Does Carcass Value Gain per Day on Feed Used in the 4-H Program Relate to Cattle Feeding Profitability?

A.S. Leaflet R2425

Daryl R. Strohbehn, professor of animal science;
Darrell Busby, extension livestock specialist

Summary and Implications

Data from 410 feedout groups representing 29,389 head from the Tri-County Steer Carcass Futurity Cooperative were analyzed to test the validity of using carcass value per day on feed (CVDOF) as a ranking tool in 4-H beef performance carcass contests. All feedout groups were calculated for feedlot profit using standardized feed and yardage costs, yet using their actual health treatment costs and miscellaneous costs. CVDOF is calculated using carcass weight gain per day during the feeding period and adjusting that for red meat yield using the percent retail product equation. This result is then put on a monetary basis by using a carcass price adjusted for carcass quality and yield grade. CVDOF when tested for its relationship to feedlot profitability was highly significant and accounted for 74 percent of the variation in profit. If one desires a ranking equation in the 4-H beef performance carcass program that relates well to feedlot profitability then CVDOF proves to be quite effective.

Introduction

One objective of the Iowa 4-H beef program is to provide educational activities which enhance youth knowledge and give them experiences that relate to business aspects of the cattle industry. Several counties in Iowa as well as the Iowa State Fair have beef carcass competitions that youth can both show their cattle and receive either ultrasound or actual carcass data. Since the mid 1970s final placing in these competitions has been based on a formula that calculates the amount of carcass value gain which takes place during the feeding period. This is done by calculating red meat yield gain, then taking that times a carcass price which reflects differences in USDA quality grade and then dividing that by the days on feed.

A historical summary done on Iowa's 4-H beef carcass data reported in 2007 indicated there was a positive and high relationship between carcass value per day on feed (CVDOF) and growth rate as reflected by both live and carcass weight and average daily gain. However, also of importance was muscling (rib eye area) and quality grade. Yet questions continue to arise on whether CVDOF is a good predictor of profitability in the feedlot sector. This question was investigated utilizing feedout data from the Tri-County Steer Carcass Futurity Cooperative, Lewis, Iowa.

Materials and Methods

Data utilized in this analysis came from 455 retained ownership groups involving 31,764 head from the Tri-County Steer Carcass Futurity Cooperative located at Lewis, IA. All cattle were fed out in cooperating custom feedlots using typical finishing rations for the state of Iowa. Because some of the groups fed were yearling type cattle, any group fed less than 130 days or having an average start weight in excess of 800 lbs were deleted from the analysis. Remaining in the dataset were 29,389 head representing 410 feedout groups.

Measures utilized in the Iowa 4-H beef project program typically are starting weight, final weight at the fair, calculated average daily gain (ADG), days on feed, and standard carcass measures at the cooperating harvest facility. Once carcass measures are taken percent retail product is calculated using a formula derived by USMARC meat scientists, it follows: 74.9- (17.78 x fat thickness) + (.548 x ribeye area) – (1.47 x %KPH). Yield grade was calculated with the following USDA equation: 2.5 + (2.5 x fat thickness) + (.2 x %KPH) + (.0038 x hot carcass weight) – (.32 x ribeye area). Carcass value per day on feed (CVDOF) was calculated as: (((hot carcass weight) – (.55 x beginning weight)) x (% retail product) x (carcass price, $.lb / .64))/days on feed. The beginning dressing percent assigned to all cattle was 55 percent. Carcasses were valued using prices with the premiums and discounts for quality grade, yield grade, and off carcass weights as shown in table 2. Descriptive statistics are shown in table 1.

Feedlot profitability calculations were standardized across all feedout groups. Feed was priced at $250 per ton of dry matter and yardage was assessed at $.33 per head per day. Actual costs for other feedlot expenses averaged per head as follows: individual health treatments - $5.19; group health treatments - $12.51; tags, implants, etc. - $9.82; and trucking insurance and checkoff - $9.51.

Results and Discussion

Analysis of this study was done utilizing the general linear models function of SAS 9.1.3. The first analysis was to look at whether CVDOF is a good predictor of feedlot profitability. Items fitted into the model were feedout contemporary groups and then the calculation CVDOF. The R-square of this model was .74 with both contemporary group and CVDOF being significant at F<.0001. Therefore, 74 percent of the variation in profitability within each feedout group was explained by the composite index, CVDOF.

The other question asked by participants in these performance carcass competitions is: "What is the degree of importance that each trait has on final placing results using

CVDOF?" To answer this question the Stepwise procedure of SAS Linear Regression was utilized. As table 3 depicts four traits were of greatest importance when it comes to predicting CVDOF; ADG, dressing percent, retail product percent (red meat yield) and carcass marbling score. ADG while on feed accounted for about 74 percent of the variation in CVDOF, while dressing percent represented about 9.5 percent. Retail product percent and marbling score accounted for slightly less than 5 percent of the variation. Other significant factors, but not appreciably improving the total model R-square, were days on feed, ribeye area and fat cover. It would stand to reason that the last two factors would not add to model efficiency due to their correlation with retail product percent.

Table 1. Descriptive statistics on cattle feedout groups in analysis.

Variable	Mean	Standard Deviation	Minimum	Maximum
Starting weight	645	74	386	796
Days on feed	171	20	128	235
Final weight	1184	77	986	1449
ADG	3.18	.36	2.18	4.36
Hot carcass weight	728	47	610	891
Dressing percent	61.5	.35	59.9	63.9
Fat cover	.45	.06	.32	.65
Ribeye area	12.5	.62	10.7	14.3
Calculate Yield Grade	2.83	.24	2.1	3.5
Marbling Score	Sm^{25}	39degrees	Se^{20}	Mt^{40}
Carcass Price	$157.94	$3.55	$46.76	$170.05
Feedlot Profitability	($40.42)	$78.65	($313.73)	$119.24
Carcass Value per Day on Feed	$3.19	$.36	$2.22	$4.28

Table 2. Prices used in CVDOF analysis and feedlot profits.

Carcass Variable	$/cwt
Base Price: Ch-, Yield Grade 3-3.5	$160.00
Quality Grade Premiums & Discounts	
Prime	$15.00
Upper 2/3s Choice	$5.00
Select	-$12.00
Standard	-$25.00
Yield Grade Premiums & Discounts	
YG 1	$7.00
YG 2-2.5	$5.00
YG 2.51-2.99	$3.50
YG 3.5-3.99	-$2.00
YG4 & YG5	-$20.00

Table 3. Stepwise regression results for traits impacting CVDOF.

Variable	Partial R-square	Model R-square	Significance Level
ADG on test	.7396	.7396	P<.0001
Dressing percent	.0947	.8343	P<.0001
Retail product percent	.0475	.8818	P<.0001
Marbling score	.0486	.9304	P<.0001
Days on feed	.0227	.9530	P<.0001
Ribeye area	.0018	.9549	P<.0001
Fat cover	.0032	.9581	P<.0001