

# Feedlot Performance and Carcass Merit of Progeny of Hereford, Hereford x Holstein and Holstein Cows

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## Story in Brief

The effects of breed of dam on postweaning feedlot performance and carcass merit of 217 steer and heifer calves from four- and five-year-old Hereford, Hereford x Holstein, and Holstein cows was determined. Calves were all sired by Charolais bulls, and were produced in two successive years. Each year calves that had been raised to weaning on range were group-fed while calves that had been reared in drylot were individually-fed during the feedlot finishing period.

Holstein progeny was heavier at weaning (121 lb.) and at slaughter (229 lb.) than their Hereford contemporaries. Holstein progeny was older at slaughter (64 days), and showed more skeletal height and length both at weaning and at slaughter than Hereford progeny. Crossbred progeny was intermediate with respect to these traits.

As percent Holstein breeding increased, there was a trend toward increased daily and total feed intake, and in feed required per pound of gain.

Holstein progeny produced carcasses which were 81 pounds heavier than crossbred, and 154 pounds heavier than Hereford progeny. Superior muscling of Hereford progeny was indicated by larger rib-eye-area per 100 pounds of carcass weight, and a slight tendency toward higher cutabilities. Conformation scores tended to be lower for Holstein progeny when compared to Hereford or crossbred progeny. Marbling scores and carcass grades of Holstein progeny were as high or higher than those for Hereford and crossbred progeny.

## Introduction

Previous research has shown that weaning weights can be greatly improved by increasing the milk production of beef cows. The fastest method of increasing milk production in a beef herd is by adding dairy breeding to the herd. However, heavier weaning weights produced by cows with a percentage of dairy breeding will probably influence both the feedlot performance and carcass merit in the feedlot.

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The purpose of this experiment was to compare the feedlot performance and carcass merit of calves with 0, 25 and 50 percent Holstein breeding when fed to approximately the same grade.

## Experimental Procedure

Feedlot performance and carcass characteristics of 217 calves with 0, 25 or 50 percent Holstein breeding were determined. Calves were from four- and five-year-old Hereford, Hereford x Holstein (crossbred), and Holstein dams (calving for the third and fourth time) sired by Charolais bulls, and produced in two successive years.

Cows and calves were maintained either on tallgrass native range (154 calves) or confined in drylot (63 calves) from birth to weaning. Treatments consisted of two levels of winter supplement (moderate and high) fed to cows of each breed on range and in drylot. An additional supplement level (very high) was fed to a group of Holstein cows and resulted in calves produced by cows of seven breed-supplement combinations.

Allotment to drylot was made on the basis of calf sex so that a ratio of three males:two females was established within each breed-treatment combination each year. Calves were born in December, January, and February, and weaned at  $240 \pm 7$  days. Drylot calves were creep-fed while range calves received only grazed forage.

At weaning, calves were fasted for six hours, weighed, photographed, and vaccinated for blackleg, parainfluenza-3, and infectious bovine rhinotracheitis. Calves were placed directly into the feedlot at weaning.

Skeletal size was estimated from either 20.3 x 25.4 cm. photographs or 5.1 x 5.1 cm. slides taken with each calf behind a grid at weaning, and prior to slaughter. Height was defined as the distance from hip (tuber coxae) to the floor, and length as the horizontal distance from the point of the shoulder (dorsal anterior humerus) to hip. The hip and point of shoulder were marked with contrasting chalk prior to photographing to facilitate more accurate measurements.

Calves from drylot cows were individually-fed *ad libitum* in box stalls from four pm to eight am and placed as a group in an outside loafing area for the remainder of the day. Calves from range cows were group-fed *ad libitum* in a bar with a covered feeding area and an outside loafing area.

Group-fed calves received a 75 percent concentrate ration consisting (percent): ground corn, 60.2; cottonseed hulls, 15.0; ground alfalfa, 10.0; cottonseed meal, 8.0; molasses, 5.0; urea, 1.0; salt, 0.3; minerals and Vitamin A.

Individually fed calves were fed a 92 percent concentrate ration consisting of (percent); whole corn, 87.0, cottonseed hulls, 5.0; and a pelleted supplement containing (percent) cottonseed meal, 3.5; soybean meal, 50.0; urea, 10.0; wheat midds, 3.5; salt, Vitamin A, minerals, and chlortetracycline.

Each calf was fed to an estimated quality grade of low choice based on visual estimation of apparent fatness. Final weights and photographs were taken after a 12 hour fast.

Group-fed calves were slaughtered in a commercial packing plant and chilled for 72 hours before quality grade; marbling score; maturity; conformation score; and kidney, heart and pelvic (KHP) fat were estimated by a U.S.D.A. grader. Individually-fed calves were slaughtered at the Oklahoma State University Meat Laboratory, and were evaluated in the carcass by a staff member. Rib eye area (REA), and back fat thickness were measured from a tracing at the 12th-13th rib separation on each carcass. Carcass grades were based on the Official U.S. Standards for Grades of Carcass Beef (1973).

## Results and Discussion

### Feedlot Performance

Feedlot performance of group-fed and individually-fed calves is summarized in Tables 1 and 2, respectively. Since previous level of supplement of the dams did not influence feedlot performance or carcass traits of the calves, the results are shown by breed only. As the percentage of Holstein breeding increased, initial weight (weaning weight) increased among both group and individually-fed calves. Crossbred progeny (calves from crossbred dams), and Holstein progeny (calves from Holstein cows) averaged 66 and 121 pounds heavier initial weights than Hereford progeny (calves from Hereford dams). Heavier initial weights were a reflection of the higher preweaning milk intakes, and larger mature size as Holstein breeding increased.

**Table 1. Effect of breed of dam on feedlot performance of group-fed calves sired by Charolais bulls, average of two years**

Item	Breed of dam		
	Hereford	Hereford x Holstein	Holstein
Initial wt, lb.	568	629	689
Slaughter wt, lb.	10001	1089	1210
Age at slaughter, days	432	449	476
Days fed	192	209	236
Daily gain, lb.	2.31	2.22	2.27
Daily feed intake, lb.	19.6	20.5	24.2
Total feed intake, lb.	3747	4257	5702
Lbs. feed/lb. gain	8.45	9.17	10.66
Skeletal size			
Initial height, in.	39.5	41.3	43.3
Initial length, in.	28.0	28.5	29.3
Slaughter height, in.	46.7	47.3	49.6
Slaughter length, in.	32.6	33.7	36.8

**Table 2. Effect of breed of dam on feedlot performance of individually-fed calves sired by Charolais bulls, average of two years**

Item	Breed of dam		
	Hereford	Hereford x Holstein	Holstein
Initial wt.	561	629	682
Slaughter wt.	981	1107	1228
Age at slaughter, days	402	460	486
Days fed	162	220	246
Daily gain	2.64	2.20	2.24
Daily feed intake	17.8	18.0	20.0
Total feed intake	2906	3945	4910
Lbs. feed/lb gain	6.88	8.26	9.04
Skeletal size			
Initial height	40.8	42.3	43.6
Initial length	26.6	27.3	28.9
Slaughter height	44.4	46.9	49.2
Slaughter length	32.0	32.8	34.3

Slaughter weight trends were similar to those for initial weight. As percentage of Holstein breeding increased, slaughter weight increased among both group- and individually-fed calves. Crossbred and Holstein progeny was 108 and 229 pounds heavier at slaughter than Herefords. The heavier slaughter weights seen in this experiment reflect increased age at slaughter, and longer feeding period as Holstein breeding increased.

As the percentage of Holstein breeding increased, the number of days on feed required to reach the estimated low choice carcass grade increased. Since all calves were placed on feed at  $240 \pm 7$  days, longer feeding period resulted in comparable increases in age at slaughter.

Among group-fed calves, breed of dam had little effect on average daily gain. However, among individually-fed calves Hereford progeny gained 0.44 and 1.40 pounds daily faster than those of crossbred or Holstein dams. These results differ from some experiments where faster gains were seen for straight-bred Holsteins than for Herefords when fed to an equal weight or time basis. Growth trials based on equal time or weight end-points favor later maturing Holsteins over the smaller, earlier maturing Herefords. In experiments reported in this paper calves were fed from an equal initial age to a similar degree of fatness at slaughter.

Among group-fed calves, there was a trend toward increased feed intake (daily and total), and poorer feed efficiency (more feed/gain) as Holstein breeding increased. Among individually-fed calves, Holstein progeny consumed 2.2 and 2.0 pounds more feed daily than Hereford and crossbred progeny. Daily feed intake was similar for Hereford and crossbred progeny. Total feed consumed during the feeding period increased as Holstein breeding

increased. Feed required per pound of gain among individually-fed calves decreased with each percentage increase in Holstein breeding.

Initial skeletal measurements (at weaning) indicated that Holstein progeny were taller and longer than Hereford progeny. Crossbred progeny was intermediate in height and length between Hereford and Holstein progeny.

### Carcass traits

Carcass traits of group-fed and individually-fed calves are summarized in Tables 3 and 4, respectively. Carcass weight increased with each percentage increase of Holstein breeding. Crossbred and Holstein progeny produced carcasses 73 and 154 pounds heavier than those of Hereford progeny. These observations are consistent with previous research at Oklahoma State University, and are a reflection of the larger mature size and longer feeding period as Holstein breeding increased. Carcass weight per day of age tended to increase as Holstein breeding increased.

Group-fed Holstein and crossbred progeny produced carcasses with 0.8 and 0.67 in<sup>2</sup> larger REAs than Herefords with a similar trend evident among individually fed calves. The superiority of Hereford progeny for muscling was apparent when REA was expressed per 100 pounds of carcass weight. On this basis, REA/100 pounds of carcass weight decreased with each increment of increased Holstein breeding.

External fatness was one of the criteria used to estimate carcass grade of the live animal, and subsequently determine the time of slaughter. Therefore, some control was exercised over fat thickness in the carcass. Among group-fed calves, fat thickness did not differ due to breed of dam. However, among individually-fed calves, crossbred progeny tended to be fatter than Hereford or Holstein progeny.

**Table 3. Effect of breed of dam on carcass traits of group-fed calves sired by Charolais bulls, average of two years**

Item	Breed of dam		
	Hereford	Hereford x Holstein	Holstein
Hot carcass wt.	618	678	768
Carcass wt/day of age	1.45	1.52	1.61
Rib eye area	11.8	12.5	12.6
REA/100 lb carcass, in. <sup>2</sup>	1.92	1.85	1.64
Fat thickness	.70	.70	.68
KHP fat <sup>a</sup>	3.42	3.15	3.27
Cutability, %	48.8	48.7	48.1
Conformation score <sup>b</sup>	11.5	11.0	10.6
Marbling score <sup>c</sup>	12.2	12.5	14.3
Carcass grade <sup>b</sup>	8.9	9.1	9.7

<sup>a</sup>Kidney, heart and pelvic fat.

<sup>b</sup>9 = high good, 10 = low choice, 11 = average choice.

<sup>c</sup>12 = slight +, 13 = small -, 14 = small, 15 = small +

**Table 4. Effect of breed of dam on carcass traits of individually-fed calves sired by Charolais bulls, average of two years**

Item	Breed of dam		
	Hereford	Hereford x Holstein	Holstein
Hot carcass wt.	603	693	761
Carcass wt/day of age	1.49	1.52	12.4
Rib eye area	12.0	12.7	12.4
REA/100 lb carcass, in <sup>2</sup>	2.0	1.84	1.63
Fat thickness	.55	.70	.60
KHP fat <sup>a</sup> , %	3.14	3.32	3.64
Cutability, %	49.8	48.5	47.8
Conformation score <sup>b</sup>	10.9	10.4	9.3
Marbling score <sup>c</sup>	14.6	14.5	14.4
Carcass grade <sup>b</sup>	10..1	10.1	10.1

<sup>a</sup>Kidney, heart and pelvic fat.  
<sup>b</sup>9 = high good, 10 = low choice, 11 = average choice.  
<sup>c</sup> = slight +, 13 = small -, 14 = small, 15 = small +

Kidney, heart, and pelvic fat did not show a consistent trend due to breed of dam. Among group-fed calves, Hereford progeny had a lower percentage of KHP fat than crossbred progeny with Holsteins intermediate. Among individually fed calves, Hereford progeny were intermediate. Cutability tended to increase as percentage of Holstein breeding increased.

Conformation score tended to decrease as Holstein breeding increased. Group-fed Hereford progeny had higher conformation scores than Holstein progeny with crossbreds being intermediate. Among individually fed-calves, Hereford and crossbred progeny had higher conformation scores than Herefords. Among group-fed calves, Holstein progeny was higher in marbling score and carcass grade than Hereford or crossbred progeny. Marbling score and carcass grade was not affected by breed of dam among individually-fed calves.

These results suggest that longer feeding periods and decreased feed efficiency may adversely affect the profitability of feeding calves with high percentages of Holstein breeding compared to beef breeds when fed to an equal carcass grade. Calves of 25 or 50 percent Holstein breeding will yield carcasses of comparable quality to beef calves when fed to an equivalent quality grade. However, Holstein crossbred progeny will produce larger carcasses which may be difficult to merchandise.