THE RELATIVE PRODUCTIVITY OF HEREFORD AND SIMMENTAL X HEREFORD STEERS

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Summary

Twenty-one Hereford (H) and 22 Simmental x Hereford (S x H) steers were intensively fed from 218.2±SE 1.56 kg to either 420, 460 or 500 kg live weight when they were slaughtered. The average daily gain of the S x H was 1.20 and of the H was 1.06± 0.41 kg/d ($P < 0.05$). Although the S x H had a greater DM intake (8.34 v. 6.75± 0.30 kg/d; P (0.01) for the steers slaughtered at 500 kg, this difference was not consistent for the other slaughter groups. The feed conversion ratios were not significantly different (6.63 v. 6.95± 0.187).

At each slaughter weight the S x H were significantly leaner than the H ($P < 0.01$) resulting in a greater percentage yield of salable meat (70.4 v. 66.5± 0.44). With some trimming, S x H slaughtered at 420 and 460 kg-live weight met the requirements for the local market, whereas the H and the 500 kg S x H were overfat at all slaughter weights.

I. INTRODUCTION

Import restrictions were changed in 1969 to allow bovine semen to enter Australia. During the years 1969-74 approximately 2 million doses from 28 breeds were imported. In the financial year 1973-74 the Simmental breed represented 21.1% of the total imports.

Although it is important to compare the productivity of these new breeds with existing genetic material, there unfortunately is very little critical work of this nature being undertaken in Australia. Since the Hereford is the main beef breed in this country and the main breed being inseminated with Simmental semen, we examined some production parameters of Hereford (H) and Simmental x Hereford (S x H) steers.

II. MATERIALS AND METHODS

(a) Animals and Management

Hereford cows on a commercial beef property in N.S.W. (Dunmore, Manilla) were either paddock mated to H bulls or artificially inseminated with semen from seven S bulls. The cows were all treated similarly and the pre-weaning conditions of the calves were the same. Twenty-one H and 22 S x H steers of comparable age were purchased from Dunmore after weaning and transferred to the Animal Husbandry Research Farm, Rocklea for testing. They were group fed in yards. As each steer reached 200 kg live weight it was transferred to an individual stall and over 28 days changed to a diet of 87% sorghum grain, 10% cottonseed hulls and 3% tallow as described by Gartner and O'Rourke (1974).

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(b) Design and Measurements

The steers were assigned at random to three groups to be slaughtered after reaching either 420, 460 or 500 kg live weight. There were seven H steers in each group and the S x H steers were randomised so that progeny from each sire were represented in each group.

Feed and water were available ad lib. Steers were weighed and individual feed intakes recorded at weekly intervals. They were slaughtered at the Animal Research 'Institute, Yeerongpilly, and dressed according to current commercial practices. After the carcasses had been chilled for 24 h, they were measured according to the Australian Meat Board (1971) and the right shins removed for estimating body composition according to Butterfield (1965). This was followed by boning out both sides into 15 primal cuts of standard trim, weighing these as well as the bone, the meat, and the fat trim.

(c) Statistical Analysis

Factorial effects for breeds, target weights and breeds x target weights were isolated by analysis of variance. However, breed comparison was of most interest for the separate target weights, so results are presented in this way. Correlations were calculated on a within breeds basis.

III. RESULTS

For each steer measurements are given from the start of full feeding of the 87% grain diet to slaughter. The performance of each breed at each slaughter weight is shown in Table 1. The overall figures show that the average daily gain of the S x H was greater than the H (1.20 v. 1.06± 0.041 kg/d;' $P < 0.05$). The feed conversion ratios were not significantly different (6.63 for S x H v. 6.95± 0.187).

TABLE 1

Comparative performance of H and S x H steers fattened to a range of slaughter weights

Slaughter weight (kg)		420	460	500	
Parameter	Breed				Average SE
Initial live weight (kg)	H	222.4	223.7	218.6	3.72
	S x H	214.5	212.5	217.5	
Final live weight (kg)	H	411.1	454.9	489.7	3.56
	S x H	418.3	449.9	502.0*	
Days on test	H	162.0	226.0	293.0*	13.46
	S x H	153.9	233.5	243.0	
Age at slaughter (d)	H	445.7	507.9	572.3*	16.01
	S x H	418.0	507.9	514.2	
Average daily gain (kg/d)	H	1.20	1.04	0.94	0.068
	S x H	1.35	1.06	1.18*	
DM intake (kg/d)	H	7.50	7.42	6.75	0.296
	S x H	7.85	7.16	8.35**	
Feed conversion ratio	H	6.38	7.20	7.25	0.315
	S x H	5.90	6.91	7.08	

Significant differences between breeds at each of the slaughter weights are indicated by *$P < 0.05$ and **$P < 0.01$.

The carcass measurements of each breed at each slaughter weight are given in Table 2. The S x H were leaner than the H, resulting in a greater yield of salable meat which was evenly distributed over the 15 primal cuts rather than concentrated in a particular quarter. There was no suggestion of greater variance in the carcass characteristics of H than of S x H. There were significant differences ($P < 0.01$) for the main effects of breed averaged over all slaughter. weights, the S x H values relative to the H values being: fat cover 10.7 v. 15.6± 0.59 mm, eye muscle area 69.4 v. 64.8± 1.19 cm^2, fat % 20.4 v. 24.6± 0.51, muscle % 57.9 v. 54.5± 0.34, bone % 14.9 v. 14.1± 0.18, fat trim % 15.0 v. 19.8± 0.48, yield salable meat % 70.4 v. 66.5± 0.44.

TABLE 2
Comparative carcass measurements of H and S x H steers grown to a range of slaughter weights

Slaughter weight (kg)		420	460	500	
Parameter	Breed				Average SE
Cold carcass weight (kg)[1]	H	243.6	275.4	303.1	3.04
	S x H	240.1	268.2	299.9	
Dressing %[2]	H	61.1*	62.1	64.5*	0.53
	S x H	59.3	60.8	61.6	
Fat cover (mm)	H	12.6**	14.4**	19.8**	0.99
	S x H	8.3	9.4	14.3	
Eye muscle area (cm^2)	H	60.9	65.3	68.1	2.01
	S x H	66.1	71.3*	70.8	
Fat (%)[3]	H	22.7**	23.7**	27.3**	0.86
	S x H	18.6	19.5	23.1	
Muscle (%)[3]	H	55.7	54.4	53.3	0.58
	S x H	59.9**	58.7**	55.2*	
Bone (%)[3]	H	14.4	14.1	13.9	0.31
	S x H	15.8**	14.9	14.1	
Fat trim (%)	H	16.3**	20.7**	22.5**	0.81
	S x H	12.0	14.7	18.4	
Yield salable meat (%)[4]	H	69.6	65.7	64.3	0.75
	S x H	72.5**	70.7**	67.9**	
Expensive cuts (% salable meat)[5]	H	42.3	42.6	42.7	0.35
	S x H	42.9	43.1	42.7	

Significant differences between breeds at each of the slaughter weights are indicated by *$P < 0.05$ and **$P < 0.01$.

1 Weighed 24 h after slaughter, includes channel and cod fat.
2 Cold carcass weight divided by fasted live weight (24 h off feed, 16 h off water).
3 Butterfield (1965).
4 Primal cuts trimmed to acceptable local shop trade levels (about 5 mm fat), plus meat trim.
5 Sirloin, rump, block fillet, silverside, topside, thick flank, rib fillet.

The correlation coefficient between daily intake and daily gain was 0.613 ($P < 0.01$), between food conversion ratio and daily gain -0.771 ($P < 0.01$), between food conversion ratio and fat percentage 0.319 ($P < 0.05$), and between dressing percentage and fat percentage 0.428 ($P < 0.01$).

IV. DISCUSSION

In view of the high cost of slaughtering and processing cattle relative to their cost of production, it is economically sound to grow steers to a weight resulting in the optimum 'yield of salable meat. This implies a limit to the degree of fat cover while recognising that some fat is desirable. Knowing when to slaughter steers is particularly important under intensive production due to the high cost of grain-based diets.

Although there are not quantitative guidelines defining the optimum fat cover required by the local beef trade, our experience has been that this is likely to be less than 10 mm over the 10th rib. On this basis the H steers on these diets should be slaughtered below 420 kg whereas the S x H steers can be slaughtered up to 460 kg. It is recognised that animals on higher roughage diets would have lower body fat percentages at comparable live weights (Weiss et *al* 1967) and the slaughter weights recommended would not necessarily apply to a grazing situation.

As live weight at slaughter was increased from 420 to 460 and 500 kg, there were significant decreases in average daily gain and increases in feed conversion ratio. This was associated with significant increases in fat and decreases in muscle parameters. This can be explained by the higher calorific value of fat compared with protein.

Although genotype x environment interactions in live weight gain can occur between breeds, they-have been reported only between Brahman and other breeds (Rollins, Carroll and Ittner 1964). Thus the relative differences between S x H and H which we found in some parameters for steers hand fed high-grain diets could equally apply under grazing conditions. In an experiment in progress S x H steers show higher rates of live weight gain than H steers under sub-tropical grazing conditions in Queensland (P.B. Hodge - personal communication).

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