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Sorting Strategies for Yearlings

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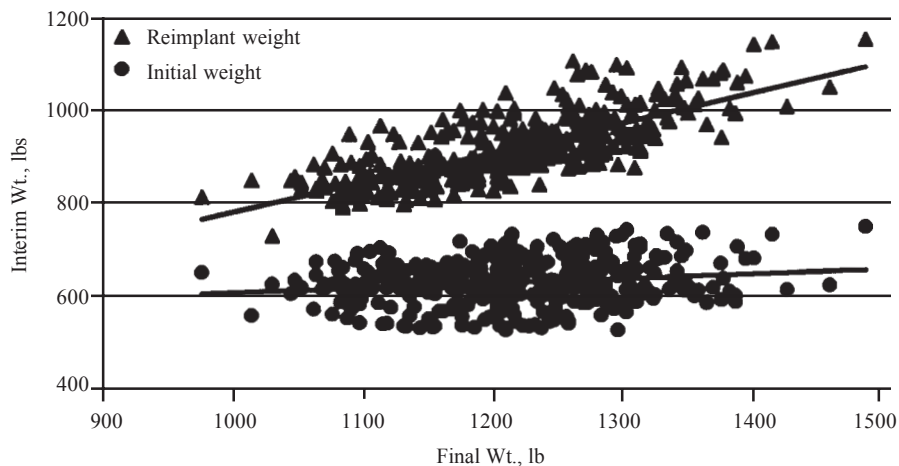


Figure 4. Relationship of initial weight and reimplant weight to final weight for calf-fed research trials (~350 head).

rate, but individuals do not. This may be due to actual variation in individual fattening rate, or because the ultrasound scans did not precisely detect small differences in fatness. Also, the variation in AFR is large. Therefore, using a constant fattening rate for a group of cattle may be appropriate, assigning a constant rate of fattening for individuals is probably not. The poor relationship of fattening rate from one period to another suggests that future fattening rates for an individual cannot be predicted by taking two ultrasound measurements and calculating a fattening rate for an individual. Thus sorting systems that predict

fattening rate or relative differences in fatness at a future time likely will realize poor success in identifying animals for different marketing groups based on fatness. Rates of weight gain and fat accretion respond similarly over the feeding period, although unrelated to one another ($r = -0.08$ to 0.08). We suggest that both may be related to dry matter intake.

Data Set 3

The results of the analysis of Data set 3 are presented in Figure 4. For calf-fed steers, the relationship of weight to final

weight greatly improves at reimplant time ($r = 0.76$) compared to the relationship to final weight at the time they enter the feedlot ($r = 0.18$). Calf-fed steers are normally reimplemented 90 to 120 days prior to slaughter. The preceding relationships suggest while sorting calf-feds by weight upon entry into the feedlot will probably realize limited success in identifying relative differences in carcass weight, sorting at reimplant time shows promise. Cooper et al. (1999 *Nebraska Beef Report*, pp. 57-59) reported correlation coefficients for weights at reimplant time vs. carcass weight ranging from 0.46 to 0.86. These data agree with those findings and suggest that sorting by weight at reimplant time may be a viable option for producers feeding calves.

These data reaffirm that measuring live body weight is a powerful tool for producers to predict relative differences in carcass weight. While accuracy in predicting these differences is generally increased by delaying sorting until late in the feeding period, producers should realize success by sorting yearlings upon entry into the feedlot and sorting calf-feds at reimplant time.

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Sorting Strategies for Yearlings

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

improve consumer satisfaction. Also, economists have suggested that carcass weight is an important factor of profitability in beef production 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 complete 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.

Item	Treatment ^a				SEM
	Control	Pasture	Feedlot	Pen	
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

^aTreatments: 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.

^{b,c}Means within row with unlike superscripts differ ($P < 0.05$).

Table 2. Carcass, economic, and variance data.

Item	Treatment ^a				SEM
	Control	Pasture	Feedlot	Pen	
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
12 th 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

^aTreatments: 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 ($P < 0.05$).

^eMarbling score: 400 = slight 0; 450 = slight 50; 500 = small 0; 550 = small 50; etc.

^{f,g}Means within row with unlike superscripts differ ($P < 0.05$).

^hStatistical 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 small⁰⁰ received no premium or discount. Premiums and discounts were calculated by multiplying the choice/select spread by 100 units above or below small⁰⁰ (premiums for marbling scores above small⁰⁰ and discounts for marbling scores below small⁰⁰). 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 dif-

ferences 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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Carcass and Palatability Characteristics of Calf-fed and Yearling Finished Steers

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Steers finished as yearlings produce less tender beef than calf-fed steers. However, fewer "tough" steaks occurred with extended aging times.

Summary

Steers finished in two management systems were used to compare carcass and palatability characteristics. Calves (n=34) were finished on a high concentrate diet for 203 days. Yearlings (n=42) grazed forages followed by 93 days on a high concentrate diet. Calves had

higher marbling scores, lower shear force values and higher sensory ratings for tenderness, flavor and overall acceptability. Compared at equal marbling scores, calves had lower shear force values and higher sensory ratings for tenderness and overall acceptability. The risk of steaks being classified as "tough" was higher in yearlings, but relatively low, especially at extended aging times.

Introduction

An intensive method of finishing cattle consists of calves entering a feedlot post-weaning, where cattle are fed a high-concentrate diet ad libitum, to optimize time on feed. These calves commonly are finished and slaughtered at 12-15 months of age and are termed calf-feds. Some extensive management systems

include finishing cattle solely on grass or forage, while others include both forage and grain feeding. Cattle which are backgrounded before entering the drylot are slightly older and commonly finished as yearlings. However, meat becomes less tender as the chronological age of an animal increases. Implementing grazing into a beef production system increases utilization of forage, thus decreasing costs associated with drylot feeding and possibly the length of time necessary in the feedlot. Literature suggests cattle on feed, for as little as 90 days, may have similar palatability traits as cattle fed for longer periods of time.

Cooler aging is a common method used to produce a more tender beef product. Aging beef allows naturally occurring enzymes in the muscle to function, thus producing a more tender cut of meat.