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Sorting Strategies for Yearlings

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Sorting yearling cattle may reduce variation in carcass weights but does not increase carcass weight or profitability.

Summary

One hundred sixty medium-framed English-cross steers were used in each year of a two-year study to determine effects of three sorting strategies on performance, carcass characteristics and profitability in an extensive beef production system. Sorting by weight before the grazing period or entering the feedlot decreased variation in carcass weight. Sorting by weight before the grazing period increased marbling scores and resulted in significantly higher premiums. However, no sorting strategy significantly increased carcass weight or improved profitability.

Introduction

As the beef industry continues to move from a commodity-based marketing system to a value-based system, efforts are under way to find methods to reduce variability in carcass characteristics and

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improve consumer satisfaction. Also, economists have suggested that carcass weight is an important factor of profitability in beef productions systems (*2002 Nebraska Beef Report,* pp. 39-41). Therefore, adding carcass weight is also important to producers. Sorting methods have shown promise in accomplishing these goals by feeding cattle more closely to their ideal market endpoint. Marketing individuals that otherwise would be overweight or overfat early and feeding individuals that otherwise would be underfat longer should avoid discounts for overweight and overfat carcasses while marketing more total pounds of carcass weight. However, many of the data available do not compare the tested sorting strategy to an unsorted control.

The objective of this research was to test possible sorting strategies in a production system extensively using forage to produce long yearlings. A long yearling can be defined as a beef animal who was weaned and has gone through a period of backgrounding in the winter and grazing in the summer prior to entering the feedlot Analysis of previous data suggests logical sorting times for this type of production system include sorting at beginning of the grazing period, at the beginning of the feeding period, and at the end of the feeding period (*2002 Nebraska Beef Report,* pp. 36-39). The hypothesis for this research was that sorting would increase carcass weight, reduce variation in carcass weight and carcass fat thickness, reduce discounts received for overweight and overfat carcasses and improve profitability.

Procedure

One hundred sixty medium-framed English-cross steers (537 lb) were used in each year of a two-year study conducted from November 1999 to December 2001 to determine effects of three sorting strategies on performance, carcass characteristics, variation in weight and profitability. A preliminary analysis of the first year's results were reported previously (*2002 Nebraska Beef Report,* pp. 36-39). This report includes compete analysis of both years of the trial. Treatments were: 1) 40 head sorted by weight prior to the grazing period (PASTURE), 2) 40 head sorted by weight entering the feedlot (FEEDLOT), 3) 60 head sorted by weight and 12th rib fat thickness at the end of the feeding period (PEN), and 4) 20 head that were not sorted and served as a control (CON). Each treatment consisted of two replicates. Each replicate in the PASTURE and FEEDLOT treatments were sorted into heavy and light halves. The light half of each replicate was marketed together and the heavy half of each replicate was marketed together. Cattle in the PEN treatment were marketed as individuals from their pens, whereas the CON were marketed together at one time.

Winter Period

Steers grazed corn residue from Nov. 30 to Feb. 8 in year 1 and from Nov. 28 to Feb 14 in year 2. Following removal from corn residue, they were fed ammoniated wheat straw ad-libitum in a dry lot until April 21 and 20 in years 1 and 2, respectively. A mineral supplement was provided. Steers were supplemented with 5 lb per head per day of wet corn gluten feed (DM basis) for the entire winter period

Summer Period

On April 21 and 20 for year 1 and 2, respectively, cattle were implanted with Revlor-G® and placed on smooth bromegrass pastures near Mead, Neb. until May 15 in year 1 (25 days) and May 19 in year 2 (28 days). They were then fly tagged and transported to native warm-season pastures near Ainsworth, Neb. The heavy half of the PASTURE treatment was removed from grass approximately half way through the grazing season [July 4 (50 days) and 3 (45 days) for year 1 and 2, respectively]. The remaining cattle were removed from native range on Aug. 18 in year 1 (95 days) and Aug. 29 in year 2 (102 days). In year 1, cattle returned to smooth bromegrass pastures to graze regrowth until Sept. 13 (26 days). In year 2, conditions did not allow for grazing of smooth bromegrass regrowth so cattle were placed directly into the feedlot. In year 1 the light half of the pasture sort was on grass for 75 days while the remaining cattle were on grass for 146 days. In year 2, the light half of the pasture sort was on grass for 73 days while the remaining cattle were on grass for 130 days. While grazing, steers were managed as one group and every effort was made to rotate cattle so forage never became limiting to steer performance.

Finishing Period

Upon entry into the feedlot, all steers were implanted with Revlor-S® and placed into pens. All cattle were in 10-head pens except for the PEN treatment which had 30 head per pen. Steers were stepped up on feed in 21 days using four step-up diets containing 45, 35, 25 and 15% roughage fed for 3, 4, 7 and 7 days, respectively. The final diet contained 7% roughage and was formulated to contain 12% CP, 0.7% Ca, 0.35% P, 0.6% K, 30 g/ton monensin and 10 g/ton tylosin (DM basis). The finishing diet contained 40% wet corn gluten feed, 48% high moisture corn, 7% alfalfa and 5% supplement. Initial weights for the winter, summer and finishing periods were an average of two weights taken on consecutive days following a four-day limit feeding at 2% of the average estimated BW. The limit fed diet consisted of 47.5% wet corn gluten feed, 47.5% alfalfa hay and 5% supplement. This was done to equalize gut fill so that weights taken were a true reflection of relative differences in weight rather than differences in gut fill.

Each treatment had an individual marketing strategy based on fat thickness or a combination of fat thickness and weight. Ultrasound was used to estimate fat thickness. The PASTURE treatment was marketed in two groups (light and heavy halves at the initiation of grazing) when the average of each group averaged 0.45 in 12th rib fat thickness. The FEEDLOT treatment also was marketed in two groups (light and heavy halves at entry to the feedlot). The light half was marketed when the group averaged 0.50 in 12th rib fat thickness to allow them to gain additional carcass weight. The heavy half was marketed when the group averaged 0.40 in 12th rib fat thickness to avoid overweight car-

Table 1. Performance data.

	Treatment[a]				
Item	Control	Pasture	Feedlot	Pen	SEM
Winter					
Days	143	143	143	143	—
Initial weight, lb	537	537	540	535	13
Daily gain, lb	1.41	1.41	1.43	1.47	0.29
Summer					
Days	138	106	138	138	—
Initial weight, lb	740	740	744	747	29
Daily gain, lb	1.67	1.76	1.72	1.74	0.04
Finishing					
Days	82	99	90	86	—
Initial weight, lb	973[b]	927[c]	982[b]	985[b]	22
Daily gain, lb	4.73[b]	4.38[c]	4.58[b]	4.63[b]	0.11
Dry matter intake, lb	31.3[b]	29.1[c]	30.8[b]	30.8[b]	0.22
Feed/gain	6.62	6.64	6.72	6.65	0.17

[a]Treatments: control=no sorting, pasture=sorted based on weight going to grass, feedlot=sorted based on weight entering the feedlot, pen=sorted by weight and fat thickness at the end of the feeding period.
[bc]Means within row with unlike superscripts differ ($P < 0.05$).

Table 2. Carcass, economic, and variance data.

	Treatment[a]				
Item	Control	Pasture	Feedlot	Pen	SEM
Carcass data					
Weight, lb	852	848	870	863	11
Yield grade	2.60[bc]	2.65[b]	2.48[cd]	2.43[d]	0.08
12th rib fat, in.	0.457	0.460	0.457	0.444	0.012
Marbling score[e]	495[f]	539[g]	502[f]	509[f]	7.93
% overweight	8.00	0.00	5.00	8.00	4.00
Economic analysis					
Break even, $/cwt	66.31	67.12	65.92	66.41	1.60
Premium/discount, $/cwt	-0.28[f]	2.75[g]	0.05[f]	-0.01[f]	0.64
Profit/loss, $/head	28.01	37.31	36.22	28.08	22.66
Standard deviation[h]					
Winter initial weight, lb	55	46	48	48	2
Summer initial weight, lb	70	62	62	62	2
Feedlot initial weight, lb	70[b]	37[c]	62[d]	66[bd]	2
Carcass weight, lb	55[f]	42[g]	46[g]	59[f]	0.03
Fat thickness, in.	0.075	0.118	0.122	0.091	0.520

[a]Treatments: control=no sorting, pasture=sorted based on weight going to grass, feedlot=sorted based on weight entering the feedlot, pen=sorted by weight and fat thickness at the end of the feeding period.
[bcd]Means within row with unlike superscripts differ ($P < 0.05$).
[e]Marbling score: 400 = slight 0; 450 = slight 50; 500 = small 0; 550 = small 50; etc.
[fg]Means within row with unlike superscripts differ ($P < 0.05$).
[h]Statistical analysis and SEM based on log base 10 of standard deviation.

casses. The average market fatness of the FEEDLOT treatment was intended to be 0.45 in 12th rib fat thickness. The PEN treatment was marketed as individuals in four kill dates in year 1 and five kill dates in year 2. Back fat thickness was measured by ultrasound and weights were taken every two weeks once the cattle were on feed for approximately 50 days. Cattle were marketed when they reached about 0.45 in 12th rib fat thickness or 1500 lb shrunk body weight (4% shrink). As estimated marketing time neared, ultrasound was also used to determine fat thickness of cattle in other treatments but was not collected at regular intervals as was the case with the PEN treatment.

Economic Analysis

Profit was calculated by selling the cattle on the rail in a value-based market that rewards high marbling cattle. The grid used is based on the work of Feuz (*2002 Nebraska Beef Report,* pp. 39-41). The grid was changed so that premiums and discounts received for marbling were based on marbling scores rather than percentage choice, because of small and varying numbers of cattle in each replicate. A few differences in individuals grading choice can have large impacts on the percentage choice of the replicate. Thus using the average marbling score for each replicate is a more realistic comparison. Premiums and discounts for marbling were based on the choice/select spread for the months of October ($9.19/cwt), November ($9.80/cwt) and December ($8.00/cwt) from 1992-2002. The actual choice/select spread for each replicate was calculated using a weighted average based on the number of cattle marketed in each of the three months. A marbling score of small^{00} received no premium or discount. Premiums and discounts were calculated by multiplying the choice/select spread by 100 units above or below small^{00} (premiums for marbling scores above small^{00} and discounts for marbling scores below small^{00}). The base price used was the average Nebraska dressed fed cattle price for October ($107.43/cwt), November ($109.57/cwt), and December ($109.58/cwt) from 1992-2001. Actual base price paid for each replicate was calculated using a weighted average of the number of cattle sold in each of the three months for each replicate. No treatments were charged for the use of ultrasound.

Results

Performance data are shown in Table 1. Treatments performed similarly during the winter and summer periods. However, because the PASTURE treatment grazed fewer days, cattle on this treatment were lighter entering the feedlot. While on feed, the PASTURE treatment consumed less feed and exhibited reduced ADG compared to other treatments. The reduction in gain is likely due to intake, since they exhibited feed conversions similar to other treatments. The reduced intake may be related to the PASTURE treatment cattle entering the feedlot at lighter weights, or that they entered the feedlot in early July and endured warmer temperatures for a longer period of time compared to other treatments.

Carcass data are shown in Table 2. All treatments were successfully marketed at similar fat depths. There were

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no significant differences in carcass weight. This was unexpected since increasing carcass weight was a main objective of the trial. The PEN treatment resulted in a reduction of USDA called yield grades indicating that this sorting strategy may reduce excess fat. The PASTURE treatment had significantly higher marbling scores compared to other treatments. This is presumably due to half the cattle on PASTURE being on feed for more days. There were no statistical differences in percentage of overweight cattle in any treatment. However, the PASTURE treatment was the only sorting strategy that successfully avoided any overweight carcasses.

Results of the economic analysis are also shown in Table 2. There were no differences in break-even costs for any treatments. The PASTURE treatment had significantly higher premiums compared to other treatments. This is related to the increased marbling scores of this treatment. There were no differences in profitability for any of the treatments. This was also unexpected but is not surprising considering there were no differences in carcass weight. Producers who want to sort cattle should use caution to not implement a sorting strategy that adds cost, because there is no opportunity to recapture the expense.

Table 2 also provides data on the variation in weight and carcass fat thickness among treatments. There were no differences in variability in weight among treatments until cattle entered the feedlot. Upon entry into the feedlot, the PASTURE treatments had significantly less variation in weight compared to other treatments, resulting in reduced variation in carcass weight. The FEEDLOT treatment also had reduced variability in carcass weight suggesting that these two sorting strategies may result in more uniform carcass weights. There were no differences in variation in carcass measured fat thickness. It was expected that the PEN treatment might have the best chance of reducing variability in carcass fat thickness, since cattle were measured individually. This was not the case, possibly because fat thickness and weight were used as sorting criteria. These results may differ if fat thickness was the only sorting criteria used.

Producers considering a sorting strategy should have specific goals in mind when implementing sorting techniques. None of the strategies investigated improved profitability. To reduce variability in carcass weight, producers may consider sorting cattle by weight upon entry into the feedlot, because it can be implemented easily into most feedlots at little to no cost. Producers using a long yearling production system wanting to increase marbling scores and reduce variability in carcass weight may consider sorting the cattle by weight before the grazing period begins and then removing the heavy cattle mid-way through the grazing season. This strategy can also be implemented with low input costs and may allow for more options in range management.

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