ULTRASOUND SORTING INCREASES FEEDLOT PROFITABILITY

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Introduction

Feedlot managers often market entire pens as mixed groups, resulting in lower-quality, over-finished, or heavyweight carcasses. As the cattle industry has moved towards value-based marketing systems, finding a cost-effective tool that predicts future carcass merit and sorts cattle into outcome groups, thus producing a more uniform product at harvest, is of great interest to feedyard managers. The objective of this research was to determine the profitability of sorting feedlot cattle at re-implant time by using ultrasound and computer technology to group cattle into uniform market groups.

Experimental Procedures

The study was conducted in cooperation with Champion Feeders, Hereford, Texas, using 311 crossbred feedlot steers owned by Broseco Ranches, Inc. Live weight of the steers at scanning ranged from 785 to 1275 pounds.

Steers were scanned with a real-time ultrasound machine at re-implant time by personnel of Designer Genes Technologies, Inc. (DG), Harrison, AR, in 2004. Live animal measurements recorded during the scanning session were live weight, 12th rib backfat, ribeye area, and estimated percentage of intramuscular fat (IMF) within the ribeye. Images were interpreted chute-side and used to sort steers into one of four projected outcome groups and determine an implant protocol. The sorting models are proprietary, but included live weight, backfat estimation, ribeye area estimation, an estimation of percent intramuscular fat, average daily gain, and ribeye shape.

Test group steers were assigned by the DG system to one of three levels of the implant regime — none, moderate, and aggressive. Animals assigned to the moderate level received Revalor[1] IS. Steers assigned to the aggressive level received Component[2] TES. All control animals received Component TES according to the feedyard's implant protocol.

The four test groups were harvested based on projected marketing times generated from the DG sorting system at 83, 97, 113, or 125 days after scanning. The control group was harvested in a single group on a date selected by feedyard management 97 days after the scanning date.

Carcass values collected by the slaughter facility with the aid of the Computer Vision System were hot carcass weight, actual fat thickness measurements, actual ribeye area measurements, and yield grade. In addition, official USDA quality grades were recorded

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[1]Revalor is a registered trademark of Intervet, Inc.
[2]Component is a registered trademark of Ivy Animal Health, Overland Park, KS.

for each carcass. A corresponding quality grade number was assigned to each quality grade (USDA Choice = 5, USDA Select = 4, no roll = 3). No-roll carcasses did not meet USDA minimum marbling requirements for USDA Select or possessed defects, such as blood splash or dark cutting, which prevented them from qualifying for an official USDA grade upon initial examination.

To determine initial value to access profitability, value was assigned to the steers at re-implant based on their weight at that time. Calf value was estimated using the USDA market reports for the week cattle were sorted, extrapolated from the 850-lb feeder steer price at Oklahoma City and the Panhandle direct slaughter price that week. Cost of gain was calculated from total cost of feed and total gain per pen. Base carcass price was set at $134.26, the five-state-area, weighted-average, dressed price for steers 35% to 65% Choice for the harvest week of the control group. Premiums of $2.00, 1.50, and 8.00 per carcass hundred weight were given to Yield Grade 1, Yield Grade 2, and Choice carcasses, respectively. Discounts of $10.00, $20.00, $11.00, and $30.00 per carcass hundredweight were given to Yield Grade 4, Yield Grade 5, no roll, and heavyweight carcasses (>1,000 lb), respectively. Premiums and discounts were based on the pricing model for Ranchers Renaissance[4]. Profit was calculated for the period from re-implant and sorting to harvest. Profit was defined as carcass value less the cost of feed, implant, and ultrasounding and the value of the steer at the time of scanning.

Results and Discussion

At scanning, steers in the control group had a similar (P = 0.154) body weight as the test groups (Table 1). The sorted steers were fed 11.4 more days than the control steers (P = 0.001).

Table 1. Initial, Performance, and Carcass Traits of Control and Sorted Steers

Trait	Control	Sorted
N	146	137
Initial Traits		
Scan weight lb	996.5	1012.1
Performance Traits[1]		
Days on feed	97.0	108.4*
Average daily gain lb/d	3.40	3.33
Carcass Traits		
Hot carcass weight lb	823.0	852.0*
Backfat thickness in	.44	.51*
Ribeye area in^2	14.9	14.6
Yield grade	2.5	2.8*
Quality grade number[2]	4.2	4.5*
Percent Choice	37.7	51.8

[1]Performance traits were evaluated only between sorting and harvest
[2]Quality grade number 5 = USDA Choice, 4 = USDA Select, 3 = no roll
*indicates a significant difference between control and sorted steers for a particular trait (P<0.05).

Ribeye areas (REA) were similar (P = 0.442) for sorted and unsorted steers. The average hot carcass weight for sorted steers was 29 pounds heavier (P = 0.004) than the control steers. The sorted steers averaged 0.07 inches greater backfat (P = 0.015) than the non-sorted steers. Consequently, due to heavier carcass weights and greater backfat thickness, the average yield grade for sorted steers was 0.3 higher (P = 0.005) than that of non-sorted steers.

Initial value was similar (P = 0.155) for

[3]CVS, Research Management Systems, USA Inc., Fort Collins, CO.
[4]Englewood, CO.

sorted and non-sorted animals (Table 2). This should be expected, because initial value was based on live weight at scanning and there were no significant differences in body weight at scanning. Total production costs were $27.39 higher (P = 0.001) per head for sorted cattle compared to non-sorted cattle. Most of this difference can be attributed to feed costs, which were $21.96 higher (P = 0.001) per head for sorted steers. Implant cost was $0.57 lower (P = 0.001) per head for sorted animals. Although all animals were scanned to evenly distribute steers between the control and test groups, ultrasound costs were not included in the total cost for control animals.

Carcass value was $63.07 higher (P = 0.001) per head for sorted steers than control steers (Table 2). Yield grade premiums were similar (P = 0.147) between sorting type. Quality grade premium was $1.27 higher (P = 0.001) per carcass hundredweight for sorted steers. Weight discounts were similar (P=0.202) between sorting type. When discounts and premiums were accounted for, the DG sorting system was more profitable (P = 0.014) by $22.93 per head over control steers. Increased profitability was primarily due to premiums for higher quality cattle.

Implications

Sorting feedlot cattle at re-implant time using ultrasound and computer technology to group cattle into uniform market groups is a cost-effective tool that can predict future carcass merit and increase profitability.

Table 2. Economic Performance of Steers

Items	Control	Sorted
Cost ($ per hd)		
Feed	150.42	172.38*
Implant	2.85	2.28*
Ultrasound	0.00	6.00
Discounts and premiums ($ per cwt)		
Yield premium	.75	.00
Quality premium	1.27	3.93*
Weight discount	-.69	-.09
Carcass value	1112.91	1175.98*
Initial value[1]	940.57	953.32
Costs	153.27	180.66*
Profit[2]	19.07	42.00*
Difference		22.93

[1]Initial live value was determined at scanning based on live weight.
[2]Profit based solely on time between sorting and harvest.
*Indicates a significant difference between control and sorted steers for a particular trait (P<0.05).