Effects of Sorting Steer Calves on Feedlot Performance and Carcass Value

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Summary

Three groups of steer calves totaling 480 head were sorted into smaller and larger frame sizes, and those groups were sorted into groups with more and less backfat. There was no difference in age among the four sorted groups. The larger steers and steers with less fat had faster rates of gain and tended to have superior feed efficiencies. Steers with more initial fat were fed fewer days. The larger framed steers and steers with less fat had heavier carcasses, less carcass backfat, more yield grade 1 carcasses and a lower percentage of Choice carcasses, but they also had greater value per carcass when evaluated using a grid paying premiums for quality and yield grades. The greatest profit to the feedyard was realized from the smaller framed steers and those with less initial backfat. For similar profit it was calculated that the larger steers should have been discounted as feeders $3.50 per hundred compared with the smaller steers and the steers with more fat discounted $5.00 per hundred compared with those having less initial fat. The results of this study suggest that sorting based on initial fat thickness may have more potential for enhancing the value of finished cattle than sorting based on frame score.

Introduction

Marketing finished beef based on carcass value rather than as a commodity will require cattle feeders to improve uniformity of cattle within loads in order to optimize the value of the cattle in a given grid. Quality grades, yield grades and weight determine carcass value. Some grids emphasize quality grade and others place more emphasis on yield grade to establish carcass value. The objective of this study was to determine if sorting feeder calves at weaning affected their net worth when finished.

Materials and Methods

Data from 80 pens of steers (six per pen) with known birthdays fed as three separate groups were used in this analysis. Three hundred Angus spring-born steers were purchased each fall for two years from one ranch. The calves were given the first immunizations at the ranch prior to shipping but were not weaned or creep fed. The average weights, days of age and frame scores (calculated from hip height and age) were 668 & 530 lbs, 287 & 254 days and 5.4 & 4.8 for the two respective years when the calves were started on the finishing rations. These calves received booster immunizations after arrival at the experimental farm and were fed a ration containing 50% grain for about three weeks prior to starting on experiment and to being fed the finishing ration. The third group of calves purchased from another ranch was weaned at 160 days, immunized and started on feed for 30 days prior to purchase. Average weight, days of age and frame score at the beginning of feeding were 385 lbs, 192 days and 3.9. The third group of calves was stepped up to a ration containing 49 Mcal NEg/cwt at the ranch, was started on a ration containing 55 Mcal NEg/cwt at the experimental farm, and then was stepped up to 65 Mcal NEg/cwt with three rations over 119 days. All the calves were fed corn-based finishing rations containing about 65 Mcal NEg/cwt of dry matter during the finishing period. The three respective groups of steers were fed 182, 184 and 196 days.

Shortly after receiving the calves at the experimental farm, each calf was weighed, measured for hip height with a calibrated tape measure fastened in the tip of the restraining chute, and measured for thickness of backfat and area of ribeye with ultrasound between the 12th and 13th ribs. Frame score was calculated from days of age and hip height using the Beef Improvement Federation equation.

All the calves were implanted with Synovex S or Component E-S at the beginning of the feeding period and reimplanted with Revalor S or Component TE-S about 100 days later

Each group of steers was sold in two groups to commercial beef packers to facilitate collection of carcass data. Weights of hot carcasses were taken after slaughter, and measurements of the carcasses were obtained after a 24-hr postmortem chill. The federal graders in the plant called marbling score, percentage of kidney, pelvic and heart fat (KPH) and yield grades. Ribeye area and fat thickness over the muscle between the 12th and 13th ribs on the left side of each carcass were measured. Yield grade of each carcass was calculated from carcass measurements using the standard yield grade equation. Individual carcass value was established by the following grid: Choice YG 3, $116 /cwt carcass; Select, -$7; Certified Angus Beef, +$2; YG 2 (Choice and Select), +$2.50; YG 1 (Choice and Select), +$6.50; YG 4, -$10; and Standard, –$13.

Results and Discussion

Sorting based on frame score or thickness of initial backfat was not related to age of the calves (Table 1). After the calves were sorted the difference in frame score was visibly obvious, but the difference in fat thickness was not apparent. Larger framed calves had larger initial ribeyes, and greater initial and final weights. They also gained faster and consumed more feed. The smaller framed steers tended to have superior feed conversion. Initial thickness of backfat and days fed were similar for the two frame sizes. Calves with more initial thickness of backfat were fed fewer days and tended to have larger initial ribeye area and slower gain. There were no significant interactions of intitial thickness of backfat and frame score for any of the parameters measured.

Carcasses from larger framed steers tended to have less backfat, were heavier, had larger ribeye areas and had greater value (Table 2). The greater carcass value was primarily the result of heavier carcasses rather than greater premiums for quality or yield grades. There were about 7% more Select or Standard grading carcasses, 5% more yield grade 1 carcasses and 12% fewer yield grade 2 carcasses in the larger framed steers. Carcasses from calves having more initial backfat had thicker backfat when finished. The fatter calves produced 5% more Choice and 5% fewer Select and Standard carcasses. There were 14% fewer yield grades 1 and 2 carcasses, 11% more yield grade 3 carcasses and 4% more yield grade 4 carcasses from the steers with more initial fat. Average carcass value from the steers with less initial fat was due primarily to more premiums for yield grades 1 and 2 and fewer discounts for yield grade 4. Again there were no significant interactions of intitial thickness of backfat and frame score for any of the carcass parameters measured.

In this comparison of sorting calves within herds, sorting steers into a group with larger frame size produced finished steers of heavier weights with the decrease in quality grade tending to be offset by the improvement in yield grade in the value-based grid used. Sorting into a group with less fat did not affect carcass weight, but tended to improve yield grade premiums more than decreasing quality grade premiums.

Table 1. Effects on feedlot performance of sorting feeder calves based on initial frame score and backfat.

	---Frame[a]---		---Backfat[b]---		----------P[c]----------		
	SF	LF	Less	More	Frame	Backfat	FXBF
Initial hip height, in	42.1	44.0	43.0	43.1	0.001	0.73	0.85
Age, days	238.6	240.0	236.4	242.6	0.84	0.49	0.84
Frame score	4.1	5.0	4.5	4.6	0.001	0.95	0.88
Initial backfat, in	0.080	0.085	0.062	0.103	0.22	0.001	0.72
Initial ribeye area, in^2	6.07	6.68	6.19	6.56	0.01	0.13	0.81
Final hip height, in	49.5	50.9	50.3	50.1	0.001	0.52	0.92
Starting wt, lbs	477.5	542.5	499.2	520.8	.01	0.41	0.78
Final wt, lbs	1157.7	1245.7	1206.4	1197.1	0.001	0.62	0.92
Days fed	190.4	191.2	193.5	188.2	0.71	0.02	0.80
Gain, lbs/d	3.53	3.63	3.62	3.55	0.01	0.10	0.12
Feed intake, lbs DM/d	18.6	19.8	19.2	19.3	0.001	0.68	0.62
Feed/gain	5.29	5.47	5.30	5.45	0.09	0.18	0.59

[a]Frame score calculated from hip height, SF = smaller frame, LF = larger frame.
[b]Backfat measured with ultrasound, L = less, M = more.
[c]P is the probability of statistical difference due to main effects of sorting based on initial frame score and backfat and interaction of frame score and backfat. $P < 0.05$ is statistically significant.

The effects on profit in the feedlot from sorting the steers as calves and selling with the described grid are summarized in Table 3. Because the calves were purchased as three groups, a uniform purchase price of $90 per hundred weight was one profit scenario evaluated. In that comparison the smaller framed steers were $18.26 per head more profitable than the larger steers because the larger framed steers cost more to purchase and feed, even though they produced higher valued carcasses. The calves that had less initial backfat were $25.47 per head more profitable in the feedlot than the fatter steers. This is because they cost less to purchase (lighter initial weight) and produced higher value carcasses even though they cost somewhat more to feed. Discounting the heavier steers $4 per hundred and the fatter calves $2 per hundred as feeders resulted in similar profits for the frame sizes but the steers with less initial fat were still $15.26 per head more profitable. Because the difference in condition between the two fat thickness groups was not apparent it is not likely the calves would be discounted as feeders. Calculations of what the purchase price should be to generate $40 per steer profit in the feedlot are given in Table 3. The larger framed steers should have been discounted $3.50 per hundred compared with the smaller steers. The steers with more initial fat should have been discounted $5.00 per hundred compared with the leaner steers. What can not be determined from this study is what the profitability of these cattle would have been if the larger framed steers had been fed to heavier weights or if the steers with more initial fat had not been fed quite as long.

Table 2. Effects on carcass measurements and value of sorting feeder calves on initial frame score and backfat.

	---Frame[a]---		---Backfat[b]---		----------P[c]----------		
	SF	LF	Less	More	Frame	Backfat	FxBF
Carcass wt, lbs	720.2	775.1	752.1	743.2	0.001	0.53	0.81
Dressing %	62.3	62.3	62.4	62.2	0.91	0.49	0.78
Marbling score[d]	435	425	425	435	0.29	0.25	0.46
% CAB	16.9	14.2	15.3	15.7			
% Low Choice	63.2	59.2	58.9	63.7			
% Select	19.5	25.3	24.5	20.2			
% Standard	0.4	1.3	1.2	0.4			
% YG 1	5.6	11.2	12.0	4.5			
% YG 2	55.1	42.9	52.5	45.7			
% YG 3	36.3	41.2	33.5	44.8			
% YG 4	3.0	4.7	2.1	5.8			
Backfat, in	0.46	0.43	0.40	0.49	0.13	0.001	0.48
Ribeye area, in^2	12.4	12.9	12.7	12.6	0.001	0.79	0.24
Calculated Yield grade	3.11	3.14	3.08	3.17	0.75	0.20	0.61
Carcass value[e], $/hd	834.49	894.66	871.52	857.63	0.001	0.41	0.76

[a]Frame score calculated from hip height, SF = smaller frame, LF = larger frame.
[b]Backfat measured with ultrasound, L = less, M = more.
[c]P is the probability of statistical difference due to main effects of sorting based on initial frame score and backfat and interaction of frame score and backfat. $P < 0.05$ is statistically significant.
[d]300 = slight^0, 400 = small^0, 500 = modest^0, 600 = Moderate^0.
[e]Grid was ($/cwt carcass): Choice YG 3, $116; Select, -$7; Certified Angus Beef, +$2; YG 2 (Choice and Select), +$2.50; YG 1 (Choice and Select), +$6.50; YG 4, $-10; and Standard, –$13.

Table 3. Effects on feedlot profit of sorting feeder calves based on initial frame score and backfat.

	---Frame[a]---		---Backfat[b]---	
	SF	LF	Less	More
Feed cost[c], $/hd	288.20	307.88	301.13	294.87
Nonfeed cost[d], $/hd	70.13	70.38	71.05	69.45
Profit[e], $/hd	46.41	28.15	50.06	24.59
Profit[f], $/hd	36.86	39.00	45.06	29.80
Purchase cost for $40/hd profit, $/cwt as feeders	91.34	87.82	92.02	87.04

[a]Frame score calculated from hip height, SF = smaller frame, LF = larger frame.
[b]Backfat measured with ultrasound, L = less, M = more.
[c]Feed cost of $110/ton @ 80% dry matter and $20/ton markup or $0.08125/lb of dry matter.
[d]Nonfeed costs of $0.30 per head/day, $3/hd implant cost and $10/hd processing cost.
[e]Purchase price of calves as feeders was $90/cwt.
[f]Purchase price of calves as feeders was $92/cwt for SF, $88/cwt for LF, $91/cwt for those with less fat and $89/cwt for those with more fat.

It is concluded that sorting young feeder cattle based on backfat measurement may have potential benefits for optimizing market value when the cattle are finished. In this study marketing the steers with more initial fat in a grid with greater emphasis on quality grade and less on yield grade would have improved their relative value.

Implications

Sorting groups of calves as feeders into two frame size groups and then sorting into steers with less and more initial backfat resulted in larger frame steers gaining more and producing heavier carcasses with more value. The calves with more initial fat resulted in finished steers with fatter carcasses with less value. Practical application of these results will require development of mathematical prediction equations to categorize cattle based on these initial measurements.

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