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A STUDY OF THE GROWTH AND CARCASS
CHARACTERISTICS OF RANGY AND
SHORT TYPE STEERS OF THE
ANGUS, BEEF SHORTHORN
AND HEREFORD BREEDS

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ABSTRACT

The growth rate and carcass characteristics of rangy and short conformation types of steers in Angus, Hereford and Beef Shorthorn breeds were compared in two trials (Trials X and XI) at Massey University.

Rangy and short type weaner steers were chosen on the basis of visual assessment of conformation by experienced stockmen. The Angus steers in Trial X came from the one herd as did the Hereford steers in Trial XI. The two types of Angus (Trial XI) and Beef Shorthorn (Trial X) steers were bred in four different herds. Types within a breed were chosen by the same people, but different persons selected the representative steers in each breed.

The steers were grazed together at pasture (except for a short period on a wintering yard in their second year of life) and weighed "full" at various intervals.

They were slaughtered at an age of about 30 months. They were processed according to normal commercial practice and various aspects of carcass yield, composition and data on carcass weight, grade, fat colour, and chiller shrinkage were collected, various carcass measurements were taken and the weights of fat and bone were recorded for the right side quarters of each carcass.

Fifteen steers were purchased of each type. Trial X concluded in March 1976 (after a period of 625 days) with 13 rangy and 14 short Angus steers, and 14 rangy and 15 short Beef Shorthorn steers. There were no animal losses in Trial XI (633 days) which finished in April 1977 (with 15 steers in each type group) in which the two types in

the Angus and Hereford breeds were compared.

The results were analysed within trials by the fitting constants procedure using fixed-effects linear models. Type effects were compared within each breed group. One model included the right side of the cold carcass as a covariate for some aspects of the carcass data analysed within a breed.

Rangy type steers in each breed had heavier initial and final liveweights and carcass weights than short type steers. Rangy steers grew more rapidly than short steers in three of the four comparisons. There was no significant difference in growth rate between types of Angus steers in either trial. Rangy Angus steers gained 0.02 kg/day (n.s.) more than short Angus steers in Trial X, but the short steers grew faster in Trial XI, 0.03 kg/day (n.s.) and they may have exhibited compensatory growth in the first half of the trial. Rangy Beef Shorthorn and Hereford steers showed a greater superiority in growth rate (Beef Shorthorn 0.07 kg/day, $P < 0.001$; Hereford 0.06 kg/day, $P < 0.001$), compared with short type steers of these two breeds.

These differences are important advantages in beef production, however the large difference in growth rate meant that because all steers were slaughtered at the same time (to meet the experimental design) the faster-growing Beef Shorthorn and Hereford steers were carried to much heavier weights than would be normal in most farming situations and this adversely affected their carcass composition, because of higher proportions of fat resulting from their heavier carcass weights.

An analysis of the order in which steers were slaughtered showed that they moved into the stunning box independent of their type, breed group or liveweight. This finding indicated that data collection subsequent to the processing of the carcasses or in the boning-out of the quarters would be spread across types and breeds randomly.

There were very small, non-significant differences between types in dressing-out percentage, carcass shrinkage in the chiller overnight (by weight, or as a percentage of hot carcass weight), and between the weight of the right and left sides of the carcass. This meant that the types tended to rank in the same order if their mean carcass composition was expressed on either a right side, cold or hot carcass basis, or liveweight basis.

Preliminary statistical analysis showed there was little difference between types in the distribution of trimmed, boneless lean, bone and trimmed-off fat between the forequarters and hindquarters of the right sides. Therefore the data for each quarter were pooled and the composition of the right side of each carcass was compared between types.

Rangy steers yielded a greater weight of trimmed, boneless lean and bone in each breed group. They yielded a lower weight of excess fat in Angus steers, but not in Beef Shorthorn or Hereford steers.

There were small, inconsistent differences between types in the percentage of commercially trimmed boneless lean and bone, but larger differences in the percentage of excess fat trimmed from the right side of the carcass. The size of the type differences was influenced by right side weight.

The ratio of trimmed meat to bone did not differ significantly between types, therefore it was concluded that the main determinant of the differences in the percentage yields was the amount of excess trimmed fat.

Rangy steers tended to have a lower percentage of excess fat and were leaner than short steers except in the case of the Beef Shorthorns and Herefords.

Angus types had similar amounts of kidney and channel fat (no significant difference between types in Trials X and XI, respectively). Rangy steers had more kidney and channel fat than short steers in Beef Shorthorns (1.73 kg, $P < 0.05$) and Herefords (2.22 kg, $P < 0.01$). When adjusted for right side weight there was less kidney and channel fat in rangy than short Angus (0.72 kg, n.s. Trial X, 1.72 kg, $P < 0.05$ Trial XI) and Beef Shorthorns (0.53 kg, n.s.), but slightly more in rangy Herefords (0.53 kg, n.s.). Rangy Angus (Trial X) and Beef Shorthorn steers had less fat over the 12th ribeye than short steers (2.0 and 1.5 mm, n.s., respectively). There was little difference in fat depth between Angus (Trial XI) and Hereford types (0.6 and 0.8 mm, n.s., respectively).

When the depth of fat over the ribeye of the 12th rib was adjusted for right side weight short steers had a slightly greater depth of fat than rangy steers in Angus (2.5 mm, n.s.) and Beef Shorthorns (5.1 mm, n.s.) in Trial X. However in Trial XI rangy Angus steers had a slightly greater depth of fat than short steers (0.4 mm, n.s.), but there was no difference between types in Herefords.

Rangy steers had larger ribeyes than short steers except in Herefords. The difference in ribeye areas between types was

2.51 cm²(n.s.) in Angus Trial X, 6.77 cm²(P<0.01) in Beef Shorthorns and 5.81 cm²(P<0.05) in Angus Trial XI. Short Hereford steers had larger ribeye areas than rangy steers by 3.77 cm²(n.s.). These differences were reduced and became non-significant when adjusted for right side weight except in Herefords where short steers had significantly larger ribeyes (6.76 cm², P<0.01).

Rangy steers had longer carcasses than short steers and longer bone measurements. They had a deeper carcass than short steers in Beef Shorthorn and Hereford steers, but not in Angus steers. The measurement of the depth of the carcass was influenced by fatness which appeared visually to increase the depth of short carcasses in relation to their skeletal size. The types did not differ in the ratio of carcass length to carcass depth.

When carcass dimensions were adjusted for right side weight the differences between types generally became non-significant except in Beef Shorthorn cattle. Rangy steers had slightly greater measures of carcass length, length of the leg and forearm, but had shorter measures of carcass depth than short-type steers except in Beef Shorthorns although the differences were not large.

It was concluded that selection of rangy- compared to short-type weaner steers by visual assessment of conformation resulted in more beef being produced by the Angus, Hereford and Beef Shorthorn cattle. The reasons for increased production were various. In each comparison between types the superior initial weight of rangy weaner steers contributed about half of the increase in final yield of lean (assuming a similar composition at weaning).

Rapid growth rate of rangy steers in Beef Shorthorn and Herefords contributed to their increased yield of lean although they were over-finished as a consequence of their greater growth rate and the experimental design requiring all cattle to be slaughtered at one time.

Growth rate was not found to be an important factor in Angus steers where it appeared that a small superiority in carcass composition resulted in a greater yield of lean meat from rangy steers.

Analysis of carcass composition and dimensions at slaughter showed considerable variation within each type. Ratios of body length to depth did not differ and in this respect rangy steers were "bigger" and heavier than short steers though not disproportionately so in relation to weight. The variation within each type suggested that some steers would have been classified into the other group had this been done at the conclusion of the trial. The ratio of body length to chest depth is not a true measure of skeletal size because of the influence of carcass fat in measuring chest depth. It would thus be unwise to draw conclusions about proportionality in size from this study.

The experiment has indirectly shown the importance of a heavy weaning weight, of rapid growth rate, and of lean content in beef production. The relative importance of other factors such as age, pre-weaning growth rate, sire and dam and the pre-trial environment could not be assessed with the cattle purchased for this investigation.

Visual assessment was not consistent in terms of selection for the same trait. This may have been due to the effect of different

persons (between breeds) and their interpretation of "types" and to the amount of phenotypic variation for type in the population from which the steers were selected.

The trends observed in this study are in the right direction to improve beef production of traditional beef breeds. The concept will be of use to farmers and others who choose cattle with or without records.

The carcasses were graded either P1 or G in both trials. The number of carcasses in each grade were: Trial X G=33, P1=23; Trial XI G=16, P1=44. An analysis tested the hypothesis that there were no differences between grades in carcass characteristics. Carcasses graded G were heavier (15.4 kg, $P < 0.05$) in Trial X, but not significantly so in Trial XI (7.9 kg, n.s.). They had no more kidney and channel fat (1.10 kg, n.s., Trial X and 0.56 kg, n.s. Trial XI) than carcasses graded P1. Results for other carcass characteristics were inconsistent between trials. Carcasses graded G in Trial X had a greater depth of fat over the 12th ribeye (2.4 mm, $P < 0.05$), and a greater proportion of excess fat and less trimmed lean of the right side of the carcass (2.26% fat, $P < 0.001$, and 1.58% lean, $P < 0.05$). These results agree with grade expectations. In Trial XI however, carcasses graded G had the same fat depth over the 12th ribeye (0.0 mm, n.s.), less excess fat trim and more lean as a percentage of right side weight (1.74% fat, $P < 0.01$, 1.72% lean, $P < 0.05$) in direct contradiction to the results of Trial X and of grade expectations.

Subjective visual assessment of fat depth from the uncut surface

of the carcass resulted in 60 and 88 percent of carcasses being wrongly classified in relation to G grade standards (Trials X and XI, respectively). Graders had more success in classifying "leaner" carcasses 30 and 25 percent of carcasses graded P1 had fat depths outside the grade specification (Trials X and XI, respectively) and then by only a few millimetres. Carcasses graded G in Trial X were of a similar "size" to those graded P1, but were heavier, whereas in Trial XI carcasses graded G were "larger", but of a similar weight.

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