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Feedlot Marketing/Sorting Systems to Reduce Carcass Discounts

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Potential Yield Grade 4 carcasses were not identified at reimplant time. Fat depth determined approximately 90 days prior to slaughter did not correlate to carcass fat depth.

Summary

A project involving 4,348 cattle and five commercial feedlots in Nebraska was conducted to evaluate marketing/ sorting systems to reduce overweight and overfat carcasses . At reimplant time, cattle were weighed and fat depth estimated either by ultrasound or by manual rib palpation. Cattle heavier and/or fatter than a predetermined weight and fat depth were identified for early sale. The system of sorting did not reduce carcass discounts. Reimplant fat depth was poorly correlated to carcass fat depth. At reimplant time (~90 days prior to slaughter), we were unable to consistently identify cattle which would become Yield Grade 4 carcasses.

Introduction

Our objective was to evaluate feedlot marketing/sorting systems. The primary goal of these systems is not to optimize marketing, which attempts to obtain maximum value for each individual animal, but to avoid carcass discounts. The primary discounts addressed were overweight and overfat carcasses. While underweight and underfat carcasses were addressed, less emphasis was placed on these discounts.

Two levels of technology were compared in this project: 1) a fat estimate made by rib palpation and 2) use of ultrasound for determination of fat depth at reimplant time. Objectives were to: 1) determine if potential discount carcasses could be identified at reimplant time and 2) determine if use of ultrasound was necessary for accurate fat depth determination.

Procedure

Five Nebraska feedlots (ranging in one-time capacity of 3,500 to 25,500 head), participated in the project. Cooperating feedlots were responsible for cattle procurement. Upon arrival, cattle were randomly split into three treatment groups: control (no sorting); low tech sort; and high tech sort. At initial processing, all cattle were processed according to the feedlot's normal procedures, identified with individual ear tags and individually weighed. All cattle were sent to their respective pens and fed according to the feedlot's normal procedures.

At reimplant time (or the last time the cattle were worked before slaughter, which might have been processing time for some short-fed yearlings), all cattle were again worked according to the feedlot's normal reimplant procedure. The control pen was worked first, individually weighed and a fat depth estimated by hand palpation over the twelfth and thirteenth ribs. Based on the average weight and distribution of weights in the control pen, maximum and minimum sort weights were determined. These sort weights were calculated as 1.5 standard deviations from the average, approximately 8 percent of the cattle on both ends of the range of weights. Maximum and minimum sort fat depths were determined in the same manner. Cattle in the low tech treatment pen were individually weighed and a fat depth estimated by visual appraisal and rib

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palpation. Cattle on the high tech treatment were also individually weighed, but their fat depth was measured using ultrasound.

At reimplant time, cattle on the low and high tech treatments were identified into three sale groups: early sale cattle (overweight and overfat) were given a purple ear tag; normal sale cattle were not given a colored tag; and late sale cattle, (underweight and underfat) were given an orange ear tag. The sale group was determined according to the maximum and minimum sort weights and fat depths determined on the control pen. If an animal was heavier and/or fatter than the maximum sort weight and fat depth, it was identified as an early sale and given a purple tag. Likewise, if an animal was lighter and/or leaner than the minimum sort weight and fat depth, it was identified as a late sale and given an orange tag. If an animal fell within the range of both maximum and minimum sort weights and fat depths, it was identified as normal sale and not given a colored tag. It is important to note cattle were not physically sorted at reimplant time, but were simply identified into sort groups with colored ear tags and returned to the same pen.

At market time, the control pen was sold as an entire pen when the feedlot decided was the best time to sell them. The early sale and late sale cattle were sorted by going into the pen at marketing time and pulling out cattle with the appropriately color-coded ear tags. Approximately seven to 14 days before the control pen was marketed, early sale cattle in the high and low tech pens were marketed. Approximately seven to 14 days after the control pen was marketed, normal sale cattle from both the high and low tech pens were marketed. Late sale cattle from the high and low tech pens were marketed seven to 14 days following normal sale cattle. We hypothesized that by removing the heavy and fatter cattle from the high and low tech pens, the remainder of the pen could be fed longer than the control pen, increasing carcass weight without increasing carcass discounts.

Theoretical and actual marketing dates are shown in Table 1. Unfortunately, economics, rather than research protocol, had greater influence on cattle sale dates. Only the two groups of cattle at Feedlot D followed the protocol sale dates exactly. In the remaining groups, due to inconvenience and cost, the late sale cattle were sold with the normal sale cattle. The group at Feedlot B were all sold together due to a high market bid and the owner's decision to sell. The cattle at Feedlot C had a modified protocol and were not randomly split into treatments. Three pens of steers, already on-feed, were chosen and assigned to one of the three treatments. At reimplant time, both the low tech and high tech pens were worked twice, each serving as its own control for determining sort weights and fat depths. Therefore, these cattle have several sale dates.

Table 1. Marketing dates for cattle by feedlot and group.

	Marketing date (days from control pen)		
Group	Early sale	Normal sale	Late sale
Theoretical	-7 to -14	7 to 14	14 to 28
Feedlot A, Group 1	-7	6	6
Feedlot A, Group 2	-7	7	7
Feedlot B	0	0	0
Feedlot C			
High tech	-23	0	—
Low tech	-29	0	—
Feedlot D, Group 1	-15	6	20
Feedlot D, Group 2	-14	7	21
Feedlot E, Group 1	-5	7	7
Feedlot E, Group 2	-8	-1	-1

Table 2. Combined results for Feedlot A (Groups 1 and 2), Feedlot D (Groups 1 and 2) and Feedlot E (Group 1).

	Treatment		
Item	Control	High Tech	Low Tech
Head count	1087	1028	1017
Processing weight, lb	875	866	882
Processing fat depth, in	.19	.18	.19
Carcass weight, lb	780	783	791
Carcass fat depth, in	.46	.47	.47
Rib-eye area, square in	13.3	13.2	13.3
Yield grade[a]	2.8	2.9	2.9
Marbling score[b]	506	502	506
Premium or discount, $/cwt[c]	-3.63	-3.67	-3.97
% Yield grade ≥ 4.0	4.3	4.9	6.3
% Carcass weight ≥ 950	.1	.3	0
% Carcass weight ≤ 550	0	.1	.3
% Quality grade ≥Choice	56.1	58.4	58.0
% Quality grade < Select	1.2	.9	1.2

[a]Calculated from carcass data.
[b]Marbling score of 400 = Slight 0; 500 = Small 0; 600 = Modest 0; etc.
[c]Based on national carcass premium and discounts for slaughter cattle (11 month average; October 1996 through August 1997).

Because of lack of uniformity of marketing dates, pooling of the data was not done across all feedlots and groups. Marketing dates from Feedlot A (Groups 1 and 2), Feedlot D (Groups 1 and 2) and Feedlot E (Group 1) were within protocol, excluding the late sale cattle and therefore, these groups were pooled for statistical analysis.

Results

Data for the five pooled groups are presented in Tables 2-4. Overweight carcasses were not a major factor in this project. Correlation coefficients for reimplant weight versus carcass weight ranged from .46 to .86, demonstrating

Table 3. Combined results from high tech treatment for Feedlot A (Groups 1 and 2), Feedlot D (Groups 1 and 2) and Feedlot E (Group 1).

	Sort Group			
Item	Early by Weight	Early by Fat	Normal Sale	Late Sale
Head count	48	92	716	181
Processing weight, lb	1001	894	866	800
Processing fat depth, in	.19	.29	.18	.12
Carcass weight, lb	852	779	785	752
Carcass fat depth, in	.52	.61	.47	.39
Rib-eye area, square in	13.5	12.8	13.2	13.3
Yield grade[a]	3.2	3.4	2.9	2.5
Marbling score[b]	513	535	508	466
Premium or discount, \$/cwt[c]	-3.39	-4.92	-3.18	-5.63
% Yield grade ≥ 4.0	7.5	25.4	4.3	0
% Carcass weight ≥ 950	0	0	0	.7
% Carcass weight ≤ 550	0	0	0	1.0
% Quality grade ≥ Choice	65.6	74.7	61.7	31.4
% Quality grade < Select	0	0	.4	1.9

[a]Calculated from carcass data.
[b]Marbling score of 400 = Slight 0; 500 = Small 0; 600 = Modest 0; etc.
[c]Based on national carcass premium and discounts for slaughter cattle (11 month average; October 1996 through August 1997).

Table 4. Combined results from low tech treatment for Feedlot A (Groups 1 and 2), Feedlot D (Groups 1 and 2) and Feedlot E (Group 1).

	Sale Group			
Item	Early by Weight	Early by Fat	Normal Sale	Late Sale
Head count	100	72	794	68
Processing weight, lb	1004	915	878	762
Processing fat depth, in	.21	.29	.18	.13
Carcass weight, lb	838	801	791	732
Carcass fat depth, in	.52	.57	.46	.41
Rib-eye area, square in	13.8	13.5	13.3	12.9
Yield grade[a]	3.0	3.1	2.9	2.6
Marbling score[b]	511	517	510	482
Premium or discount, \$/cwt[c]	-3.77	-3.91	-3.94	-4.93
% Yield grade ≥ 4.0	8.0	8.9	6.6	0
% Carcass weight ≥ 950	0	0	0	0
% Carcass weight ≤ 550	0	0	.2	1.7
% Quality grade ≥ Choice	62.2	62.3	58.0	44.
% Quality grade < Select	1.5	0	.8	5.8

[a]Calculated from carcass data.
[b]Marbling score of 400 = Slight 0; 500 = Small 0; 600 = Modest 0; etc.
[c]Based on national carcass premium and discounts for slaughter cattle (11 month average; October 1996 through August 1997).

a reasonably good relationship between reimplant weight and carcass weight. This suggests cattle heavier at reimplant time are likely to have heavier carcasses at slaughter. Therefore, we feel identifying cattle at reimplant time as potential overweight carcasses is effective.

Overfat carcasses (Yield Grade ≥ 4) were a much greater problem. Our sorting system was unable to consistently reduce the number of these discounts. In most cases, carcasses which had a Yield Grade of 4 or greater were not identified into the early sale group. Therefore, we were unable to identify potential overfat carcasses at reimplant time. This generally holds true for both the high and low tech treatments, although more overfat carcasses occurred in the low tech treatment.

It was not possible to determine the accuracy of identifying cattle which became Yield Grade 4's in the high and low tech treatments because cattle identified for early sale were sold from 12 to 21 days earlier than normal sale cattle. However, in the control treatment, only 20 percent of cattle which became Yield Grade 4's would have been identified for early sale using rib palpation. In the high and low tech treatments, 25.4 and 8.9 percent respectively, of the cattle which were identified for early sale, due to fat depth at reimplant time, still became Yield Grade 4's (Tables 3 and 4). These cattle were identified as potential overfat carcasses, but were not sold early enough to prevent the discount.

Correlation coefficients for reimplant fat depth versus carcass fat depth were much poorer than for weight. Correlation coefficients for ultrasound reimplant fat depth versus carcass fat depth ranged from .39 to .50, while coefficients for manual fat depth estimation ranged from .23 to .35. The square of the correlation coefficient represents the amount of variation in carcass fatness explained by the ultrasound or manual measurement made at reimplant time. Therefore, ultrasound explained between 15 and 25 percent of the variation in carcass fat thickness; manual measurements of fat depth explained between 5 and 12 percent. These values are very poor for determining when cattle should be marketed. Although the ultrasound measurement was a slightly better predictor, neither rib palpation nor ultrasound satisfactorily predicted carcass fat depth at reimplant time.

This system was unable to consistently reduce the amount of discounts due to Yield Grade 4 carcasses. There are two possible explanations: 1) fat depth determinations at reimplant time were inaccurate or 2) the cattle deposited fat at different rates from reimplant time to slaughter. In the past, ultrasound has been shown to be reasonably accurate in fat depth determination. We feel the greater source of error is in the rate of fattening. It may be invalid to assume fatter cattle at reimplant time will have fatter carcasses approximately 90 days later. It is our conclusion that potential Yield Grade 4 carcasses cannot be consistently identified at reimplant time, at least not with fat depth as the single measurement.

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