Growth and carcass composition of Sahiwal-cross and Friesian bulls

T. F. REARDON, E. G. WOODS, J. D. B. WARD and J. J. BASS

Ruakura Animal Research Station
Ministry of Agriculture and Fisheries, Hamilton

ABSTRACT

Growth rates of Sahiwal-cross (S × F) and Friesian (F) bulls were compared in 2 experiments. In the first, 40 F and 38 S × F bulls were slaughtered at a carcass weight of about 230 kg and the left side of each carcass was jointed and dissected into meat, fat and bone. The 2 breed groups were grazed at equal levels of pasture allowance from 17 weeks of age when F calves (124 kg) were 30 kg heavier than S × F. After 17 weeks of age, F bulls gained live weight and carcass weight faster than S × F and were slaughtered 9 weeks earlier. Mean weights of carcass, of carcass corrected for live weight and of fore- and hindquarters, were the same for the 2 breeds. However, S × F carcasses had more meat (72% *v* 71%), more fat (8% *v* 6%), less bone (20% *v* 22%) and consequently a higher meat:bone ratio (3.55 *v* 3.18) than F carcasses of the same weight.

In the second experiment 24 F and 24 S-cross bull calves were grazed as 1 mob from 20 weeks of age when both breeds had a mean live weight of 96 kg. From then until 55 weeks of age F and S-cross bulls grew at similar rates (0.59 and 0.56 kg/d respectively). From 55 to 67 weeks, F bulls grew slightly faster (1.26 and 1.18 kg/d respectively).

Keywords Sahiwal-cross; Friesian; bull beef; carcass composition; growth rate

INTRODUCTION

Half-bred Sahiwal heifers from British dairy-type dams (Friesian, Jersey, etc.) have found a ready market when exported from New Zealand as live animals (Callow, 1983; Wallace, 1983). However there is no such market for the male progeny from this breeding programme. Winks *et al.* (1979) concluded that Sahiwal × Friesian steers, having shown the same growth rate and a higher dressing percentage than Friesian steers, warranted further study as beef animals. Koch *et al.* (1982 a, b) showed that Sahiwal-sired steers produced carcasses comparable in many respects to those of Hereford or Angus-sired steers although their growth was slower. Again the Sahiwal-sired steers had higher dressing percentages.

As no data are available on Sahiwal-cross bulls, the aim of the present study was to examine their potential as dairy beef animals under New Zealand conditions in comparison with the commonly used Friesian bulls.

EXPERIMENTAL

Experiment 1

In December 1980, 40 Friesian (F) and 40 (2 of which died) Sahiwal × Friesian (S × F) bull calves with a mean age of 17 weeks and mean live weights of 124 and 94 kg respectively were selected from calves described by Ward *et al.* (1983). From then until slaughter the 2 groups were offered equal levels of allowance of pasture dry matter (DM) by dividing a paddock by a temporary fence and offering a fresh area of pasture daily to each group. The level of pasture allowance was 8 kg DM/100 kg live weight until the calves were 37 weeks of age. Because of pasture scarcity during winter allowances were reduced from 8 kg as follows:

from 37 to 49 weeks of age to 5 kg
from 49 to 55 weeks of age to 4 kg
from 55 to 58 weeks of age to 5 kg
from 58 weeks to slaughter to 6 kg

Hay was offered *ad libitum* from 37 to 58 weeks of age.

Bulls were slaughtered in batches as they reached approximately 420 kg live weight. They were fasted for 48 hours and weighed immediately before slaughter. Carcass weight (including channel and kidney fat) was recorded before chilling. The left side of each carcass was weighed after chilling for a minimum of 24 hours and was divided into cuts (Everitt and Jury, 1964) which were in turn dissected into meat, trimmed fat and bone.

Experiment 2

From F bull calves and from bull calves (S × X) from Sahiwal sires and dams of mixed breeding born in 1981 (Ward *et al.*, 1983), 24 of each type with a mean live weight of 96 kg and a mean age of 20 weeks were selected in early January 1982 and were grazed as 1 mob thereafter under moderate levels of feeding.

Live weights were recorded at intervals of from 6 to 20 days. Rates of gain were calculated from the regression of live weight on time.

RESULTS

Experiment 1

From birth until allocated to the experiment, F calves had grown faster ($P < 0.001$) than S × F calves (0.72, 0.43 kg/d respectively). The resultant difference in mean initial live weight tended to increase during the experiment (Fig. 1). Consequently, F bulls were slaughtered on average 9 weeks earlier than S × F bulls (Table 1). Mean weights of carcass (hot and cold) and of carcass adjusted for live weight were similar for the 2 breeds as were the weights of fore- and hindquarters (Table 1). However the breeds differed in composition of carcass with S × F carcasses having more fat and less bone than F in both the fore- and hindquarters and more meat in the forequarter (Table 1).

Relative to F, the left side of S × F carcasses had a total of 0.81 kg less meat in the shin, thin flank and topside ($P < 0.01$) and a total of 1.70 kg more meat in the chuck, fillet, thick flank, silverside and rump skirt ($P < 0.05$) with no significant differences in amount of meat in the clod, blade, brisket, forerib, loin or shank. By contrast, all cuts showed significant differences between breeds in amount of bone with S × F having more bone only in the thin flank (0.024 kg; $P < 0.05$) and less bone in each of the remaining cuts — a total of 2.34 kg. The largest relative deficits of bone in the F × S carcasses were in the topside (17% less, $P < 0.001$), the clod (15% less, $P < 0.001$), chuck (12% less, $P < 0.01$), thick flank (12% less, $P < 0.01$) and femur and blade (11% less in each, $P < 0.001$). These opposite trends in meat and bone resulted in S × F sides having a 12% higher meat:bone ratio than F (Table 1).

S × F sides had 0.28 kg more kidney fat than F ($P < 0.01$) but similar amounts of channel fat. They had more fat in all joints (a total of 1.7 kg) except the chuck, forerib and fillet which did not differ between breeds. The major differences in fat content (both relative and absolute) were in the brisket, thin flank, thick flank and loin in which 1.1 kg of extra fat were found in S × F sides.

TABLE 1 Age at slaughter, rates of live-weight and carcass gain and carcass composition of F and S × F bulls, Experiment 1.

	F	S × F	
Weight gain 17 to 59 weeks (kg/d)	0.86	0.74	***
Mean age at slaughter (weeks)	64	73	—
Carcass gain (kg/d)[1]	0.53	0.48	***
Hot carcass (fats in) (kg)[2]	227.3	228.3	NS
Left side weights (kg)			
Cold (fats out)	109.0	109.0	NS
Forequarter	55.6	55.1	NS
meat[3]	38.9	39.7	***
fat[3]	2.7	3.3	***
bone[3]	13.5	12.3	***
Hindquarter	55.3	56.0	NS
meat[4]	38.1	38.0	NS
fat[4]	4.3	5.3	***
bone[4]	10.7	9.7	***
Meat:bone ratio	3.18	3.55	***

[1] Carcass weight at 17 weeks assumed to be 45% of live weight.
[2] Adjusted for differences in fasted live weight.
[3] Adjusted for differences in weight of left forequarter.
[4] Adjusted for differences in weight of left hindquarter.

Experiment 2

In the first 36 weeks of the experiment, F calves grew slightly but not significantly faster than S × X (0.59 and 0.56 kg/d respectively) so that by the age of 55 weeks they were about 9 kg heavier (Fig. 1). In the period from 55 to 67 weeks of age rate of gain increased and F grew faster than S × X (1.26 and 1.18 kg/d respectively; $P < 0.05$).

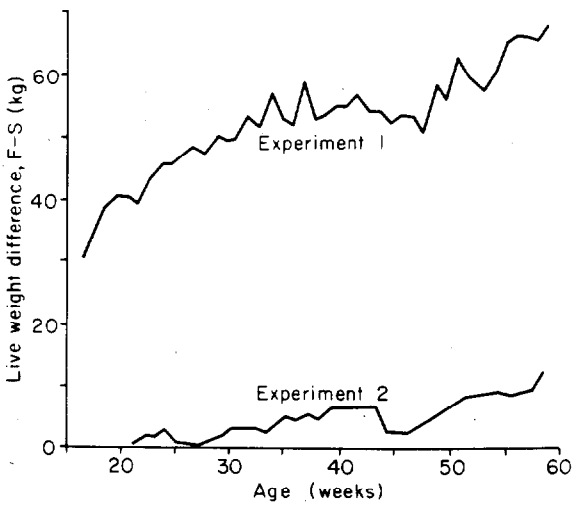

FIG. 1 Difference in live weight as a function of age, Friesian minus Sahiwal cross, Experiments 1 and 2.

DISCUSSION

In a comparison of Friesian and Sahiwal × Friesian steers on the Atherton Tableland of Queensland, Winks *et al.* (1979) grew 12 of each type from a live weight of 130 kg to carcass weights of from 260 to 330 kg and found no difference in rates of live-weight gain (0.71 and 0.74 kg/d respectively). In the first

experiment of the present study, Sahiwal-cross bulls also grew at 0.74 kg/d (to 59 weeks of age) but this was significantly slower than the growth rate of Friesian bulls (0.86 kg/d). The superior growth rate of Friesians as compared with Sahiwal × Friesians in this experiment but not in the early part of Experiment 2 nor in the comparison of steers by Winks *et al.* (1979), could be attributable to differences in growth rates before the experiment began, differences resulting from the grazing system used in Experiment 1 or to differences between breeds in potential growth rates at high levels of nutrition on pasture. It is not possible on the evidence within Experiment 1 to totally eliminate any one cause. However while differences in early nutrition have been shown to produce differences in weaning weights that have persisted (Everitt, 1972) there is little evidence of such difference in weaning weight actually increasing after uniform nutrition is imposed and certainly not to the extent seen in Experiment 1 (Fig. 1). Thus breed differences in reaction to similar levels of pasture allowance (based as they were on live weight) and higher potential growth rates at high levels of pasture feeding remain likely causes of the better growth rates of Friesians in Experiment 1.

The additional fat trim found in Sahiwal-cross bull carcasses as compared to Friesian in Experiment 1 at carcass weights of 230 kg is in agreement with the greater fat depths measured by Winks *et al.* (1979) in steer carcasses of the same breeds at about 260 and 320 kg. At a common carcass weight of 285 kg Koch *et al.* (1982 b) also found that Sahiwal-sired steers had higher fat trim than those sired by Brahman, Pinzgauer and Tarentaise but an equal level of fat trim to steers sired by Hereford or Angus bulls.

Additional fat trim in Sahiwal-sired carcasses tended to be offset by lighter bones in the findings of both Koch *et al.* (1982 b) and in bulls in the present experiment. However, the trend was insufficient in the data of Koch *et al.* (1982 b) to balance the extra fat trim and Sahiwal-sired steers produced slightly less retail product than Tarentaise, Pinzgauer or Brahman but the same amount as Hereford and Angus-sired steers. In the present data, lighter bones more than offset additional fat trim in Sahiwal-sired bull carcasses so that they produced more meat than Friesians at the relatively light carcass weights examined.

In summary, Sahiwal-cross bulls have grown at rates comparable to more familiar breeds (Friesian, Hereford and Angus) under moderate to good feeding conditions (e.g., the early stage of Experiment 2; Winks *et al.* (1979)) but have grown more slowly under very good feed conditions where growth rates were about 0.9 kg per day or more (e.g., Experiment 1; the latter stage of Experiment 2; Koch *et al.* (1982 a)). In contrast to published reports on Sahiwal steers superior dressing-out percentages for Sahiwals were not found in the present study with bulls. Sahiwal-cross bulls produced an acceptable carcass that was slightly fatter, lighter boned and had slightly more saleable meat than a Friesian bull carcass of the same weight.

ACKNOWLEDGEMENTS

W. D. Carter, D. M. Duganzich, staff of the Ruakura Beef and Abattoir units.

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