Electronic Sorting of Feeder Cattle into Uniform Lots to Increase Profit Potential

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INTRODUCTION

Lack of uniformity is one of the major marketing problems facing Tennessee beef producers. This problem influences prices received for feeder calves and even carries over into the finished market with reports of value differences well over $100 per head. January 1, 1999 estimates indicate that there are approximately 1.03 million beef cows in Tennessee producing over $355 million in revenue. These figures rank Tennessee in the top 9 states in the United States in total beef cows and in the top 4 in number of farms with beef cows with over 47,000 beef producers. Of the 47,000 beef producers, an estimated 43,000 are operations with fewer than 50 animals with 70% of the on farm production coming from operations with less than 100 head. Therefore, the Tennessee beef industry can be characterized as largely involving cows and calves with limited resources devoted to the feedlot or finishing segment of the beef industry. Such operations have widely variable genetics and management plans and are usually forage based. As a result, the primary commodity for sale in the state of Tennessee is feeder calves produced from these widely divergent, small herds. With feeder calf production being the primary beef industry for Tennessee, improving the operating efficiency of this segment should be a major area of interest. Any methods of improving uniformity, and thus value, of feeder calves will have a positive influence on the Tennessee beef industry. Since a majority of the producers have less than 100 cows, it is difficult to obtain uniform, truckload lots of feeder calves from a single producer. Most of these calves must be co-mingled with stock from other small producers and this contributes to lack of uniformity in the group. The influence of uniformity on value is well documented throughout the beef industry. Recent advances in real-time ultrasound technology have afforded the opportunity to use objective measurements as a tool in sorting feeder cattle. Cattle can be grouped into outcome groups based on various physical traits measured on individual animals. This report illustrates the application of real-time ultrasound technology in grouping cattle into more uniform groups with resulting economic impact.

PROCEDURE

Experimental animals utilized in this trial were stocker cattle made available from a Middle Tennessee stocker operator. This operator groups and feeds several hundred head of stocker cattle in western feedlots each year under retained ownership. The operator's source of cattle is Tennessee and Kentucky feeder calf markets, where cattle are available with the wide diversity in makeup as previously described. Typically the operators buys the cattle, backgrounds them on forage for about 90 days and then ships truckload lots as available.

For this study, the operator made available a truckload lot of stocker calves destined for a Kansas feedlot. Research personnel were able to obtain the following measurements on the cattle prior to shipment:

Live weight
Hip height
Breed code (1 = Angus, 2 = Angus cross, 3 = Hereford, 4 = Composite, 5 = Other British based cross, 6 = European and European cross)
Rump fat
Rib fat (12th rib)

Using these measurements, a computer prediction package under development by the senior author was employed to predict days on feed (DOF), rib fat, intramuscular fat and carcass weight for the cattle. This prediction package utilizes a target intramuscular fat level (4.5 % to represent the High Select to Low Choice range) plus the estimated intramuscular fat (IMFAT) level of the calves at processing. Differing rates of intramuscular fat deposition and rib fat accumulation are utilized for each breed group to arrive at a projected number DOF for each steer.

After measuring by research personnel, cattle were transported to a western Kansas feedlot facility for finishing according to the feedlot's protocol. At harvest, carcass data and feedlot performance data were made available for analysis.

RESULTS AND DISCUSSION

Table 1 presents the overall means for the variables to be discussed in this report. Since most producers are most interested in economic performance, only those factors directly related to and influenced by economic factors will be discussed. Also, because of limited numbers for some breed groups, the Hereford (n=1), Composite (n=2), Other British-based Crosses (n=10) and European and European Crosses (n=3) were all grouped as "MIXED" (n=16) and compared with Angus (n=17) and Angus Cross (n=24). It is apparent from a review of the data in Table 1 that differences did exist in the initial load of cattle. All six breed groups were represented which illustrates the diversity in biological types typical of co-mingled cattle. This particular load was primarily a mix of straight-bred Angus, Angus cross and other British cross cattle with smaller numbers of the other three breed groups.

A review of the measurements obtained at cattle prior to shipping to feedlot indicates no significant (P>.05) difference in initial live weight, hip height and beginning estimated IMFAT level. Angus and Angus Cross cattle were significantly fatter over both the rump and 12th rib than the Mixed group. The sorting program utilized in this trial identified a specific market quality endpoint (4.50 % IMFAT) as the target criteria. Therefore this would transpose to a shorter required DOF for those cattle will higher beginning IMFAT than those with lower IMFAT's. It can be noted that these cattle with higher beginning IMFAT also are fatter at the 12th rib (rib fat) and most notably have much more rump fat. The relationship of rump fat to carcass merit has been noted in earlier trials at this station (unpublished data). If cattle had been fed to the recommended DOF, the projected average rib fat measurement was 0.46 in. ranging from 0.43 in.

Table 1. Mean values for selected beginning, projected and actual variables.

VARIABLE	BREED GROUP		
	ANGUS (n = 17)	ANGUS CROSS (n = 24)	OTHERS (n = 16)
Initial weight, lb	717	736	707
Hip height, in.	47.6	47.9	47.6
Rump fat, in.	.24	.23	.18
Rib fat, in.	.12	.12	.09
Initial IMFAT, %	1.96	1.87	1.68
Harvest IMFAT,%	*4.75*	*4.50*	*4.40*
Act. rib fat, in.	.64	.55	.45
Proj. rib fat, in.	*.48*	*.47*	*.43*
Actual yield grade	3.69	3.40	2.97
Est. yield grade	*3.12*	*3.02*	*2.84*
Actual REA	12.64	12.92	13.49
Proj. DOF, days	*107*	*116*	*130*
Actual DOF, days	148	148	148
Extra DOF	*41*	*32*	*18*
Est. loss/head, $	-11.07	-5.39	-7.31

for the Mixed group to 0.48 in. for the Angus. However, by feeding all biological types to 148 days, the resulting average rib fat was 0.56 and ranging from 0.45 for the Mixed group to 0.64 in. for the Angus. This resulted in an average Yield Grade of 3.69 for the Angus, 3.40 for the Angus cross and 2.97 for the Mixed cattle. Since these cattle were sold on a value-based grid, considerable value differences were noted for the fatter, lower yielding cattle. The particular packer grid at the time of harvest did not reflect any value differences between Select and Choice cattle (no Standard cattle). Spreads utilized were:

Discounts/Premiums	**$/cwt, carcass**
Lights (550 and down)	-16.00
Heavies (950 and up)	-16.00
Yield grade 3	-1.00
Yield grade 4	-16.00
Yield grade 5	-21.00
Yield grade 1 and 2	+3.00
Prime	+5.00
Certified Angus Beef	+1.50

As a result of the assigned discounts and premiums, this operator experience a total loss of $434.51 by extended feeding of these cattle. This was determined by using actual rates of rib fat deposition and live weight gain and then using these figures to generate estimated rib fat and carcass weight for the projected days on feed. These values were then used to estimate yield grade (Est. yield grade) for the cattle at the projected DOF. Since no price spread was used for Select or Choice cattle, whether these cattle were Select or Choice at projected DOF was not an issue, as long as they did not project to Standard grade. The projected carcass weights and yield grades were then priced at the same price of the cattle at harvest. The daily feed cost for the cattle was $1.69 per head for day. This rate was then charged for the extra days on feed and that value was subtracted from the actual amount received at 148 days for each of the 57 head. The following example illustrates the effect of an extra 24 days in the feedlot on value of one of the Composite cattle:

	Actual	Projected
Days on feed	148	124
Carcass weight, lb.	885	814
Rib fat, in.	0.64	0.55
Yield grade	4.23	3.6 (Estimated)
Carcass value, $/cwt	85.10	100.10
Carcass value	753.14	814.81

Extra days fed 24
Extra feed cost 40.56 (24 days x $1.69/day)
Net value difference 102.23 ([Projected carcass value + extra feed cost] – actual carcass value)

If this operator had harvested the identified animal at the projected days on feed, he would have realized a value increase of $102.23 on this animal.

SUMMARY

Obviously, not all cattle will net the amount illustrated by the above single animal, and projecting days on feed for loads of mixed cattle is not a perfect science. However, by using ultrasound as a sorting tool, an increased value of approximately $3.75 per carcass cwt. would have been realized for these cattle. Current feeding conditions (price) were very favorable ($0.3910 per pound of gain). Therefore the extra 1752 days these cattle were fed was not disastrous to the owner. However, if cost of gain goes up with increased ingredient cost of the ration, these differences become more apparent. For example, if feed cost had only been 20% higher, this operator would have had a net loss of over $1036.00 rather than $434.51 on these 57 head of cattle. The penalty for increased rib fat that produces Yield Grade 4 and 5 cattle is severe and costly to owners retaining ownership of cattle through the feedlot finishing period. ***Ultrasound sorting can be one tool to uniformly allocate biological groups of cattle to feeding groups that will reduce overfeeding and increase profit potential.***