NCCC-134
APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

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Suggested citation format:

Feuz, D.M. 1998. "Economic Implications of Show List, Pen Level, and Individual Animal Pricing of Fed Cattle." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL. [http://www.farmdoc.uiuc.edu/nccc134].

Economic Implications of Show List, Pen Level, and Individual Animal Pricing of Fed Cattle

Dillon M. Feuz

Fed cattle are currently sold on a show list (several pens of market ready cattle), pen by pen, or individual head basis and may be priced using live weight, dressed weight, or gird or formula pricing. Analysis of 85 pens, 5520 head, of fed cattle revealed that marketing level ie., show list, pen, or individual, had only limited impact on the variability of revenue on a pen average basis. Moving from live weight to dressed weight pricing did slightly increase the variability of pen average revenue. Revenue variability on an individual head basis increased with grid pricing. In explaining revenue variability, weight explained the majority of the variation in revenue. Marbling difference may account for about 25 percent of the variation, depending upon time period and grid. Fat thickness and ribeye area accounted for less than three percent of the variation in revenue.

Introduction

The structure of the cattle feeding and meat packing industries continues to evolve. Many of the structural changes are driven by concerns to improve the efficiency of operations and reduce per unit costs of production by spreading fixed costs over more units, i.e., increase the size of the operation. As both the cattle feeding and meat packing industries have changed, the price negotiation process for fed cattle has changed considerably (Bailey et al., 1993 and Ward, 1987). Has the increases in operational efficiency come at the expense of pricing efficiency? What are the economic implications of current fed cattle marketing practices?

Fed cattle pricing has been based predominantly on a live weight basis. Prior to the 1970's, many fed cattle were sold through terminal auctions. Buyers bid for each pen of cattle and the seller could take the highest bid. Auctions tend to increase pricing efficiency but decrease operational efficiency. As both packers and feedlots increased in size, many of them began trading cattle direct, by-passing the terminal markets. Presently, only a very limited volume of fed cattle are sold through terminal markets. In the last several years there has also been an increase in the proportion of fed cattle sold on a dressed or carcass weight basis. In 1980, only 27% of fed cattle were sold on a carcass weight basis and that increased to 45% in 1994 (Grain Inspection Packers and Stockyards Administration).

Another practice that has evolved is for the majority of cattle to sell on the same day within a few hours of active trading. Many large feedlots sell the entire show list (several pens of market ready cattle) at one price. This practice most likely reduces marketing costs, including

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time, but is detrimental to pricing accuracy. Cattle feeders have long complained that most fed cattle are bought "on the average." This implies both an average price and an average quality. They assert that higher quality cattle receive the same price as lower quality cattle. This is certainly the case if the entire show list is sold at the same price. However, research has shown that at least some value differences are reflected in transaction prices for individual pens of cattle (Jones et al., 1992; Ward, Koontz, and Schroeder, 1996). Pens of cattle with expected higher quality grades, lower yield grades, and higher dressing percentage for live weight sales receive higher prices. However, Jones et al. found that differences in live weight prices only reflected about 25% of the value differences at the wholesale level. Many packers and feeders agree that buying cattle on averages is bad for the industry and that it does not send necessary price signals to producers.

Price discovery needs include pricing fed cattle to more closely reflect wholesale value. Value based marketing and value based pricing are concepts meant to link price and value more directly. The direction needs to move from marketing a show list at one price, to marketing each pen of cattle at a different price, to marketing each animal at a different price, i.e., a price reflecting its true value.

Several efforts have been made to move toward value based marketing and pricing. Among them are exclusive marketing agreements, strategic alliances, formula pricing, and grid pricing. Value-based pricing, given current technology, requires pricing fed cattle on carcass traits, not live animal characteristics. Most grids today are an expanded version of selling cattle on a "grade and yield" basis in the past. Past research shows that pricing accuracy, i.e., how closely fed cattle prices reflect actual wholesale values, increases as cattle pricing moves from live weight, to dressed weight, to dressed weight and grade (Feuz, Fausti, and Wagner, 1993).

The objective of this research is to examine the transmission of economic signals from packers to producers when cattle are priced on a 1) showlist basis, 2) pen basis, and 3) individual carcass basis. Both live weight and carcass weight pricing will be considered for the showlist and pen pricing and two different packer grids will be considered for the individual carcass pricing. A brief discussion of current value based marketing efforts is included with the objective of understanding those practices that enhance pricing efficiency and those practices that do not enhance pricing efficiency.

Value Based Marketing

There are numerous pricing grids, packer formulas, and strategic alliances now available to price fed cattle. The USDA-AMS is now reporting weekly from seven major packers the average and range of premiums and discounts being offered on their grids and formulas. What is the difference between a grid, a formula, or an alliance?

Pricing Grid

Table 1 contains a representation of a basic pricing grid. For most grids the base price is for a USDA Choice, Yield Grade 3, 550-950 pound carcass. The base price is frequently tied to the relevant cash market, e.g., the five day average Nebraska top, or $1 over the Kansas direct trade. However, in interviews with feeders and packers, Schroeder et al., 1998, found that several base prices were being used: specific market reported prices, plant average prices, boxed beef cutout prices, futures market prices, and other negotiated prices. The premiums and discounts may change weekly, based on supply and demand conditions, or may be fixed for some period of time. If the grid is a "packer grid" the premiums and discounts will generally change. However, some of the grids associated with specific breed alliances have fixed premiums and discounts. Over time, the premiums for yield grade 1 and 2 carcasses, the upper choice and prime premium over choice, the standard discount compared to select carcasses, and the discounts for light or heavy carcasses have remained quite stable or fixed on many grids. However, the choice-select spread and the yield grade 4 discount are more variable with many grids and are dependent upon market conditions.

Formula Price

A formula pricing agreement may be based on a grid similar to the grid in Table 1. Other formula agreement may be a fixed premium over the live or dressed market if a percentage of the pen or show list is within acceptable standards for the agreement. Generally, formula agreements

Table 1. An Example Grid Pricing System (Carcass $/cwt)

(Assumes base Choice Yield Grade 3 price $105/cwt, Choice/Select spread $6.25/cwt)

	Yield Grade				
Quality Grade	1	2	3	4	5
Prime	8.00	7.00	6.00	-14.00	-19.00
CAB	3.00	2.00	1.00		
Choice	2.00	1.00	**105.00**	-20.00	-25.00
Select	-4.25	-5.25	-6.25	-26.25	-31.25
Standard	-24.50	-25.5	-26.50	-46.50	-51.50
Dark Cutters, Stags, etc.		-20.00			
Greater Than 950 lbs.		-25.00			
Less Than 550 lbs.		-25.00			

are exclusive agreements between individual packers and individual feeders. However, the same formula offered by a particular packer to one feeder would likely be offered to other qualifying feeders

Alliances

An alliance can be defined as any formal or informal agreement between different segments of the beef industry. Most of the alliances involve cow-calf producers and cattle feeders, and the cooperation of a specific beef packer. Almost all of the alliances are using a grid or formula to establish the fed cattle price. However, there are generally additional criteria the cattle have to meet to qualify to be sold through the alliance. Several of the cattle breed associations have established alliances that are based on cattle having some percentage of that breed. Some feed companies have established alliances for producers who use their feeds and follow a recommended feeding program. Other groups have established alliances based on location of cattle, organically produced cattle, or other management criteria.

Base Price Considerations

An important issue regarding base prices is the use of a formulated price based on plant averages. Plant averages have important implications to the value of specific pens of cattle and to the efficiency of the market in general. Many base prices are adjusted on a plant-by-plant basis, in response to the type of cattle being slaughtered at that plant. Plant average dressing percentages are used to adjust live base prices to carcass equivalent prices. Generally speaking, cattle that have a higher dressing percentage than the plant average, will receive a price premium. Base prices are frequently adjusted for the percentage of cattle grading choice or higher at the plant. Yield grades may also be used in arriving at the base price for the plant. Data from the plant's prior weekly kill or the average of the three to four weeks prior kill is used to establish base-lines for yield, quality grade and other specifications.

Feuz, 1997 has shown how changing plant averages impacts the base price for a grid and ultimately the net price received from the grid. A disadvantage of base prices tied to plant averages is that the "true value" of a pen of cattle is now relative to the plant average and not an absolute based on the quality of the pen. From a market efficiency point of view, there are different market signals being sent to producers, for producing a similar product. This creates an inefficiency in the market place, and will likely impede the efforts of the beef industry to improve the quality and consistency of their product.

Data & Procedures

Detailed carcass data on 85 pens of fed cattle, 5,520 head, marketed throughout 1997 from numerous feedlots were collected. Table 2 contains summary statistics on the carcass characteristics of these cattle. The pens were not randomly selected but are all pens from one

Table 2. Summary Statistics on the Carcass Characteristics of the 85 Pens and 5520 Individual Fed Cattle.

	85 Pens		5520 Individual Fed Cattle	
	Mean	Std. Dev.	Mean	Std. Dev.
Live Weight (lbs)	1203.24	74.9140		
Dressing Percent (%)	62.81	1.1550		
Hot Carcass Weight (lbs)	755.80	49.2021	758.41	80.1684
Marbling Score ([1])	4.32	0.4361	4.30	0.8960
Percent Choice or Above (%)	60.99	19.0107		
Yield Grade (1-5)	2.21	0.3661	2.23	0.7091
Fat Thickness (inch)	0.41	0.1065	0.41	0.1940
Ribeye Area (sq. inch)	12.81	0.8541	12.74	1.4489

[1]Marbling Score: 1-2 Standard, 3 Select, 4 Low Choice, 5 Choice, 6 High Choice, 7-8 Prime.

large meat packer and are pens that cattle producers requested to receive detailed carcass data. The pens ranged in number of head per pen from 20 to 205 and averaged 65 head per pen. The cattle appear to be typical of the cattle killed in the USDA defined region 7-8 (IA, KS, MO, NE, CO, MT, ND, SD, UT, & WY). The cattle had an average live weight of just over 1200 pounds, dressed out at 62.8 percent, averaged 61 percent choice or above, and had an average yield grade of 2.2. The range in the percent of the pen grading choice or above was from 15 to 96 percent.

Sales were simulated over three pricing levels, two time periods, and three pricing methods and average revenue per pen and individual revenue per head were determined for each marketing scenario. The three pricing methods are live weight, dressed weight, and grid based pricing. Two different packer grids are used. One is more representative of a grid that has larger premiums and discounts associated with quality grades and generally has lower premiums and discounts associated with yield grades. The other grid has higher premiums and discounts associated with yield grades, and has lower premiums and discounts associated with quality grades. Both grids use plant average adjusted base prices which impact the net price received from the grid. The two time periods are the first week in December, 1996, and the first week of May, 1997. The December time period was one in which the choice-select spread was relatively large and the May time period had a more typical spread. The general price level was fairly similar for the two time periods. The three pricing levels are show list, pen level, and individual animal pricing. For show list pricing all 85 pens are sold at the same average market price. The

percentage of cattle grading choice or above and dressing percent were used to differentiate prices on a pen level. Those pens that were within one standard deviation of the average for the two variables received the same price. Pens that exceeded 80 percent choice received a $1.00/cwt. premium dressed and a $0.50/cwt. premium live and pens that were less than 42 percent choice received an equivalent discount. For live weight pricing, pens that exceeded 63.97 dressing percent or were less than 61.65 dressing percent received a $1.00/cwt. premium or discount, respectively. The prices used in the analysis are displayed in Table 3.

Table 3. Prices used in the Analysis. (Dollars/cwt.)

	Show list		Pen Level		Choice-Select Spread	Grid A Base	Grid B Base
	Live	Dressed	Live	Dressed			
Dec. '96	67.77	111.48	66.27-69.27	110.48-112.48	19.06	118.50	118.71
May '97	68.94	111.09	67.44-70.44	110.09-112.09	6.79	114.00	13.71

Regression analysis was used to analyze the variation in revenue per head under pen level pricing and individual animal pricing for each time period and pricing method. By definition, show list revenue is equal to price times weight and since price is constant across all pens, weight is the only variable. At the pen level, the available data for analysis are average live weight (**LW**), average dressed weight (**DW**), dressing percentage (**DP**), percentage of pen grading choice or above (**CPLUS**), and average yield grade (**YG**). On each individual animal hot carcass weight (**HCW**), marbling score (**MS**), fat depth over the 12th rib (**FAT**), and ribeye area (**REA**) are the collected data.

Research has shown that consumers want a consistent, tender, palatable cut of beef with minimal outside fat cover (Smith et al. 1995). Consumers want pounds of lean red meat. Therefore, if the marketing system were functioning efficiently, production of fat should be penalized, higher yielding, heavier muscled cattle should receive a price premium, and cattle with a more tender, palatable carcass should also receive a premium. At the individual animal level, **FAT** should be negatively related to revenue, **REA** a measure of muscling should be positively related to revenue, and **MS** a subjective measure of tenderness and palatability should be positively related to revenue. Weight should also be positively related to revenue, but may not be linearly related since major price discounts occur for light, generally less than 550 pounds, and heavy, generally greater than 950 pounds, carcasses. At the pen level, **YG**, a subjective measure of fat depth and muscling, should be negatively related to revenue, and **CPLUS**, an even more

subjective measure of carcass tenderness and palatability should be positively related to revenue. One would also expect **LW**, **DW** and **DP** to all be positively related to revenue.

The following equations were analyzed using OLS regression procedures for pen level and individual animal data:

Pen Level

$$LREV = b_o + b_1 LW + b_2 DP + b_3 CPLUS + b_4 YG + e$$

$$DREV = b_o + b_1 HCW + b_2 CPLUS + b_3 YG + e$$

$$GREV = b_o + b_1 HCW + b_2 HCW^2 + b_3 CPLUS + b_4 YG + e$$

Individual Animal Data

$$GREV = b_o + b_1 HCW + b_2 HCW^2 + b_3 MS + b_4 FAT + b_5 REA + e$$

where LREV, DREV, and GREV are live weight revenue, dressed weight revenue, and grid revenue, respectively. Each equation is estimated separately for the two different time periods and the grid revenue equation is estimated separately for the two different packer grids.

Coefficients of separate determination were calculated for each regression result to determine the influence of each independent variable on revenue, i.e., which factors are being most rewarded by the marketing system. The sum of the coefficients of separate determination is equal to the R^2 value for each regression equation. By accounting for the correlation between and the variability of each of the independent variables, the coefficient of separate determination effectively separates out the amount of variation in the dependant variable explained by each independent variable. The first step in calculating this coefficient is to calculate a beta coefficient (β) defined as the regression coefficient for that variable multiplied by the ratio of that variables standard deviation to the standard deviation of the dependant variable (Ezekiel and Fox). Burt and Finley have shown that for the n variable case the coefficient of separate determination is equal to:

$$C_1 = \sum_{i=1}^{n} \beta_1 \beta_i r_{1i}$$

$$C_n = \sum_{k=1}^{N} \beta_n \beta_k r_{nk}$$

where β is the beta coefficient and r is the simple correlation coefficient.

Coefficients of separate determinations determine the relative weight or importance of each independent variable in explaining revenue differences. This will be used as a proxy for the transmission of economic signals.

Results

Summary statistics on average revenue per pen and revenue for each individual animal are displayed in Tables 4 & 5, respectively. Feuz, Fausti, and Wagner have shown that revenue variability increased on a per head basis if marketing method went from live weight to dressed weight to dressed weight and grade. Does per pen revenue variability increases when going from live weight to dressed weight to grid pricing and when going from show list to pen level to individual animal pricing? From Table 4, it appears that there was a slight increase in variability in going from live to dressed weight pricing. However, depending upon the packer grid and the time period, per pen revenue variability may or may not increase from selling on a grid compared to dressed weight pricing. There is also no indication that moving from show list to pen level marketing increases per pen revenue variability. Per head revenue variability (Table 5) does substantiate the earlier work of Feuz, Fausti, and Wagner, in that revenue variability did increase in going from live to dressed weight to dressed weight in grade, or in this case, grid marketing. However, producers are paid on a pen basis, not an individual head basis, even if cattle are priced on an individual head basis. Therefore, it would appear that pricing method and pricing level have only a minimal impact on per pen revenue variability.

What factors do explain the variation in per pen revenue. Table 6 contains the results of estimating the regression equations using pen level data. All of the independent variables were significant and had the expected sign with the exception of yield grade. Yield grade was not significant with live or dressed weight pricing at the pen level. Weight was positively related to revenue and was non-linear with grid pricing. The percentage of the pen grading choice or above was positively related to revenue and yield grade was negatively related to revenue. While the variables show up as statistically significant, what weight do each of the variables carry in explaining revenue differences?

Table 4. Mean and Variability of Revenue of 85 Pens of Fed Cattle with Sales Simulated over Three Pricing Levels, Two Time Periods and Three Pricing Methods ($/Head).

Level	Time	Pricing Method	Mean	Standard Deviation	Coefficient of Variation
Show list	Period 1	Live Weight	815.44	50.7692	6.23%
	Period 2	Live Weight	829.51	51.6457	6.23%
	Period 1	Dressed Weight	833.57	54.8505	6.58%
	Period 2	Dressed Weight	830.62	54.6506	6.58%
Pen Level	Period 1	Live Weight	815.73	51.5533	6.32%
	Period 2	Live Weight	829.81	52.4205	6.32%
	Period 1	Dressed Weight	833.55	54.7044	6.56%
	Period 2	Dressed Weight	830.60	54.5130	6.56%
Individual	Period 1	Grid A	837.12	60.1350	7.18%
	Period 2	Grid A	837.48	53.8294	6.42%
	Period 1	Grid B	849.55	57.6395	6.78%
	Period 2	Grid B	839.82	53.8295	6.41%

Table 5. Mean and Variability of Revenue of 5520 Head of Fed Cattle with Sales Simulated over Three Pricing Levels, Two Time Periods and Three Pricing Methods ($/Head).

Level	Time	Pricing Method	Mean	Standard Deviation	Coefficient of Variation
Show list	Period 1	Live Weight	816.07	84.3155	10.33%
	Period 2	Live Weight	830.16	85.7711	10.33%
	Period 1	Dressed Weight	836.47	89.3717	10.68%
	Period 2	Dressed Weight	833.51	89.0590	10.68%
Pen Level	Period 1	Live Weight	817.69	85.2067	10.42%
	Period 2	Live Weight	831.70	86.6572	10.42%
	Period 1	Dressed Weight	836.59	89.2892	10.67%
	Period 2	Dressed Weight	833.63	88.9768	10.67%
Individual	Period 1	Grid A	838.97	125.6655	14.98%
	Period 2	Grid A	839.79	98.7333	11.76%
	Period 1	Grid B	851.23	113.5948	13.34%
	Period 2	Grid B	841.85	94.9917	11.28%

Table 6. Results of Regression Analysis to Explain Revenue Differences of 85 Pens of Fed Cattle with Sales Simulated over Two Pricing Levels, Two Time Periods and Three Pricing Methods.

	Pen Level		Individual Animal Pricing			
	Live	Dressed	Grid A P1	Grid A P2	Grid B P1	Grid B P2
Intercept	-333.40** (24.3114)	-16.34** (4.5680)	-705.77** (168.2436)	-572.30** (168.2436)	-783.94** (160.3181)	-685.56** (146.7647)
Live Weight	0.6825** (0.0057)					
Dressing Percent	5.1650** (0.3737)					
Carcass Weight		1.1138** (0.0054)	2.7662** (1.0270)	2.5696** (0.4057)	3.1199** (0.9111)	2.9664** (0.3893)
Carcass Weight Sq			-0.0011** (0.0003)	-0.0010** (0.0003)	-0.0013** (0.0003)	-0.0013** (0.0003)
Choice or above	9.9460** (2.5790)	17.9614** (1.5551)	79.1865** (4.8954)	78.0503** (4.4504)	141.3421** (4.6648)	62.5721** (4.2704)
Yield Grade	-1.1889 (1.3121)	-1.3055 (0.8121)	-5.0958* (2.5583)	-5.0958* (2.3258)	-16.7420** (2.4378)	-16.0087** (2.2317)
Adj. R^2	0.99	0.99	0.98	0.98	0.98	0.98

Note 1: Single and double asterisks indicate significance at the 0.05 and 0.01 level, respectively.
Note 2: Standard Errors are in Parentheses.
Note 3: Only Results for Period 1 are shown for Pen Level Models. The only coefficient that changes is associated with weight, reflecting price changes between periods.

Results of calculating the coefficients of separate determination are displayed in Figures 1 and 2. From Figure 1, live or dressed weight explains 100 percent of revenue variation if cattle are sold on a show list level and either sold live or dressed weight. If cattle are sold on an individual pen level, then live weight accounts for 96.7 percent and dressing percent accounts for 2.9 percent of the revenue variation when selling on a live weight basis. If selling on a dressed weight basis, carcass weight explains 99.7 percent of the variation. The percentage of cattle grading choice or above and yield grade account for less than 0.5 percent of the variation.

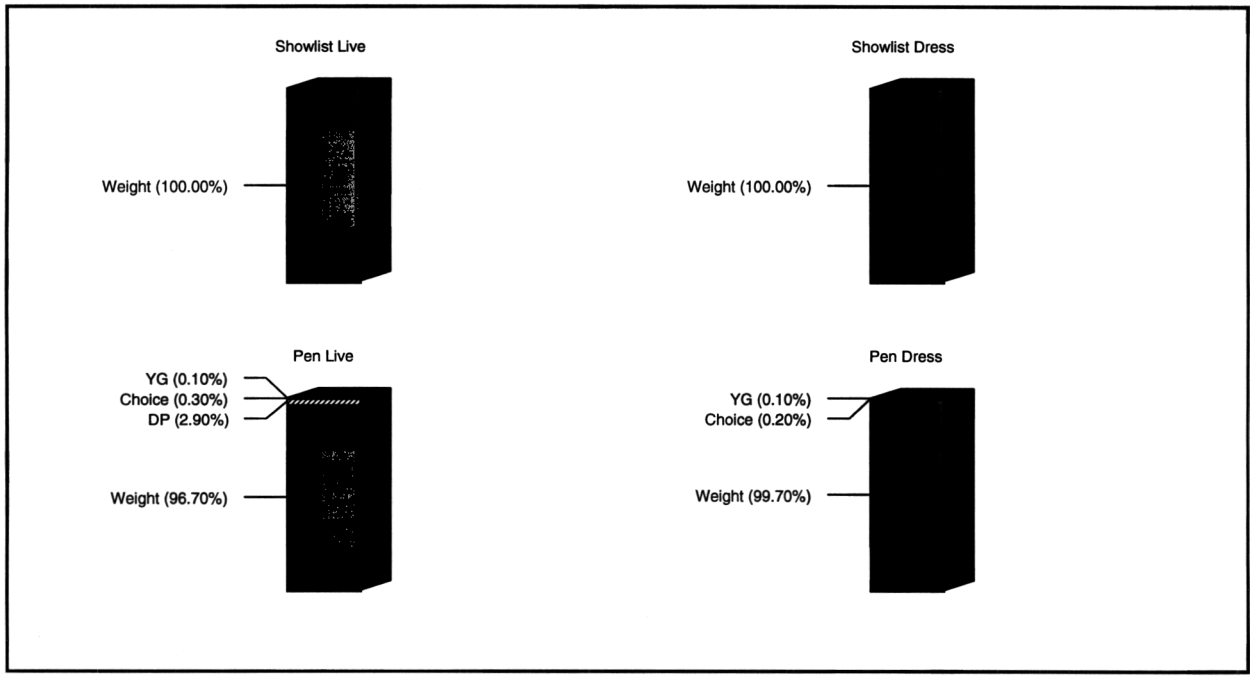

Figure 1. Proportion of variation in revenue explained by weight and other factors if cattle are sold on a live or dressed weight basis.

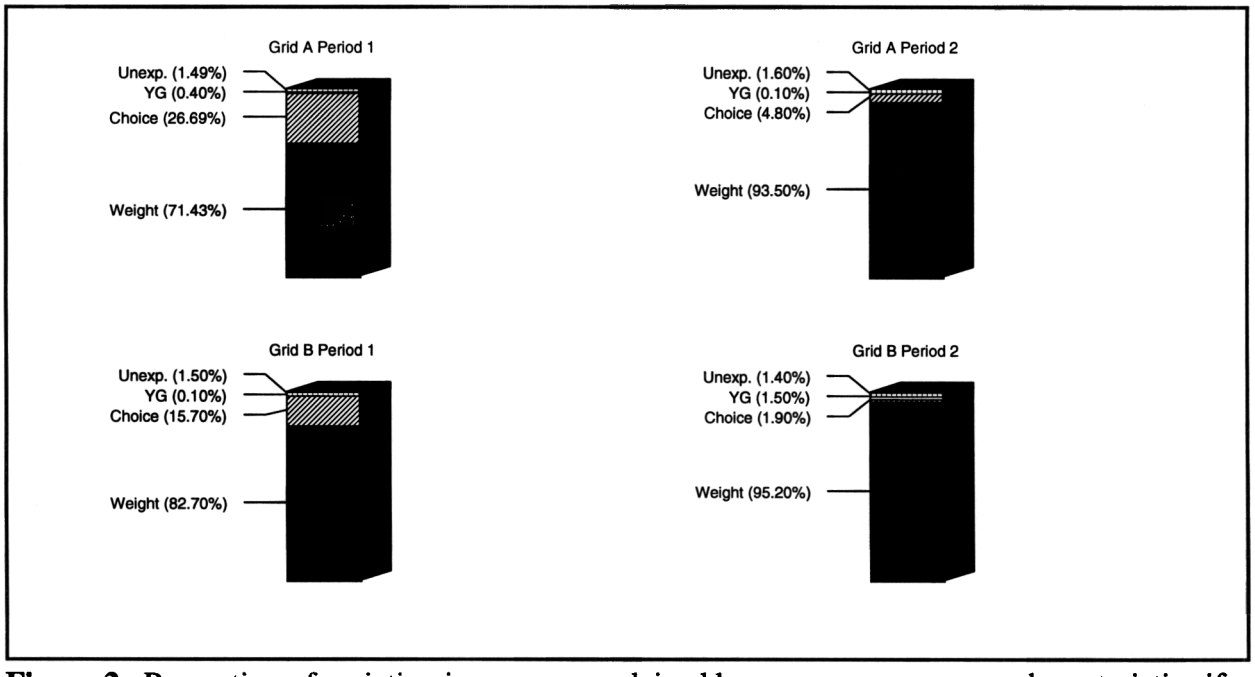

Figure 2. Proportion of variation in revenue explained by pen average carcass characteristics if cattle are sold on a grid.

If the cattle are sold on a grid, but only pen level data are collected, then carcass weight explains between 71 and 95 percent of the variation in revenue depending upon the grid and the time period. The percentage of the cattle grading choice or higher may explain as much as 27 percent or as little as two percent of the per pen revenue variation. Yield grade only accounts for 0.1 to 1.5 percent of the variation. At the pen level, it does not appear that the market is very efficient at transmitting consumer desires for a consistent, lean, tender, and palatable beef product back to producers in the form of increased revenue for that product.

What information is available at the individual head level to help producers respond to the market? The results of estimating the regression equation to explain revenue differences on an individual head basis when selling on a grid are contained in table 7. All of the independent variables are significant and have the anticipated sign, with the exception of ribeye area that is

Table 7. Results of Regression Analysis to Explain Revenue Differences of 5520 Head of Fed Cattle with Sales Simulated over Two Pricing Grids and Two Time Periods.

	Grid A		Grid B	
	Period 1	Period 2	Period 1	Period 2
Intercept	-905.6266**	-726.1459**	-1052.6798**	-906.2714**
	(44.0447)	(24.3808)	(39.9154)	(24.1478)
Carcass Weight	2.6592**	2.6595**	3.2896**	3.2511**
	(0.1158)	(0.0641)	(0.1049)	(0.0635)
Carcass Weight Squared	-0.0010**	-0.0010**	-0.0014**	-0.0014**
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Marbling Score	76.9922**	35.5015**	56.9946**	25.3128**
	(0.8535)	(0.4724)	(0.7735)	(0.4679)
Fat Thickness	-16.8211**	-21.8686**	-41.0819**	-42.7426**
	(4.1304)	(2.2864)	(3.7432)	(2.2645)
Ribeye Area	0.7025	0.7685*	2.4166**	2.3896**
	(0.6045)	(0.3346)	(0.5479)	(0.3314)
Adjusted R^2	0.82	0.91	.82	0.91

Note 1: Single and double asterisks indicate significance at the 0.05 and 0.01 level, respectively.
Note 2: Standard Errors are in Parentheses.
Note 3: Marbling Score: 1-2 Standard, 3 Select, 4 Low Choice, 5 Choice, 6 High Choice, 7-8 Prime.

not significant for Grid A in time period 1. Carcass weight is positively related to revenue and is non-linear decreasing with increased weight. Marbling score is positively related to profits, but the magnitude of this variable on revenue changes considerably by grid and by time period. Fat thickness over the 12th rib is negatively related to revenue. The coefficient on this variable is more stable over time than is marbling score but it also varies significantly by packer grid. Ribeye area is positively related to revenue, its coefficient appears stable over time, but it does vary by grid.

The results of calculating the coefficients of separate determination, ie., determining the proportion of variation explained by each independent variable, are graphically depicted in Figure 3. Carcass weight still explains from 38 to 78 percent of the variation in revenue. Marbling score accounts for 6 to 24 percent of the variation, depending upon time period and grid. Not surprising, the proportion of revenue variation explained by marbling under Grid A, which placed larger premiums and discounts on various quality grades, was larger than for Grid B. Marbling score was also more heavily weighted in the first time period, when the choice-select spread was larger. Fat thickness and ribeye area accounted for less than three percent of the variation. It would appear that if producers are willing to pay for the individual carcass data, then they may receive some consumer signals regarding tenderness and palatability. However, these signals are not clear. They vary by time period and by grid. It would appear that information on fat thickness and ribeye area are of only limited value.

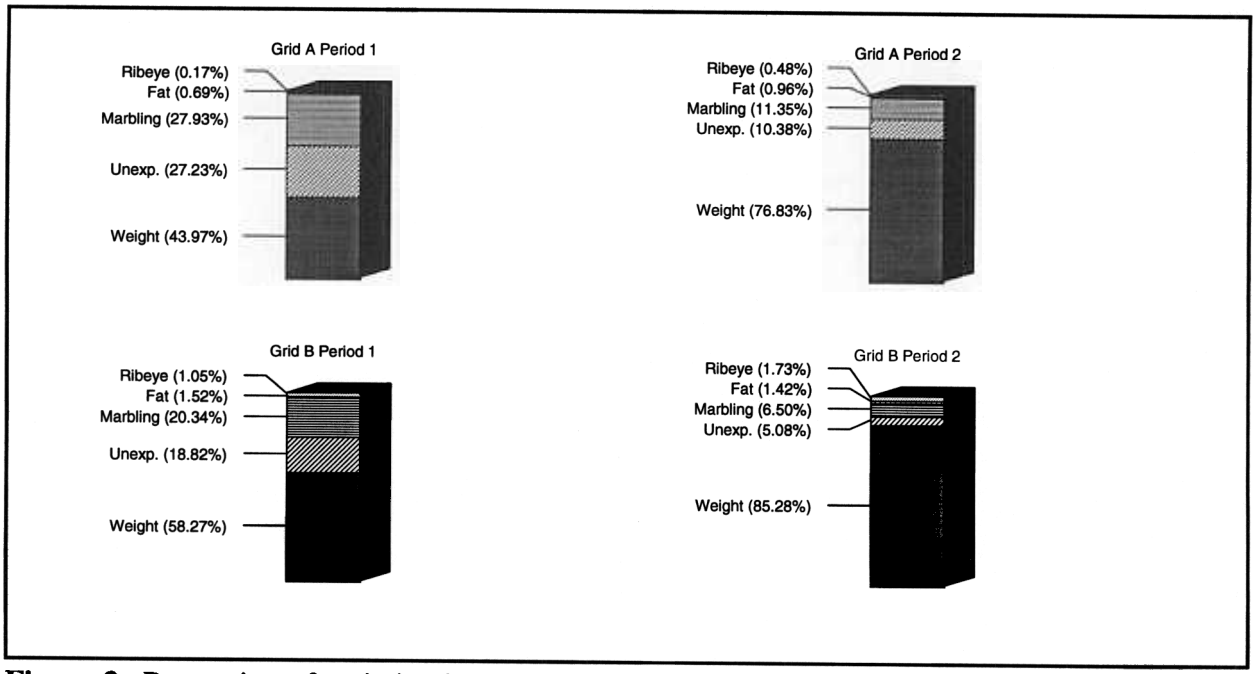

Figure 3. Proportion of variation in revenue explained by individual carcass characteristics if cattle are sold on a grid

Summary

There is concern in the beef industry that present marketing practices may be impeding the transmission of economic signals from consumers to producers. If there are not clear economic signals reaching producers, then it is not likely that producers will alter their management practices to produce a product that is more desirable to consumers. Presently, fed cattle may be sold on a show list (several pens of market ready cattle), pen by pen, or individual head basis and may be priced using live weight, dressed weight, or gird or formula pricing. Are all these marketing practices equal in transmitting economic signals from consumers to producers?

Analysis of data on 85 pens, 5520 head, of fed cattle revealed that marketing level ie., show list, pen, or individual, had only limited impact on the variability of revenue on a pen average basis. Moving from live weight to dressed weight pricing did slightly increase the variability of pen average revenue. The variability of pen revenue from selling on a grid was impacted by the specific grid and time period. In some cases variability increased relative to dressed weight and in other cases variability decreased. Revenue variability on an individual head basis increased with grid pricing. However, since producers receive payment on a pen basis, this may not be a relevant measure of potential risk.

In explaining revenue variability, weight explained 100 percent of the variation if cattle are sold on a show list basis. Even when pricing individual pens, weight still accounts for over 95 percent of the variation in revenue. If cattle are sold on a grid, but only pen average data are collected, then weight accounts for 71 to 95 percent of the variation and the percentage of the pen grading choice or higher accounts for 2 to 27 percent of the variation in revenue depending upon the grid and time period. If individual data are collected from selling on a grid, then weight explains from 38 to 78 percent of the variation in revenue. Marbling score accounts for 6 to 24 percent of the variation, depending upon time period and grid. Fat thickness and ribeye area accounted for less than three percent of the variation. If producers are willing to pay for the individual carcass data, then they may receive some consumer signals regarding tenderness and palatability. However, these signals are mixed and vary by time period and by grid. Information on fat thickness and ribeye area are of only limited value.

Clearly, market signals are more likely to reach producers if cattle are priced individually However, present grid pricing practices may be sending mixed signals to producers. That may not be all bad. Not all consumers desire the same product. It is likely that pricing efficiency improves with grids and operational efficiency may also improve if producers can identify the type of cattle they are producing and sell them on a grid that rewards that type of cattle. Those different types and qualities of cattle can then be marketed to different consumer markets.

References

Bailey, D., C. Bastian, G. Glover, and D. Menkhaus. 1993. The Changing Meat Industry: Implications for the Beef Sector and Cooperative Extension's Role, Position Paper, Western Extension Marketing Committee, Utah State University, Logan, UT.

Burt, O.R. and R.M. Finley. 1980. "Statistical Analysis of Identies in Random Variables." *American Journal of Agricultural Economics*, vol 62:574.

Ezekiel, M. and K.A. Fox. 1959. *Methods of Correlation and Regression Analysis*, 3rd ed., John Wiley, New York.

Feuz, D.M. 1997. "Pricing/Formula Grids: Which Fit and Which Don't Fit." Proceedings of the 1997 Range Beef Cow Symposium XV,Rapid City, SD. December 9-11.

Feuz, D.M., S.W. Fausti and J.J. Wagner. 1993. "An Empirical Analysis of the Efficiency of Four Alternative Marketing Methods for Slaughter Cattle." *Agribusiness An International Journal,* vol 9(5):453-463.

Grain Inspection Packers and Stockyards Administration, United States Department of Agriculture, *Packers and Stockyards Statistical Report,* several years, 1989-95.

Jones, R., T. Schroeder, J. Mintert, and F. Brazle. 1992. "The Impacts of Quality on Cash Cattle Prices." Souther Journal of Agricultural Economics, 24(2):149-162.

Schroeder, T.C. , C.E. Ward, J.R. Mintert, D.S. Peel. 1998. "Value-Based Pricing of Fed Cattle: Challenges and Research Agenda" *Review of Agricultural Economics* In Press.

Smith, G.C., J.W. Savell, H.G. Dolezal, T.G. Field, D.R. Gill, D.B. Griffin, D.S. Hale, J.B. Morgan, S.L. Northcutt, J.D. Tatum. 1995. *Improving the Quality, Consistency, Competitiveness, and Market-Share of Beef. The Final Report of the Second Blueprint for Total Quality Management in the Fed-Beef (Slaughter Steer/Heifer) Industry. National Beef Quality Audit.* Conducted by Colorado State University, Texas A&M University, and Oklahoma State University for the National Cattlemen's Association.

Ward, C.E. 1987. "Market Structure Dynamics in the Livestock-Meat Subsector: Implications for Pricing and Price Reporting," in Key Issues in Livestock Pricing: A Perspective for the 1990's, W. Purcell and J. Rowsell (eds.). Research Institute on Livestock Pricing, Department of Agricultural Economics, Virginia Tech., Blacksburg, VA.

Ward, C.E., S.R. Koontz, and T.C. Schroeder. 1996. "Short-Run Captive Supply Relationships with Fed Cattle Transaction Prices." Role of Captive Supplies in Beef Packing. Washington, D.C.: Grain Inspection, Packers and Stockyards Administration, U.S. Department of Agriculture, GIPSA-RR96-3.