Factors Influencing the Extent

of Grid Pricing of Fed Cattle

by

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Practitioner's Abstract: *Motives for grid pricing of fed cattle have been identified in previous research. Also, estimates of grid pricing exist from feedlot surveys and data generated via mandatory price reports since 2001. However, no research has attempted to estimate factors influencing the extent of grid pricing by cattle feeders. Cattle feedlot respondents to a survey primarily in Nebraska, Colorado, Kansas, and Texas reported a wide range of grid pricing use in 2003. Two groups of feedlot respondents were created; those using grid pricing for half or less of their fed cattle marketings in 2003 and those using grid pricing for more than half of their marketings. Ordinary least squares and ordered logit models were estimated to determine factors affecting grid pricing use for the two comparison groups. For many potential factors influencing grid pricing, no significant differences were found between groups. The two most robust factors were the percent of fed cattle sold to the largest buyer and the percent of fed cattle marketed with some type of agreement, contract, or through an alliance or cooperative. Other significant factors related to market conditions and expected carcass performance of the cattle. However, results were neither consistent nor strong enough to explain the sharp drop in formula pricing fed cattle during the third year following implementation of mandatory price reporting.*

Keywords: Cattle, Fed cattle, Marketing, Pricing, Grid pricing

Introduction

Previous research shows a distinct trend toward grid pricing of fed cattle, away from live weight and dressed weight cash market pricing (Schroeder et al. 2002). Cattle feeder survey respondents reported pricing 16% of fed cattle with a grid in 1996, 45% in 2001, and anticipated using a grid to price 62% of fed cattle marketed in 2006.

Since implementation of the Livestock Mandatory Reporting Act in April 2001, additional information is available on the methods of procuring and pricing fed cattle. Both volume and price levels for packer procurement of fed cattle by several methods now can be tracked weekly; including negotiated pricing, formula pricing, forward contracting, and packer owned deliveries (Ward 2004a, 2004b). Formula pricing was the predominant method of pricing fed cattle on a grid, both based on a survey of feeders (Schroeder et al. 2002) and data since mandatory price reporting (Ward 2004a). In 2001, formula pricing accounted for 46.7% of fed cattle purchases and increased to 49.1% in 2002, quite consistent with the feedlot survey findings in Schroeder et al. 2002. However, in 2003, the extent of formula pricing dropped sharply, to 34.0%.

Considerable research has been conducted on grid pricing, most dealing with price, revenue, and profit level implications, risk differences, and market signals associated with grid pricing (Feuz, Fausti, and Wagner 1993, 1995; Fausti and Feuz 1995; Schroeder and Graff 2000; Anderson and Zeuli 2001; Feuz 1999; Fausti and Qasmi 2002; McDonald and Schroeder 2003; Whitley 2003). Schroeder et al. 2002 identified the primary motives for using grid pricing. The three predominant motives were to receive premiums for carcass attributes, to receive carcass data from packers, and to receive a higher base price. However, no research has addressed how much

influence market conditions and related factors influence the use of grid pricing and whether or not these factors can explain the apparent sharp change in grid pricing usage during 2003-04. Was the decline a short-term, temporary response to unusual market conditions in 2003 or the beginning of a trend away from formula pricing and grid pricing due to concerns or unsatisfying experiences with grid pricing?

This research had a single, focused objective: to determine factors affecting the extent of grid pricing by cattle feeders for fed cattle. Is the extent of grid pricing affected by market conditions, learning on the part of cattle feeders, concerns with grid pricing, characteristics of cattle fed, characteristics associated with cattle feeding firms, or other factors? The purpose of this paper is to report results from a cattle feeder survey conducted in September 2004 intended to fill another hole in the developing literature on grid pricing by cattle feeders and packers.

Survey and Data Summary

A survey was conducted in September 2004 of cattle feeders in Nebraska, Colorado, Kansas, Oklahoma, Texas, and New Mexico to capture data relevant to the issue addressed in this research.[1] Cattle feeders surveyed were members of the Nebraska Cattlemen's Association, Colorado Livestock Association, Kansas Livestock Association, or Texas Cattle Feeders Association.[2] Approximately 500 questionnaires were mailed and 147 completed questionnaires were returned, a 29.4% response. The survey instrument contained questions about the feedlots (location, size, extent of custom feeding, extent to which cattle were sold to their largest buyer) and about their marketing and pricing practices (extent of marketings under a contract or agreement and marketings by pricing methods). Then feeders ranked their agreement or disagreement on a seven-point Likert scale with several statements regarding their likelihood of pricing fed cattle with a grid. These statements related to market conditions, estimated carcass characteristics of the cattle being sold, previous experience with grid pricing, etc. Feedlot managers were also asked about when (if) they sorted cattle in the feedlot prior to marketing and for what purpose. Lastly, feedlot managers were asked to state concerns they had with components of grid pricing.

Of the 147 usable questionnaires returned, 31 respondents did not use grid pricing in 2003. Since the focus of this research was factors affecting grid pricing use, the remainder of the paper refers to the 116 respondents who used grid pricing for some or all of the fed cattle they marketed in 2003. Table 1 provides summary information about the cattle feeder respondents; state where most of their fed cattle were fed, marketings in 2003, and extent of grid pricing. Over half the respondents (64.3%) were from Nebraska and Kansas. Barely over half marketed less than 20,000 fed cattle in 2003. The extent of grid pricing varied from 1 to 100% with 59.5% using grid pricing for 40% or less of their marketings in 2003 and 36.3% using grid pricing for more than 60%.

Grid pricing groups were compiled based on the extent of grid pricing use, i.e., percent of total fed cattle marketed that were priced with a grid in 2003. The objective was to determine whether or not there was a difference in factors affecting grid pricing for groups of cattle feeders

based on the extent of their use of grid pricing. Any number of criteria could be used to create grid pricing groups. For the remainder of the paper, two groups are compared; cattle feedlots marketing 50% or less of their fed cattle with a grid and those using grid pricing for more than 50% of their marketings. Statistical tests and models were also applied to groups defined as thirds, fourths, and fifths of the distribution besides halves reported here, with very similar results.

Table 2 shows feedlot characteristic differences and marketing and pricing practice differences between the two grid pricing groups. The percentage of custom fed cattle between the two groups was not significantly different. Most other differences were statistically significant. Those using grid pricing more frequently sold a higher percentage of their fed cattle to the largest buyer purchasing their fed cattle (83.6%) compared with the other group (56.5%). Cattle feeders using grid pricing more frequently sold a higher percentage of their fed cattle via an agreement, contract, or as part of an alliance or cooperative (61.2%) compared with 16.8% for the other group.

Given how the groups were created, the extent of pricing by method was not surprising. Feeders using grid pricing more heavily priced 84.0% of their fed cattle marketings with a grid compared with 18.4% on average for the other group. Those not using grid pricing as much, predictably used live weight and dressed weight pricing for a higher percentage of their marketings (46.7% and 34.7%, respectively) compared with the group using grid marketing more frequently (10.2% and 5.2%, respectively).

How the base price in grids was determined also varied between the two groups. The most common method of determining the base price for both groups was a formula tied to a quoted price. Those not using grid pricing as much, used this method for 42.2% of their marketings while the heavier users of grid pricing used it for 39.1% of their marketings. Those not using grid pricing as much reported negotiating the base price for a higher percentage of their grid priced trades (39.9%) compared with 23.5% for the heavier users of grid pricing. Those using grid pricing more often reported using a formula tied to a plant average price (or packer procurement cost) more commonly (29.6%) compared with the group not using grid pricing as much (14.3%). No significant difference was found in their use of a formula tied to the boxed beef market.

Factors Affecting Grid Pricing

Cattle feeders were asked to respond to thirteen statements believed to potentially affect their use of grid pricing. The statements came from the author with input from economists listed in footnote 1 and persons associated with the cooperating cattle organizations listed earlier. Means and rank tests were conducted to determine similarities and differences among the two groups of respondents, based on their prior use of grid pricing.

Mean and Rank Tests – Table 3 presents the mean rating for each of the statements by the two groups created based on their use of grid pricing. A ranking of 1 corresponded to strongly agree

with the statement, 4 was neither agree nor disagree, and 7 was strongly disagree. Perhaps surprisingly, how cattle feeders in the two groups responded to the statements did not differ significantly, except for a single statement.

Table 3 groups the statements into similar categories. One could argue that mean ratings closer to 1 and 7 indicated more and less importance, respectively, for the factor believed to affect grid pricing than those closer to 4, depending on how the statement was presented. While some comparison is made in the following discussion, recall there was only one significant difference between the group which used grid pricing for half or less of their marketings in 2003 and the group that used grid pricing for more than half of the fed cattle marketed from their feedlot that year. For the group using grid pricing most frequently, factors of most importance were

- when cattle were expected to fit a specific grid
- when cattle were expected to quality grade well
- when cattle were expected to dress well
- when recent experiences with grid pricing were favorable
- when cattle were expected to yield grade well.

Four of the five factors were from the Cattle Characteristics group in Table 3; with the fifth from the Other Factors group.

Among other factors presented to feeders, those of most importance were

- when there was a wide Choice-Select price difference
- when marketing with an agreement, contract, or part of an alliance or cooperative
- when there was a favorable base price.

Two of these factors came from the Price and Market Conditions group and one from the Other Factors group in Table 3.

Four of the five factors rated highest by the group using grid pricing the most also were rated most important by the group not using grid pricing as frequently. The sole statement for which there was a significant difference in the mean response related to using grid pricing when futures market prices are relatively stable. This factor was rated more important to the group using grid pricing less frequently than to the other group.

Mean differences are neither the sole criterion nor perhaps the best one on which to claim no significant differences among the two groups of cattle feeder respondents. Two nonparametric tests were also conducted on the rankings of each statement by the two groups. While not shown here, the only significant difference in rankings of the statements by the two groups according to the Wilcoxon Scores test (rank sums) or the Spearman Rank Correlation test was, again, for the statement regarding the relative stability of futures market prices.

Ordinary Least Squares and Ordered Logit Models – Two regression models were specified and estimated with SAS (SAS Institute); one with extent of grid pricing as the dependent (continuous) variable in an ordinary least squares model; and one with the extent of grid pricing group as the dependent (binary choice) variable in an ordered logit model. The ordered logit model was also estimated with three, four, and five dependent (choice) variables with similar

results. Alternative estimation methods, i.e., stepwise and adjusted R^2, were used in selecting the model to report.

Independent variables were characteristics of the feedlots, marketing and pricing practices, and response to statements regarding concerns with grid pricing or factors that affected their likelihood of using grid pricing. Responses to the thirteen statements were included in three alternative ways, with similar results. Alternatives included: (1) including a continuous variable (rating 1-7) for each statement just as respondents rated them; (2) creating a dummy variable for those agreeing (ratings 1-3) and disagreeing (ratings 5-7) with each statement compared with those neither agreeing or disagreeing (rating 4); and (3) creating a dummy variable for those most agreeing (ratings 1-3) or most disagreeing (ratings 5-7) with each statement compared to those neither agreeing nor disagreeing and responding in the opposite direction, thus comparing the majority responses (either agreement or disagreement) with all other respondents.

Ordinary least squares (OLS) estimation results are shown in Table 4. Results for the ordered logit (OL) model which included the same variables as the OLS model were essentially identical in terms of signs and significance with two minor exceptions, both relating to the significance level being just above or below 0.10. While ordered logit model results are not reported here, selected results are mentioned.

The same two variables were significant in every version of both the OLS and OL models. As the percent of fed cattle sold to the largest buyer increased, both the extent of grid pricing and the probability of a higher usage of grid pricing increased. Similarly, as the percent of fed cattle marketed with an agreement, contract, or part of an alliance or cooperative increased, both the extent of grid pricing and the probability of higher usage of grid pricing increased. The latter result was consistent with the 2002 survey of cattle feeders (Schroeder et al. 2002). The former result was not surprising to the author but was initially thought to relate to size of feedlot. However, feedlot size was rarely if ever significant in models estimated and feedlot size was not highly correlated with extent of marketings to the largest buyer. Neither was the correlation between extent of marketings to the largest buyer and use of a marketing agreement or related commitment especially high ($r = 0.504$).

Recall from above that based on mean ratings, four of the five most important statements determining whether or not to use grid pricing related to the Cattle Characteristics group. For the regression results, just one statement was significant from this group. As agreement increased that a determining factor was the expectation cattle would dress well (have a high dressing percentage), the extent of grid pricing increased. While this variable was marginally significant in the OL model, feeders agreeing with the statement were 3.4 times more likely to be in the group using grid pricing more frequently than in the group using grid pricing for half or less of their marketings.

Three significant factors determining the extent of grid pricing came from the Price and Market Conditions group, suggesting that market conditions are indeed a driving force in determining the extent of grid pricing. As agreement increased regarding the importance of a wide Choice-

Select price spread, the extent of grid pricing increased. Conversely, as disagreement increased with the the importance of a wide yield grade 4 vs. yield grade 5 price spread, feeders were less apt to use grid pricing. The importance of the Choice-Select price spread is consistent with considerable previous grid pricing research (Schroeder and Graff 2000; Anderson and Zeuli 2001; Feuz 1999; McDonald and Schroeder 2003). Feeders agreeing with the importance of the Choice-Select price difference were 12.4 times more likely to be in the group using grid pricing more frequently than in the group using grid pricing less often. Lastly, as disagreement increased with the importance of tight supplies (meaning marketing cattle "green" or with fewer days on feed) as a determining factor in grid pricing, the extent of grid pricing declined.

The two remaining significant variables were from the Other Factors and Futures Market Conditions groups. As agreement increased with the importance of expected favorable profit margins on the fed cattle being marketed, the extent of grid pricing increased.

The last statement to be discussed was very robust across models estimated, both OLS and OL models, and for various grid pricing groups. As disagreement increased with the importance of relatively stable futures market prices, the extent of grid pricing declined. In fact, the OL odds ratio was larger for this variable than any other. Feeders disagreeing with the importance of this factor were 16.0 times more likely to fall into the group using grid pricing more frequently than in the group using grid pricing less frequently. So to heavier users of grid pricing, the stability of futures prices was not very important. The relationship between relative stability of futures market prices and extent of grid pricing for the lighter users of grid pricing is not clear.

Sorting to Enhance Grid Pricing Effectiveness

Feedlot managers were asked whether or not they sorted cattle in the feedlot, when, and for what purpose. It could be argued that cattle feeders using grid pricing more frequently would be more apt to sort cattle one or more times to maximize the effectiveness of grid pricing. Survey responses bore that out. Table 5 summarizes the sorting results from feedlot manager respondents.

Feedlot managers in the group using grid pricing less frequently in 2003 reported not sorting cattle significantly less than those using grid pricing less frequently. Significant differences were also found regarding when sorting occurred. More frequent users of grid pricing sorted more often at placement and prior to marketing than the group of feeders not using grid pricing as much.

Feeders were asked to rank on a scale of 1 to 3 the purpose of sorting cattle on feed. No significant difference was found between the two grid pricing groups (Table 5). The highest mean rank for each group was to minimize "out" or severely discounted carcasses, which is consistent with much advice given by economists familiar with grid pricing. The second and third highest mean ranks differed in absolute terms between the two groups. For the group using grid pricing most frequently, the next two highest-ranking targets were quality grade and end weight.

Grid Pricing Concerns

One could argue that concerns regarding grid pricing components may influence the extent to which feedlot managers market fed cattle with grids. Feedlot managers were asked to rate their concern on a ten-point scale with components of grid pricing. A significant difference (at 0.05) was found between the two grid pricing groups for two components but not the other two.

As would be expected, feedlot managers who used grid pricing less frequently expressed greater concern regarding how the base price is determined in grids than those using grid pricing more frequently (mean rating of 8.2 and 7.2, respectively). Similarly, the same group was more concerned about the structure of premiums and discounts (mean rating of 8.0 and 6.9, respectively). No difference was found between the two groups regarding the subjective nature of quality and yield grading (mean rank of 7.4 and 7.7, respectively). However, this was the component of most concern to frequent users of grid pricing. At the bottom for both groups was concern about the absence of key factors determining the value of carcasses, such as red meat yield and tenderness, among others (mean rank 6.6 and 6.1, respectively, for the two groups).

Summary and Conclusions

Previous grid pricing research identified motives for grid pricing by cattle feeders, but no attempt has been made to empirically explain the extent of grid pricing. This research sought cattle feedlot managers' input into factors determining their use of grid pricing and related practices or concerns related to grid pricing use.

Findings indicate some differences among cattle feedlot managers who marketed more than half vs. half or less of their fed cattle via grid in 2003. Some differences were related to extent of marketings sold to the largest buyer and extent of involvement with market agreements of some form. Feedlots using grid pricing more frequently were more apt to determine the base price in grids by a formula tied to plant average prices and less negotiation with packers.

Price and market conditions also explained some of the difference in the extent of grid pricing and the difference in grid pricing groups. However, these were not consistent enough to explain the decline in formula priced trades during the third year of mandatory price reporting compared with the first two years. Neither did other significant variables in the regression and ordered logit models provide much insight into why formula priced trades declined and negotiated trades increased during the three years following implementation of mandatory price reports.

Cattle feeders using grid pricing more frequently were both more apt to sort cattle and more apt to sort at placement and prior to marketing. However the purpose for sorting between the two grid pricing groups was essentially the same, with the most important objective being to minimize "out" carcasses.

This research was intended to shed light on factors affecting grid pricing use by cattle feeders. While providing some insight and generating additional information not available in prior grid pricing research, results generally were unremarkable. Feedlot managers have several reasons to use grid pricing and the ones hypothesized to be potentially important in the feedlot survey were not strongly related to feedlot location, size, and extent of custom feeding. Neither was extent of grid pricing consistently related to many factors hypothesized by economists to influence the extent of grid pricing. It appears, each feedlot assesses its own management objectives and market-related factors in determining how to price fed cattle. Attempting to formulate policies aimed at enticing cattle feedlot managers to use or not use specific types of pricing methods (for whatever reasons), seems difficult due to the diversity of pricing behavior and diverse reasons for choosing their pricing methods.

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Endnotes

[1] Useful input on the survey instrument was obtained from Ted Schroeder, John Lawrence, Steve Koontz, and Dillon Feuz.
[2] Surveys were mailed to members of three associations by their staff; for the fourth, surveys were mailed directly from Oklahoma State University to association members.

Table 1. Selected frequency distributions from survey respondents using grid pricing in 2003

	Number of Responses	Percent of Total
Respondents by state where majority of cattle were fed		
Nebraska	42	36.5
Colorado	15	13.0
Kansas	32	27.8
Texas	20	17.4
Oklahoma, New Mexico, other	7	6.1
Respondents by size based on number of cattle marketed		
Less than 5,000 head	25	21.6
5,000-19,999	35	30.2
20,000-49,999	22	19.0
50,000-99,999	22	19.0
100,000 or more	12	10.3
Respondents by extent of marketings priced with a grid		
1-20 percent	48	41.4
21-40	21	18.1
41-60	5	4.3
61-80	17	14.7
81-100	25	21.6

Table 2. Fed cattle marketing and pricing practices, by extent of grid pricing in 2003 (NE, CO, KS, TX, OK, NM)

Practice	Grid Pricing Groups	
	50% or less of Marketings	More than 50% of Marketings
	(Percent)	
Percent custom fed	60.8	52.5
Percent sold to largest buyer*	56.5	83.6
Percent marketed with an agreement, contract, part of an alliance or cooperative**	16.8	61.2
Percent priced on a …		
Live weight basis**	46.7	10.2
Dressed weight basis**	34.7	5.2
Grid*	18.4	84.0
Percent of grid pricing when the base price is …		
Negotiated***	39.9	23.5
Formula tied to quoted prices	42.2	39.1
Formula tied to plant average****	14.3	29.6
Formula tied to boxed beef	1.4	5.5

* Different means at 0.01 significance, with equal variances
** Different means at 0.01 significance, with unequal variances
*** Different means at 0.05 significance, with equal variances
**** Different means at 0.05 significance, with unequal variances

Table 3. Mean rating of factors affecting whether or not to use grid pricing, by extent of grid pricing in 2003 (NE, CO, KS, TX, OK, NM)

	Grid Pricing Groups	
Factor	50% or less of Marketings	More than 50% of Marketings
	(Mean response)	
Price and Market Conditions		
Favorable base price	3.20	3.67
Upward trending market	4.44	4.36
Tight supplies (fewer days of feed)	5.20	5.07
Wide Choice-Select price spread	3.61	3.07
Wide YG4-YG5 price spread	4.96	4.50
Cattle Characteristics		
Quality grade well (percent Choice or better)	2.76	2.86
Yield grade well (percent YG1-2)	3.53	3.05
Dress well (high dressing percent)	3.43	2.88
Cattle expected to fit a specific grid	3.13	2.71
Futures Market Conditions		
Relatively stable prices*	3.89	4.43
Relatively stable, predictable basis	4.21	4.69
Other Factors		
Favorable expected profit margins	4.14	4.12
Marketing with an agreement, contract or through an alliance or cooperative	4.00	3.56
Favorable recent experience with grid pricing	3.38	2.93

* Different means at 0.10 significance, with equal variances

Table 4. Regression results for factors affecting the extent of grid pricing by survey respondents in 2003

Independent Variable	Coefficient
Intercept	-15.790 ***
	(1.91)
Percent sold to largest buyer	0.674 ***
	(6.02)
Percent marketed with an agreement contract, part of an alliance or cooperative	0.366 ***
	(5.42)
Disagreement with "Tight supplies (fewer days on feeder)"	-7.676
	(1.62)
Agreement with "Favorable profit margins"	-10.765 **
	(2.16)
Agreement with "Wide Choice-Select price spread"	11.488 **
	(2.44)
Disagreement with "Wide YG4-YG5 price spread"	-9.762 **
	(2.10)
Agreement with "Dress well (high dressing percentage)"	8.883 *
	(1.95)
Disagreement with "Relatively stable futures market prices"	14.336 ***
	(2.92)
n	110
Adjusted R²	0.596

Numbers in parentheses are absolute values of calculated t statistics; *=0.10, **=0.05, and ***=0.01 significance level.

Table 5. Extent and purpose of sorting cattle on feed, by extent of grid pricing in 2003 (NE, CO, KS, TX, OK, NM)

Timing of Sorting	Grid Pricing Groups	
	50% or less of Marketings	More than 50% of Marketings
	(Percent)	
None**	63.0	35.6
At placement*	25.3	50.5
At re-implanting	18.4	27.1
Prior to marketing**	33.7	54.3
Objectives of Sorting***	(Mean Rank)	
Quality grade target (e.g. Choice or higher)	1.7	1.7
Yield grade target (e.g. YG 1-2)	1.9	1.9
Fat thickness target	2.1	2.0
Finished end weight target	1.6	1.8
Minimize "out" carcasses	1.5	1.6

* Significantly different means at 0.01 level with unequal variance
** Significantly different means at 0.01 level with equal variance
*** Rank=1 is most important on a scale of 1 to 3