

THE CHAROLLAIS BREED was developed in France for beef and work. According to Le Syndicat Central d'Exportation de la Race Charollaise, the mature weight of cows is between 1,400 and 1,750 lbs; bulls, between 2,200 and 2,600 lbs; and four-year-old steers, between 1,850 and 2,600 lbs. Although the Charollais is larger and appears to be later maturing than any of the British beef breeds, it is remarkably well proportioned in body and muscle development and is being used to an increasing extent in commercial beef cattle herds.

Because the endemic nature of foot and mouth disease in Europe precludes direct importation of Charollais cattle into the United States, American breeders have been relying principally on small importations from Mexico. Consequently, the buildup in numbers of pure Charollais cattle has been slow. The numbers of grade cattle carrying Charollais breeding has increased greatly, however, through crossbreeding, particularly crossbreeding with Brahman cattle. These crossbreds are generally called Charbrays to denote their Charollais and Brahman ancestry. To a more limited, but ever increasing extent, Charollais bulls are also being crossed with the British beef breeds.

Other experiments

Charollais bulls have been used in crossbreeding experiments at the USDA Range Experiment Station, Miles City, Montana, and at the Louisiana State Experiment Station. At Louisiana, Charollais x Hereford crossbred calves, sired by Charollais bulls, were no heavier at weaning time and had less finish at slaughter time than Hereford calves. Hereford carcasses graded higher, ranked higher in compactness and thickness, were plumper in the loin and round, and had a thicker covering of fat over the ribs. Carcass analyses showed more bone in the crossbred carcasses, but no significant differences in the amount of carcass fat, marbling, or tenderness.

In Canadian crossbreeding experiments, crossbred Charbray x Hereford calves sired by Charbray bulls were heavier at weaning and at slaughter than were Herefords, but the carcasses of the crossbreds lacked the conformation and the degree of fatness to grade as high as Hereford carcasses. A comparison of crossbreds with both parental breeds, where one parent breed was either Charollais or Charbray, has not been reported. This last type of comparison is of interest, since it is a measure of hybrid vigor.

Performance Comparisons OF CHARBRAY HEREFORD —and Crosses Between

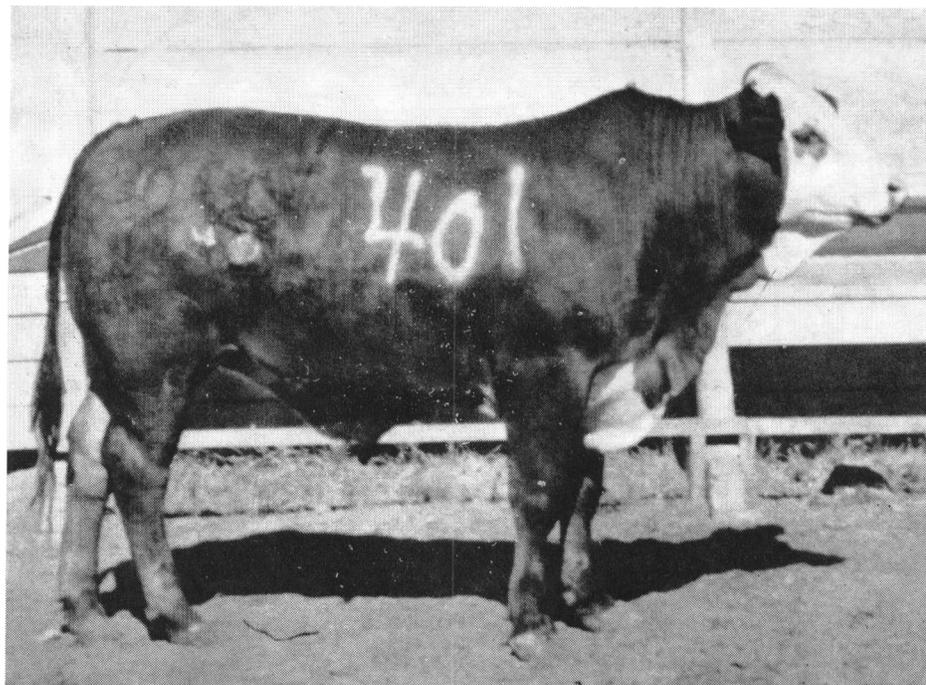
F. D. CARROLL · W. C. ROLLINS

Davis tests

For this experiment at Davis, Charollais were equated with Charbray in that Charbray cows mated to Hereford bulls were regarded as the reciprocal cross of Hereford cows mated to Charollais bulls. The cooperating Charollais breeder had Charollais bulls and Charbray cows that were 10/16 to 15/16 Charollais. In designating crossbreds, the breed of the male parent appears first. Therefore, to

measure hybrid vigor, the average performance of all crossbred calves (Charollais x Hereford and Hereford x Charbray) was compared with the average performance of all straightbred calves (Charbray and Hereford). Also being compared were the performances of the Charollais x Hereford crossbred with Hereford straightbred calves and the performances of the Hereford x Charbray crossbred with Charbray straightbred

Steer calf no. 401, Hereford bull x Charbray cow



ESTIMATES OF HYBRID VIGOR IN LIVE ANIMAL AND CARCASS TRAITS

	A	B	S.E.†	B/A × 100
	Av. of all animals	X-breds minus straight-breds	of B 38 d.f.	%
Fleshing score 2 = thin flesh as a feeder: 3 = av. flesh 4 = above av. flesh	2.80	-.11	.16	-3.9
Av. daily gain, lb.	2.34	-.03	.11	-1.0
Pounds of feed per lb. of gain	7.64	-.04	.24	-0.5
Slaughter weight, lb.	930	5	31	0.5
Carcass weight, lb.	583	1	21	-0.2
Lumbar length/carcass length	.356	.004	.002	1.0*
Estimated carcass fat, %	17.7	-.9	.9	-5.1
Ether extract in ribeye, % of dried wt.	11.8	-.2	.1	-1.7
Marbling score: 3 = traces 5 = small amount 7 = moderate amount	4.4	-.3	.2	-6.8
Maturity score: 2 = mature 4 = intermediate 6 = youthful	5.6	.2	.2	3.6
Carcass grade: 14 = standard 17 = good 20 = choice	16.6	-.6	.4	-3.6
Fat thickness, in.	.27	-.02	.03	-7.4
Heart, kidney, and pelvic fat, %	1.90	-.01	.11	-0.5
Area of ribeye, sq. in.	12.0	-1.0	4.1	-8.3
Per cent of carcass wt. in boneless trimmed meat in round, loin, rib, and chuck, %	51.9	.2	.3	0.4

* P < .05

† Standard error of B using 38° of freedom.

AND CATTLE Them

calves. Indirectly, Herefords were also compared with Charbrays.

Two cooperating ranches, one raising Herefords and the other raising Charbrays produced two calf crops each for this experiment. During the first breeding season, one Hereford and one Charollais bull were placed with each herd of cows. For the second breeding season, the cow herds remained the same, but the bulls were switched. Hence, each of the four

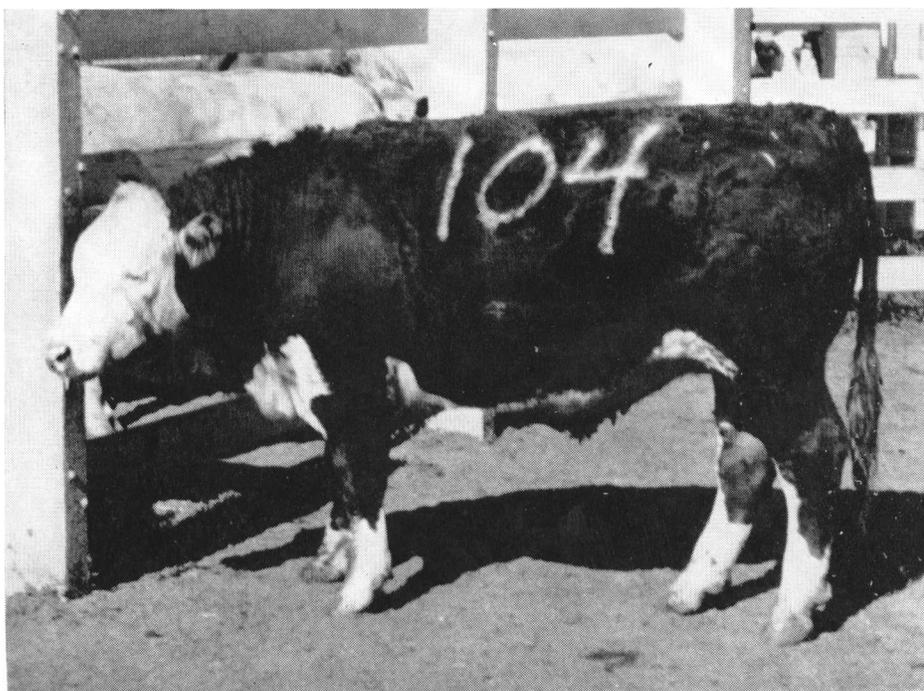
bulls sired both crossbred and straight-bred calves, which prevented any bias that might have occurred if one bull of a pair had been better than the other in any particular trait. The calves were brought to Davis at weaning (8 months of age), fed a growing ration for 135 days, and fattened for 140 days. Data on growth, feed efficiency, carcass and meat quality traits were obtained.

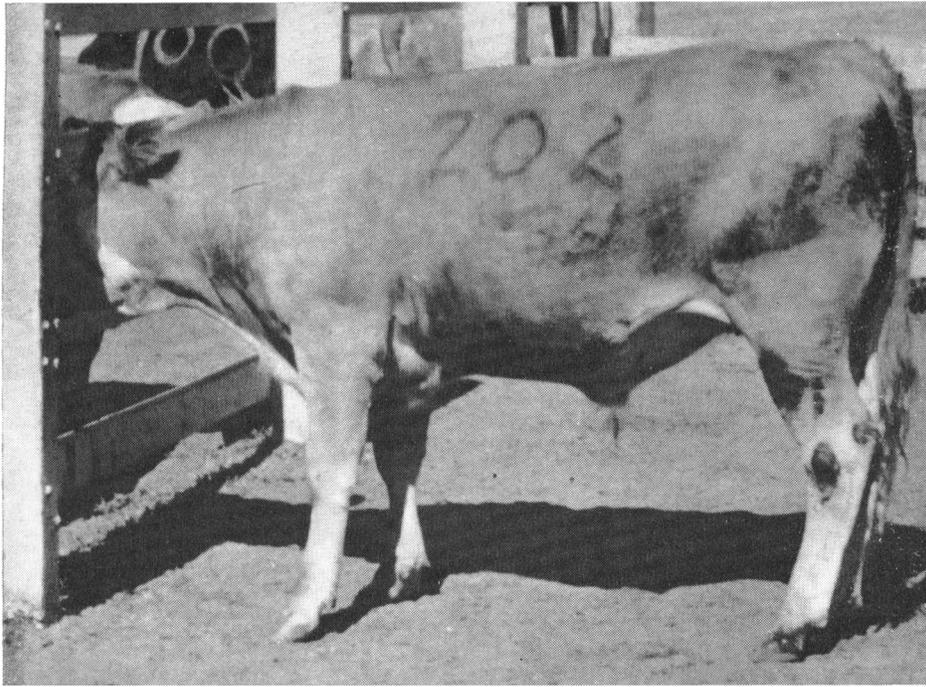
The experimental results presented in

the table compare the average of all the crossbreds with the average of all the straightbreds. There was a significant difference in only one measurement: the ratio of length of lumbar (loin) to length of carcass was larger in the crossbreds. In all other measurements, differences between groups did not approach significance; however, straightbreds tended to be fatter than the crossbreds in all measures associated with fatness such as feeder condition, estimated carcass fat percentage, ether extract in the ribeye muscle, marbling score, carcass grade, fat thickness, and estimated percentage of heart, kidney, and pelvic fat. Conversely, crossbreds tended to produce heavier, leaner carcasses with a higher proportion of boneless, trimmed meat in the round, loin, rib, and chuck. Total cooking losses were higher for straightbred meat, but in the cooked meat the differences in moisture content were not important. Scores for lean color, tenderness, juiciness, and flavor showed no important differences between the two groups; however, the panel of judges was consistent in scoring the crossbred meat less tender. Shear values were also higher (meaning less tender) for crossbred meat.

Since only four bulls were used in this experiment, there is a possibility of bias in any comparison between Herefords and Charollais x Herefords dropped on one ranch and between Charbrays and Hereford x Charbrays dropped on the other ranch—if the bulls did not ade-

Steer calf no. 104, Hereford bull x Hereford cow





Steer calf no. 202, Charollais bull x Hereford cow

quately represent their breeds. This limitation must be borne in mind when evaluating the following summary statements:

As feeders, Herefords (HH) tended to be fleshier than Charollais x Herefords (CH), but Charbrays (CC) and Hereford x Charbrays (HC) were about equally well fleshed. For average daily gain, feed efficiency, slaughter weight, and carcass weight, CH tended to rank higher than HH, and CC higher than HC. These results point out the positive influence of Charollais breeding on growth rate.

Subjective evaluations of carcass conformation and maturity and nearly all measures of carcass fatness (such as fat thickness, marbling score, carcass grade, and estimated carcass fat) indicated that HH were more compact, more mature, and fatter than CH, and HC more than CC. However, the ranking was reversed for ribeye area and estimated yield of boneless, trimmed meat in the round, loin, rib, and chuck. Hence, Hereford breeding appeared to have a positive influence on conformation and on rate of maturity and fattening while Charollais breeding appeared to have a positive influence on the production of leaner carcasses with a higher proportion of lean cuts. Carcass conformation of the latter would be expected to compare more favorably with the former, if the degree of maturity were comparable.

Steaks from the sirloin and roasts from the prime rib and top round were used in cooking tests and palatability compari-

sons. Subjective and objective measurements of lean color were made on the sirloin tip. Comparing HH and CH, drip losses during cooking were greater in HH cuts, round roasts excepted, while evaporation losses were greater in CH cuts, round roasts excepted. Total cooking losses, however, were greater in HH meat. Comparing CC and HC, drip losses during cooking were greater in HC cuts, round roasts excepted, while evaporation losses were greater in CC meat. Total

cooking losses favored neither group. These results indicated that animals sired by Hereford bulls had more fat in the meat, while those sired by Charollais bulls had more moisture. This is further borne out by the results showing more moisture in the cooked meat from animals sired by Charollais bulls.

The taste panel favored HH over CH meat for juiciness, flavor, and tenderness. HC was favored over CC for juiciness and flavor and also for tenderness in two of the three cuts of meat. Shear tests for tenderness agreed quite well with the taste panel. These comparisons suggest Hereford bulls had a stronger influence than Charollais bulls on juiciness, flavor, and tenderness.

Herefords and Charbrays cannot be compared directly because these straight-bred groups were produced on different ranches; however, on the basis of the indirect comparisons in this study, Herefords tended to mature and fatten sooner, to produce fatter, plumper, more compact carcasses, and to have meat more favored by the taste panel. Charbrays tended to grow faster, to use feed more efficiently, to reach heavier slaughter weights, and to produce heavier, leaner carcasses with less plumpness and compactness.

Floyd D. Carroll and Wade C. Rollins are Professors in the Department of Animal Husbandry and Animal Husbandmen in the Experiment Station, University of California, Davis.

Steer calf no. 500, Charollais bull x Charbray cow

