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Strict Enforcement of Zero Tolerance: Effect on Carcass Weight and Dressing Percent

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Summary

Strict enforcement of "Zero Tolerance" regulations in the beef industry is a concern to producers and beef packers. Data on over 1,500 steers, fed and slaughtered over a four period, as part of the South Dakota Retained Ownership Demonstration Project were used to estimate the cost to producers of zero tolerance enforcement. Regression analysis was used to estimate hot carcass weight and dressing percent using the first three years data (time period prior to zero tolerance enforcement). Hot carcass weight and dressing percent were then predicted for year four. On average 13.8 lb of additional hot carcass weight was predicted compared to actual hot carcass weight. If this is due to the additional trimming associated with the enforcement of zero tolerance, then the loss to producers would have averaged \$15.73 per head in 1994.

Introduction

The USDA began a program of strict enforcement of "Zero Tolerance" in the beef packing industry following the E. coli O157:H7 outbreak in the Pacific Northwest in 1993. The regulations require beef packers to trim away large parts of a carcass if any fecal contamination occurs. The results of this enforcement are likely to be increased costs to beef packers, decreased revenue to cattle producers, and increased costs to consumers and society.

Those involved in the beef industry are not opposed to "zero tolerance." However, the present regulations are opposed by those who feel there are alternative, more cost effective

methods of controlling E. coli and other contaminants. In addition, many feel that the beef industry is being forced to operate under stricter guidelines than the poultry industry, creating an unfair advantage for the poultry industry. According to one major beef packing firm, the current inspection differences (zero tolerance and other regulations) amount to about \$43 per market steer subsidy to the poultry industry.

The objective of this paper is to determine the average amount of additional carcass weight that is being trimmed off and lost under the present regulations. The value of this lost carcass weight, or cost to producers, will then be estimated.

Materials and Methods

South Dakota State University has conducted a steer feeding and marketing demonstration the last four years. There has been 1,164 steers that have been placed on feed in October and fed an accelerated finishing ration at the same feedlot. The steers were marketed and slaughtered at one beef packing plant with the same slaughter endpoint (market when the estimated fat cover over the 12th rib is .4 inch). Detailed data have been collected at slaughter on these steers (Table 1).

In years three and four of the demonstration, there also has been 365 steers and 154 heifers placed on feed in January and fed a finishing ration. These cattle were marketed at the same slaughter endpoint as the 1,164 steer calves. Slaughter data on these steers and heifers are presented in Table 2.

¹Associate Professor.

Table 1. Means and standard deviations on slaughter data of 1,164 steer calves fed an accelerated finishing ration

Variable	Units	Year 1 n = 250	Year 2 n = 350	Year 3 n = 150	Year 4 n = 414
Slaughter weight	lb	1146.91 ^a (99.080)	1124.54 ^b (106.905)	1148.38 ^a (97.064)	1152.99 ^a (102.069)
Hot carcass weight	lb	733.58 ^a (69.533)	718.75 ^b (77.021)	724.48 ^{ab} (64.641)	722.81 ^{ab} (69.751)
Dressing percent	%	63.94 ^a (1.904)	63.87 ^a (2.002)	63.07 ^b (1.818)	62.67 ^c (1.948)
Days on feed	days	195.70 ^a (17.006)	189.41 ^b (16.402)	182.31 ^c (23.529)	207.01 ^d (25.981)
Fat over 12th rib	inches	.42 ^a (.152)	.45 ^b (.160)	.39 ^a (.145)	.40 ^a (.143)
Rib eye area	sq. in.	12.84 ^a (1.555)	12.33 ^b (1.678)	12.69 ^a (1.225)	12.36 ^b (1.332)
Kidney, heart & pelvic fat	%	2.47 ^a (.600)	2.38 ^{ab} (.558)	2.71 ^c (.570)	2.34 ^b (.525)

Note: Means with different superscripts in the same row are significantly different at the $\alpha = .05$ level.

Table 2. Means and standard deviations on slaughter data of 365 steers and 154 heifers fed a winter finishing ration

Variable	Units	Steers		Heifers	
		Year 3 n = 169	Year 4 n = 196	Year 3 n = 65	Year 4 n = 89
Slaughter weight	lb	1244.76 ^a (105.669)	1196.01 ^b (106.685)	1122.49 ^y (84.234)	1063.14 ^z (99.669)
Hot carcass weight	lb	792.47 ^a (70.157)	740.45 ^b (71.444)	711.49 ^y (58.855)	651.56 ^z (61.544)
Dressing percent	%	63.67 ^a (2.008)	61.90 ^b (1.888)	63.39 ^y (2.200)	61.31 ^z (1.897)
Days on feed	days	142.18 ^a (12.980)	136.84 ^b (20.265)	131.00 ^y (21.672)	122.03 ^z (21.087)
Fat over 12th rib	inches	.41 ^a (.163)	.35 ^b (.131)	.42 ^y (.173)	.39 ^y (.132)
Rib eye area	sq in	13.16 ^a (1.438)	13.04 ^a (1.647)	12.63 ^y (1.208)	12.27 ^y (1.206)
Kidney, heart & pelvic fat	%	2.49 ^a (.555)	2.11 ^b (.492)	2.70 ^y (.514)	2.35 ^z (.556)

Note: Means with different superscripts in the same row are significantly different at the $\alpha = .05$ level. Means for steers versus heifers are not compared.

The data for the first three years of the accelerated feeding program and for year three for the winter feeding program, the time period prior to the current enforcement of regulations on zero tolerance, were used to explain variations in hot carcass weight and dressing percent. Two specific equations were estimated using ordinary least squares regression:

$$\text{Hot Carcass Weight} = b_0 + b_1 * \text{Slaughter Weight} + b_4 * \text{KHP} + b_5 * \text{Days} + e$$

and

$$\text{Dressing Percent} = b_0 + b_1 * \text{Slaughter Weight} + b_4 * \text{KHP} + b_5 * \text{Days} + e$$

where **Fat** is the fat over the 12th rib, **REA** is the rib eye area, **KHP** is the kidney, heart and pelvic fat, **Days** is the number of days on feed, and **e** is the random or unexplained error.

Using these two equations and the data for the fourth year on slaughter weight, fat, REA, KHP, and days on feed, predictions were made for hot carcass weight and dressing percent. The actual values for hot carcass weight and dressing percent were then subtracted from the predicted values and these residuals were

analyzed. If the changes in enforcement of regulations have not effected carcass trimming procedures, then the residuals should be centered around zero. However, if more trimming is taking place as a result of the zero tolerance regulations, then the residuals will on average be positive. In other words, there will be more predicted than actual hot carcass weight and the predicted dressing percent will be greater than the actual dressing percent

Results and Discussion

The results of estimating the two equations for the three separate data sets are contained in Tables 3 and 4.

Depending upon the data set, between 85 and 93% of the variation in hot carcass weight is explained by the other independent variables. All of the independent variables are significant with the exception of fat thickness for the heifers. Only 24 to 36% of the variation in dressing percentage were explained by the regression equation. However, all of the independent variables are significant, with the exception of slaughter weight and fat thickness for the heifer data set.

Table 3. Regression results for explaining variations in hot carcass weight

	Accelerated steer calves	Winter steers	Winter heifers
Intercept	-126.4463** (10.1821)	-136.4536** (26.5587)	-119.0404* (48.9982)
Slaughter weight	.5840** (.0087)	.5703** (.0154)	.5786** (.0385)
Fat	36.2348** (4.9161)	23.3908* (10.6310)	-14.0011 (20.2555)
REA	7.8264** (.5950)	9.6733** (1.2296)	7.6512* (3.0537)
KHP	6.1600** (1.2261)	10.7173** (2.8476)	18.2313** (5.7630)
Days	.3063** (.0388)	.3899** (.1200)	.3139* (.1356)
Adjusted R ²	.9339	.9212	.8523
F-stat	2110.550**	393.987**	74.861**

Note: Standard errors are in parentheses and a single asterisk and a double asterisk denote significance at the .05 and .01 level, respectively.

Table 4. Regression results for explaining variations in dressing percent

	Accelerated steer calves	Winter steers	Winter heifers
Intercept	52.5243** (.8874)	52.1156** (2.1666)	53.1300** (4.1659)
Slaughter weight	-.0045** (.0008)	-.0056** (.0013)	-.0048 (.0033)
Fat	3.2334** (.4285)	1.8467* (.8672)	-1.1222 (1.7222)
REA	.6842** (.0519)	.8176** (.1003)	.6542* (.2596)
KHP	.5683** (.1068)	.8648** (.2323)	1.6018** (.4900)
Days	.0262** (.0033)	.0341** (.0098)	.0265* (.0115)
Adjusted R ²	.3087	.3602	.2361
F-stat	67.620**	19.917**	4.956**

Note: Standard errors are in parentheses and a single asterisk and a double asterisk denote significance at the .05 and .01 level, respectively.

The regression equations estimated for each data set were used to predict hot carcass weight and dressing percentage in year four. The actual, predicted and residual differences for hot carcass weight and dressing percentage are shown in Table 5. The regression equations on average predicted 13 to 15 lb more hot carcass weight than the actual hot carcass weight. The

prediction for dressing percentage averaged 1.11 to 1.37% over the actual dressing percentage. These residual differences are all significantly different than zero. This would indicate that there has been a structural change in cattle slaughtering and that more carcass weight is being trimmed off following the implementations of the strict regulations on zero tolerance.

Table 5. Actual, predicted, and residual hot carcass weight and dressing percentage

	Accelerated steers		Winter steers		Winter heifers	
	HCW	DP	HCW	DP	HCW	DP
Actual	722.81	62.67	740.45	61.90	651.56	61.30
Predicted	735.91	63.78	755.67	63.23	665.52	62.67
Residual	13.10**	1.11**	15.22**	1.33**	13.96**	1.37**

Note: Double asterisk denotes that the residuals are significantly different from zero at the α .05 level.

The weighted average hot carcass weight residual is 13.8 pounds. How much does this lost carcass weight cost producers? How much does it cost beef packers? If the average carcass price paid to producers was \$114 per cwt. for 1994, then producers lost an average of \$15.73 (13.8 * \$1.14) per head. Total steer and heifer slaughter for 1994 was 33.5 million head, so that the total cost to cattle producers from lost revenue was \$527 million.

This \$527 million would be a reduction in beef packers' cost of purchasing cattle. However, they have incurred additional costs in meeting the zero tolerance regulations, and they also would have experienced a reduction in revenue since the trimmed off carcass cannot be sold as carcass or boxed beef. Additional research is needed to determine the costs beef packers have incurred in meeting the zero tolerance guidelines.