) even following adjustments for final weight and years. This may have been due to the imprecise nature of the measurement combined with the effects of hide removal.

The animals used in the experiment were produced in the first instance from three-quarter bred Sahiwal bulls and hence only approximated F1 and F2 generations. This may help to explain the apparent differences between this experiment and previous work reported by Laing and Taylor (1982), and that reported by Seifert and Kennetiy (1972) who worked with genuine F1 and F2 progeny.

One of the major difficulties in obtaining this type of data was in the inherent problem of dam age differences between generations. Correction factors to account for these differences are difficult to obtain and apply accurately to interactions (Seifert et al. 1980).

This experiment demonstrated that G1 three-eighths Sahiwal five-eighths Hereford steers overcame a 16.7 percent liveweight disadvantage at weaning to produce a 6.4 percent advantage in carcass weight when compared with G2 three-eighths Sahiwal five-eighths Hereford steers. This advantage was a combination of increased growth on pasture and in feedlot and an increased dressing percentage associated with the higher final weight.

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