Consolidation in the Meat Sector

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Slaughter industries are consolidating, as the number of firms falls and plant sizes grow. Related changes are occurring in upstream livestock production sectors: large cattle feedlots and hog farms account for sharply growing shares of livestock sales. As in poultry, new contractual relationships have begun to replace spot market cash transactions for cattle and for hogs. Those sharp structural changes have raised concerns about market power, pollution control, and the reliability of traditional price reporting sources. This is a research conference, aimed at encouraging evaluation and discussion of research methods, data sources, and results.

Topics covered at the conference include the following:

* The existence, extent, and effects of market power in livestock and meat industries; Causal factors in consolidation, such as scale and scope economies, mergers, changes in product mix, innovation, and changes in contractual relations;

* Vertical coordination, as compared to spot markets for transferring livestock, including summaries of recent developments and implications for location, for product characteristics, and for price discovery;

* Externalities associated with consolidation, including the effects of larger animal production facilities on pollution and the effects of local control regulations on consolidation.

Meatpacking Firm Mergers: Empirical Impacts in an Experimental Market for Fed Cattle

Clement E. Ward and Jong-In Lee

Professor and Extension Economist, and
Graduate Research Assistant, respectively

Oklahoma State University

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An historical perspective of mergers suggests the U.S. economy has undergone four periods of extensive merger activity, the fourth ending about 1987 (Carlton and Perloff 1994; Connor and Geithman 1988). Arguably, we are experiencing the fifth period in the 1990s. There are several reasons for mergers which are believed to have positive social outcomes, among them increased efficiency and productivity, ability to capitalize on economies of size and scope, synergism of operations, and improved management. However, there may be negative social outcomes, among them decreased efficiency and profitability, exploitation of short-term gains at the expense of long-term losses, and increased market power leading to higher-than-competitive consumer prices or lower-than-competitive input prices.

Empirical evidence on merger impacts has addressed postmerger efficiency or productivity of merged firms, profitability of the acquiring firm, and various financial effects on stock prices and earnings. No significant improvement in postmerger profitability was found using line of business profits for the 1960s and 1970s (Ravenscraft and Scherer 1987; Scherer 1988). However, other research revealed significant improvements in productivity of individual plants resulting from mergers (Lichtenberg and Siegel 1987).

Merger activity was not believed to contribute significantly to increased concentration in manufacturing or the overall economy (Carlton and Perloff 1994). Increased merger activity included the food industries (Connor and Geithman 1988; MacDonald 1988). There, mergers contributed to concentration in food retailing (Caswell 1987) and meatpacking (Marion and Kim 1991). For meatpacking, the four-firm concentration ratio (CR4) in steer and heifer slaughter

increased from 26.0 in 1972 to 80.0 in 1996 (Grain Inspection, Packers and Stockyards Administration 1997). A series of mergers and acquisitions in 1987 alone, involving some of the largest meatpacking firms, increased the CR4 in steer and heifer slaughter by 12 percentage points, from 55.1 to 67.1. However, no studies have examined market effects from meatpacking firm mergers.

The drive to operate larger, more efficient meatpacking *plants*, capitalizing on economies of size (Ward 1993), does not explain by itself the increase in *firm* size, such as via mergers and acquisitions. Internal growth as well as mergers and acquisitions have both played a significant role in increased beefpacking concentration (Marion and Kim 1991). However, no research has estimated how large a firm must be (i.e. how many plants are needed) to achieve most economies of scope or multi-plant economies and yet not have excessive, potential market power.

Economists have examined impacts from structural and behavioral changes in meatpacking using transaction-level data (see Ward, Koontz, and Schroeder 1998 and cited references) as well as with aggregated data such as annual averages (see Azzam and Schroeter 1995 and cited references). Frequently, data to directly examine transaction-level impacts from various structural and behavioral changes are not available. The *Fed Cattle Market Simulator (FCMS)* was developed in part to capture the necessary data to study such market phenomena. This paper reports on an analysis of transaction-level data from the experimental market in which meatpacking firms were merged. The analysis involved assessing market price effects, changes in market behavior among merged and non-merged firms, and profitability prior to the merger, during the merger, and after dissolving the merger. This is believed to be the first study to explicitly examine *potential* impacts of meatpacking firm mergers.

Fed Cattle Market Simulator Structure

The *FCMS* creates a market for fed cattle in which participants role play as feedlot marketing managers and meatpacking procurement managers (Ward et al. 1996). Eight participating feedlot teams and four participating meatpacking teams trade cattle in seven-minute trading sessions. Feedlot teams market fed cattle from their feedlot when cattle reach acceptable finish weights. Meatpacking teams purchase fed cattle for processing into boxed beef.

The time reference and trading periods in the simulated market are weeks. During each trading period or week, feedlot and packer teams negotiate prices and transactions. About 35-40 transactions occur per trading period on average. Participants role playing as meatpacking procurement managers approach feedlots to purchase cattle from the visible array of paper pens of cattle. Each sheet of paper represents a pen of 100 fed steers available for sale. All pens on the visible array represent that week's show list. Prices are negotiated and sales occur for the range of available weights of show-list cattle, from 1100 to 1200 pounds in 25-pound increments. Cattle in the simulated market grow 25 pounds per week and must be processed into boxed beef in the five-week marketing window, but can be sold anytime during the five-week period. Cattle sold in the current week for delivery in the current or following week are treated as cash market transactions. Cattle to be delivered two or more weeks in the future are recorded as contract transactions, i.e., following the reporting protocol among Agricultural Marketing Service (AMS), U.S. Department of Agriculture (USDA) market reporters.

Continuous market information is provided during the trading period on two digital display bars, one which scrolls cash market information (trading volume and high-low price range) and the other which scrolls futures market information (trading volume and current prices

for three active futures contracts). Current market information parallels within-week or within-day market information available to fed cattle buyers and sellers from AMS-USDA and the Chicago Mercantile Exchange (CME).

Cattle placements in feedlots include periods of larger and smaller supplies, as occur in a cattle inventory cycle. Fed cattle market conditions and resulting prices are driven largely by how effectively participants market and purchase fed cattle. *Cattle on Feed* reports, much like those reported by the National Agricultural Statistics Service (NASS), USDA are issued every four trading weeks and indicate feeder cattle placements, fed cattle marketings, and cattle on feed, in total and by weight groups.

Teams receive a profit and loss statement following each week of trading. The statement details that week's sales/purchases and provides profit/loss information for each transaction and on average for the period.

Experimental Design and Data

Experimental simulation with the *FCMS* represents an integration of business simulation and experimental economics (Ward et al. 1996). Within a specified market structure and set institutional structure, subjects or participants of experimental simulation studies make repetitive decisions that affect performance of their particular firm and the entire market. The distinction between experimental simulation and experimental economics revolves around the amount of physical control researchers impart on subjects of the experiment. In experimental economics, the experimenter purposefully and directly controls specific variables of the system, thus allowing the experimenter to monitor and focus on selected variables in order to draw

conclusions about how those selected variables affect economic behavior and performance. (Friedman and Sunder 1994). The purpose of experimental simulation is to evaluate dynamic relationships between many economic variables of a specified market when major components of that market are affected by realistic market changes. With experimental simulation, researchers control relatively few variables in the market, thus allowing economic variables to interact more with one another much like real-world markets. Participants of the simulated market experience consequences of interrelated decisions that they must make regularly. Properly designed experimental economics experiments can make use of relatively basic statistical methods, while experimental simulation or less-controlled experiments, such as with the *FCMS*, require more elaborate econometrics estimation.

Data for this study were collected from two, day-and-a-half workshops with large agribusiness firms. Firm A is one of the largest meatpacking firms in the U.S., while Firm B is one of the largest cattle feeding firms. The predetermined experimental design was identical, with one exception, for the two workshops. Data were generated from 30 trading weeks of the *FCMS* in each workshop. Each workshop consisted of a start-up or learning period in which data were not collected (Weeks 38-40), a premerger period of 10 weeks (Weeks 41-50), a 10-week period in which a merger of two packers was imposed upon the experimental market (Weeks 51-60), a postmerger period of 10 weeks (Weeks 60-70), and an ending period for which data were not collected (Weeks 71-76). The only difference in the two experimental designs was the packers involved in the mergers. For Firm A, the two smallest firms in the *FCMS* (Packers 1 and 2) were merged, whereas for Firm B, the two largest firms (Packers 3 and 4) were merged.

Given there are four firms in the *FCMS*, the four-firm concentration ratio (CR4) is 1.00 before the merger, during the merger, and after the merger was dissolved.. The Herfindahl-Hirschman index (HHI) was 2,562 prior to the merger (based on the minimum-cost volume of each packer) and after each merger was dissolved. In the workshop for Firm A, when the two smaller packers were merged, the *ex anti* HHI increased to 3,462. For Firm B, when the two larger packers were merged, the *ex anti* HHI increased to 4,212. Based on the 1968 merger guidelines of the Department of Justice, this level of concentration and change in the HHI resulting from the two mergers in real-world markets would raise concerns about competition and would be challenged (Carlton and Perloff 1994). Similarly, mergers which increase concentration this magnitude in a market as concentrated as the *FCMS*, would even face a Department of Justice challenge according to the more lenient merger guidelines of 1992.

The merger in each workshop was announced to workshop participants in the form of a press release. A brief meeting with the merging packers was held. Merger participants were instructed to operate their merged firm as a multi-plant firm. They were to share profit/loss statements and other pertinent information, such as prepurchased cattle by forward contracts, etc. The merged packers then jointly developed and implemented a procurement and pricing policy.

Data collected for this study consisted of transaction prices with associated information for 30 weeks of trading, or 1,062 pens of fed cattle for Firm A and 1,083 pens for Firm B. Each data record consisted of one transaction between one feedlot firm and one meatpacking firm. Data for each transaction included: week traded, meatpacker purchasing the cattle, feedlot selling the cattle, weight of cattle traded, transaction price, and type of transaction (cash or forward contract). Other data recorded for each trading week included: break-even prices for 1150 pound

cattle for each feedlot and the largest meatpacker, boxed beef price, number of pens marketed, number of pens of cattle on the show list at the beginning of each trading week, and profits for each feedlot and packer.

Models Specified

Previous transaction price models using *FCMS* data provided the basis for the models specified (Ward et al. 1996; Anderson et al. 1998; Ward et al. 1999). Those models were based on previous price discovery research analyzing fed cattle transaction prices using industry data (Ward 1992; Schroeder et al. 1993; Ward, Koontz, and Schroeder 1998).

Transaction Price Model

A transaction price model was specified to estimate how meatpacking firm mergers affected the level of transaction prices. Transaction prices were modelled as a function of lagged boxed beef prices (BBP) and lagged fed cattle marketings (TM). Transaction prices were assumed dependent also on the current total inventory of cattle on the show list (TSL) and potential profit/loss to be shared by packers and feeders (PPL) during the week transactions occurred. Also included were binary dummy variables for the weight of cattle traded (WT), type of transaction (TYP), feedlot selling cattle (FDLT) and packer buying cattle (PKR). Additional binary variables were included to measure price differences among premerger, merger, and postmerger periods (MERGR). Thus, the model specified and estimated was

$$(1)\quad TPFC_{it} = \beta_0 + \beta_1 BBP_{t-1} + \beta_2 TM_{t-1} + \beta_3 TSL_t + \beta_4 PPL_t + \sum_{j=1}^{5} \beta_{5j} WT_{jit} + \sum_{j=1}^{2} \beta_{6j} TYP_{jit} + \sum_{j=1}^{8} \beta_{7j} FDLT_{jit} + \sum_{j=1}^{4} \beta_{8j} PKR_{jit} + \sum_{j=1}^{3} \beta_{9j} MERGR_{jit}$$

where, t = time in simulated weeks which is 41, 42, ..., 70 and I = transaction observations within each week = 1, 2, 3, ..., n. There are potentially a different number of transactions each week. Complete variable definitions and expected signs are presented in Table 1. One variable from each binary group was omitted and is referred to as the "base" in subsequent tables and figures.

Many traditional economic variables found in transaction price models using industry data are accounted for or held constant by the *FCMS* (Ward et al. 1996). Reasons for including selected variables in transaction price models for fed cattle are developed in previous research cited above. Thus, explanations for inclusion of variables in this model will be brief.

Boxed beef price was included in the model because demand for fed cattle is derived from the demand for beef. The boxed beef price (BBP_{t-1}) was lagged one week because decisions under uncertainty tend to be made based on market information reported most recently. Two supply variables were included. One was the total number of pens marketed the previous week (TM_{t-1}), similar to previous research (Schroeder et al. 1993). The second is unique to using *FCMS* data. Number of cattle on the show list (TSL_t) represents cattle that can be marketed in the current week at one of five weights, 1100 to 1200 pounds in 25-pound increments. Previous research found information on market-ready inventories was important in forecasting fed cattle prices (Bacon, Trapp, and Koontz 1992).

Buyers and sellers negotiate transaction prices based on their respective break-even prices and market conditions. The difference between the largest meatpacker's break-even price for the 1150-pound cattle and the feedlot break-even price for the same weight cattle represents potential profits or losses (PPL_t) available to share in week *t*. Available profits or losses were used as a measure of the bargaining range or the distribution of profits or losses between buyers and sellers (Ward et al. 1996). Significant price differences were observed among simulated firms due to individual negotiation skills that are unique to each simulated feedlot and meatpacking firm. Separate variables were included to account for price differences among the eight feedlot and four meatpacking firms, ($FDLT_{jit}$, PKR_{jit}, respectively).

The primary purpose of this specification was to determine whether or not transaction prices differed before the merger period, during the merger period, and after the merger was dissolved ($MERGR_{jit}$). The binary variable was intended to measure the potential shift in transaction price level as a result of the specific market structure of packers.

Results and Discussion

Several types of results are presented, some to address behavioral changes and some to address price and profit performance changes before, during, and after the merger/dissolution.

Behavioral Changes

Table 2 provides summary statistics for selected variables from Firm A and Firm B workshops by experimental simulation periods. Note that prices increased sharply during and after the merger period due to sharply reduced supplies of fed cattle.

Summary statistics are presented for each packer during each of the three periods. However, it should be noted that during the merger period, Packers 1 and 2 were a single firm for Firm A and Packers 3 and 4 were a single firm for Firm B. Thus, for Firm A, the market share for Packers 1 and 2 increased from 22.2 and 24.1 %, respectively, to 51.3 % for the merged firm; and for Firm B, market shares for Packers 3 and 4 increased from 28.3 and 30.6 %, respectively, to 66.1 % for the merged firm. Note that for the firms not involved in the mergers, market shares declined during the merger period. There appeared to be some synergistic or efficiency gains experienced by the merged firms, enabling them to jointly increase market shares beyond the additive shares of the merging firms during the premerger period.

Some changes were noted in trading patterns among firms as a result of the mergers. However, no clear pattern is evident from Table 3. Most packers purchased cattle from two or three primary suppliers in each period, though the primary suppliers changed for most packers during the three experimental periods. Extent of contracting also varied between Firms A and B and among experimental periods with no clear pattern emerging.

Observation of the participants during the workshops yielded some insight into management differences. With Firm A, one strong leader emerged after the merger of Packers 1 and 2. This leader quickly directed buyers to purchase cattle from specified feedlots and not directly compete for cattle. Purchases were directed to specific plants to achieve the minimum-cost volume for each plant. After the merger of Packers 3 and 4 in the Firm B workshop, no such leadership emerged among the merged teams. If buyers were directed to purchase from specific feedlots to avoid competing among themselves, it was not apparent. Nor was it apparent

purchases were coordinated between the two plants to ensure maximum plant efficiency at both plants.

Transaction Price Model Results

The transaction price model estimated by OLS regression explained 90.8 and 88.5 % of the variation in fed cattle transaction prices for Firm A and B, respectively. Table 4 provides parameter estimates for the transaction price and price variance models.

Similar to previous transaction-level studies, the price and quantity variables significantly affect fed cattle transaction prices. Boxed beef price (BBP_{t-1}), number of cattle marketed (TM_{t-1}), and number of pens of cattle on the show list (TSL_t) all impact transaction prices in the anticipated direction. The potential profit/loss each week (PPL_t) was significant and positive for Firm A unlike previous work with *FCMS* data and was not significant for Firm B. Differences in managerial and negotiation skills also existed among participants of the *FCMS*, leading to average transaction price differences among several feedlot firms ($DFDLT_{jit}$) and meatpacking firms ($DPKR_{jit}$).

Price differences for weights of cattle marketed were unexpected relative to previous work. Anticipated prices differences were expected to take a quadratic form, i.e., larger discounts for lighter and heavier animals, compared with 1150-lb cattle. Coefficients indicated discounts occurred for 1200-lb cattle but significant premiums were observed for lighter weight cattle for Firms A and B. Forward contract prices were significantly lower for Firm B, consistent with theory (Carlton 1979) but not with previous *FCMS* work. Contract prices were negative but not significant for Firm A.

Significant price differences were found between the experimental periods, both for Firms A and B. In both cases, prices during the merger period (DPD_{jit}) were significantly higher than prior to the merger, i.e., $2.50/cwt higher for Firm A and $4.18/cwt higher for Firm B. Following dissolution of the merger, prices declined in both cases, but were significantly lower only for Firm B. Merger-period prices were $2.36/cwt higher than following the dissolution for Firm B. Results suggest the merged firms achieved some managerial efficiencies or economies of scope, i.e. from multi-plant operations, resulting from the merger. Note that the merger did not specifically affect economies of plant size, which did not change during the experiment, only multi-plant economies.

During the merger period, market prices were significantly higher than before the merger. Significant market share differences were noted during the merger period for both Firms A and B. For Firm A, market shares were: Merged Packer 1 and 2,51.3, Packer 3, 25.5, and Packer 4, 23.2 %. For Firm B, market shares were: Merged Packer 3 and 4, 66.1, Packer 1, 16.8, and Packer 2, 17.1 %. Despite the significant size differences between the largest and smaller firms, the merged firms failed to use their presumed market power to depress prices for fed cattle. On the contrary, they appeared to pass along their economies of scope efficiencies in the form of higher prices for fed cattle. This result is consistent with research with industry data indicating that larger firms, most of which are multi-plant firms, paid higher prices for fed cattle than smaller firms (Slaughter Cattle Procurement and Pricing Team 1996).

Profitability Comparisons

Profitability of firms prior to and during the mergers and following its dissolution are shown in Table 5. Both for Firms A and B, the merged firms were more profitable than their single-plant rivals. In the case of Firm A, Packers 1 and 2 were the least profitable packers prior to the merger. However, during the merger, Merged Packer 1-2 was the most profitable packer. Packer 2 remained most profitable after the merger was dissolved.

Packers 3 and 4 were the most profitable packers before the merger in the Firm B case. Together, they represented the most profitable packer during the merger period. Following dissolution of the merger, Packers 3 and 4 remained the most profitable packers though the ranking after the merger reversed between the two packers compared with prior to the merger.

It appeared the management of the merged firms capitalized on their multi-plant organization during the merger relative to their competitors. In the case of Firm A, the merged firm (Packer 1-2) remained profitable despite also sharing some of their efficiency gains with feedlots via higher fed cattle prices. For Firm B, the merged firm (Packer 3-4) was not profitable but lost less than its rivals. Market prices likewise were higher during the merger period but to the detriment of packer profits. In both cases, the merged packers did not use their significant increase in market share to depress market prices for fed cattle. In only one case, did the merged firm use its larger size to significantly increase profitability.

Summary and Conclusions

The *Fed Cattle Market Simulator (FCMS)* was developed to provide a realistic market framework and institutional structure in which market participants make repeated

marketing/procurement decisions. Experimental simulation was used in this study to estimate fed cattle transaction price impacts from two packer mergers, one involving the two smallest packers in the *FCMS* and one involving the two largest packers. Data were collected for 30 trading weeks from *FCMS* workshops with two, large agribusiness firms, amounting to 1,062 and 1,083 transactions, respectively.

Results for several economic variables were found to be generally consistent with previous research using industry data as well as previous *FCMS* studies. These variables included lagged boxed beef prices, lagged marketings, total show list, and dummy variables for individual feedlot firms and individual meatpacking firms. Other variables differed somewhat from prior studies with *FCMS* data. Among them were the potential profit/loss each week, and dummy variables for weight of cattle sold and type of transaction.

The central focus of this study was on impacts which resulted from the merger of two of the four meatpacking firms; the two smaller firms in one case and the two larger firms in another. Some behavioral differences were noted during the mergers compared with preceding and following periods, however no clear changes were observed. During the merger period for both firms, market prices were significantly higher than prior to the merger and significantly higher compared with the post-merger period for one firm. For both mergers, profits of the merged firm exceeded profits of their rival firms or losses were less than for rival firms.

Unexpectedly, even though the merged firms experienced a sharp increase in market share relative to market shares prior to the merger, there was no evidence the merged firm used its larger size to depress prices paid for fed cattle. Instead, they appeared to achieve some

economies of scope and passed along some of the efficiency gains in the form of higher prices for fed cattle.

This research was the first to measure impacts from mergers and acquisitions in an experimental market. As always, care must be exercised in transferring results from this experimental simulation to the real-world fed cattle industry. The experimental market does not allow estimating any spatial market impacts and temporal impacts may vary during an entire cattle cycle. However, results suggest that mergers *may* have positive, short-run impacts on market prices. It appears more information is needed on the extent of economies of scope. Mergers may result in behavioral changes among the merged and non-merged firms but not *necessarily* to the detriment of the market. Management of the merged firms affected how effectively merged packers operated, thus affecting their profitability.

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Table 1: Variable Definitions with Expected Signs.

Variables	Variable Definition	Expected Sign
Dependent Variable		
$TPFC_{it}$	ith transaction price ($/cwt) for one pen of fed cattle in week t	N/A
Independent Variables		
BBP_{t-1}	Boxed beef price ($/cwt) for Choice, YG 1-3 550-700 lb carcasses, lagged one week	Positive
TM_{t-1}	Total number of pens of cattle (100 hd/pen) marketed, lagged one week	Negative
TSL_t	Total number of pens of cattle (100 hd/pen) on the market-ready show list in week t	Negative
PPL_t	Potential profit or loss ($/cwt) in week t, i.e., largest meatpacker's break-even price for 1150 lb cattle less the feedlot break-even price for 1150 lb cattle	Negative
Wt_{jit}	Binary dummy variables for weight of cattle traded (lbs), j=1-5, 1=1100, 1=1125, 3=1150 (Base), 4=1175, and 5=1200	Positive/ Negative
TYP_{jit}	Binary dummy variables for type of transaction, j=1-2, 1=Cash (Base) and 2=Forward Contract	Negative
$FDLT_{jit}$	Binary dummy variables identifying feedlot firms, j=1-8, 1=FDLT1, 2=FDLT2, 3-FDLT3, 4=FDLT4, 5=FDLT5 (Base), 6=FDLT6, 7=FDLT7, and 8=FDLT8	Positive/ Negative
PKR_{jit}	Binary dummy variables identifying meatpacking firms, j=1-4, 1=PKR1, 2=PKR2, 3=PKR3, and 4=PKR4 (Base)	Positive/ Negative
$MERGR_{JIT}$	Binary dummy variables for merger, non-merger periods, j=1-2, 1=Premerger, 2=Merger (Base), and 3=Postmerger	Positive

Table 2. Summary Statistics by Experimental Period

Variable	Firm A			Firm B		
	Premerger	Merger	Postmerger	Premerger	Merger	Postmerger
Transactions (n)	415	341	306	399	363	321
Price ($/cwt)						
Mean	72.94	80.51	84.96	73.04	81.80	82.98
Std. Dev.	3.04	1.74	1.75	2.47	1.74	2.46
Marketings (Pens)						
Mean	41.8	35.3	29.9	40.2	36.2	31.5
Std. Dev.	2.2	8.0	7.0	5.4	6.4	4.1
Boxed Beef Price ($/cwt)						
Mean	114.37	125.67	130.27	115.26	125.87	131.22
Std. Dev.	1.30	4.95	4.44	2.70	3.70	4.51
Total Show List (Pens)						
Mean	129.3	113.6	91.0	132.8	118.3	100.2
Std. Dev.	17.2	14.2	9.7	12.7	7.0	8.9
Potential Profit/Loss ($/cwt)						
Mean	-1.51	0.02	0.37	-0.86	0.08	1.34
Std. Dev.	3.78	3.30	4.68	3.52	2.46	5.01
			(% of Period Transactions)			
Packer 1	22.2	24.9	26.5	19.5	16.8	20.9
2	24.1	26.4	20.9	21.6	17.1	18.4
3	26.0	25.5	24.5	28.3	35.5	27.1
4	27.7	23.2	28.1	30.6	30.6	33.6
Feedlot 1	13.0	11.4	12.4	12.5	11.3	12.4
2	13.0	9.7	12.4	13.5	12.4	14.3
3	14.4	11.4	10.4	12.3	11.6	10.0
4	10.6	11.7	13.4	10.8	12.4	11.8
5	12.0	14.1	14.7	11.8	14.0	14.3
6	12.8	14.7	12.4	13.3	13.5	12.1
7	11.5	14.4	10.4	12.3	13.5	11.2
8	12.5	12.6	13.7	13.5	11.3	13.7
Weight 1100	1.4	1.2	2.9	0.8	0.0	0.3
1125	2.6	15.8	20.3	1.2	7.7	7.8
1150	65.3	60.7	66.0	57.9	57.6	74.8
1175	25.5	19.1	9.5	35.3	30.3	15.3
1200	5.1	3.2	1.3	4.8	4.4	1.9
Type - Cash	90.1	84.4	85.6	93.0	93.4	81.0
Contract	9.9	15.5	14.4	7.0	6.6	19.0

Table 3. Purchases by Packers Prior to and During the Merger, and After Dissolving the Merger.

Packer	Period	Feedlot (% of Packer Purchases)							
					Firm A				
		1	2	3	4	5	6	7	8
1	Premerger	8.7	23.9	0.0	26.1	12.0	21.7	0.0	7.6
	Merger[1]	8.2	2.4	12.9	18.8	25.9	11.8	9.4	10.6
	Postmerger	6.2	1.2	17.3	1.2	37.0	21.0	16.0	0.0
2	Premerger	21.0	5.0	25.0	0.0	2.0	13.0	0.0	34.0
	Merger[1]	7.8	3.3	15.6	17.8	20.0	12.2	15.6	7.8
	Postmerger	4.7	17.2	14.1	25.0	3.1	0.0	17.2	18.8
3	Premerger	12.0	25.0	29.6	12.0	1.8	10.2	0.0	9.3
	Merger[1]	17.2	0.0	16.1	9.2	4.6	12.6	10.3	29.9
	Postmerger	32.0	22.7	8.0	1.3	8.0	21.3	4.0	2.7
4	Premerger	10.4	0.0	2.6	6.1	30.4	7.8	41.7	0.9
	Merger[1]	12.7	35.4	0.0	0.0	5.1	22.8	22.8	1.3
	Postmerger	7.0	10.5	3.5	26.7	8.1	5.8	5.8	32.5
					Firm B				
1	Premerger	34.6	0.0	16.7	6.4	14.1	14.1	5.1	9.0
	Merger[2]	0.0	21.3	6.6	13.1	1.6	19.7	16.4	21.3
	Postmerger	0.0	55.2	0.0	1.5	3.0	29.8	0.0	10.4
2	Premerger	4.6	12.8	4.6	9.3	11.6	24.4	8.1	24.4
	Merger[2]	24.2	12.9	12.9	0.0	14.5	30.6	0.0	4.8
	Postmerger	0.0	13.6	54.2	0.0	8.5	13.6	10.2	0.0
3	Premerger	4.4	13.3	23.0	15.0	17.7	7.1	14.2	5.3
	Merger[2]	10.8	7.8	14.7	19.4	10.1	5.4	12.4	19.4
	Postmerger	46.0	1.2	0.0	3.4	3.4	9.2	6.9	29.9
4	Premerger	11.5	23.0	4.9	10.7	4.9	10.7	18.0	16.4
	Merger[2]	10.8	12.6	9.9	10.8	25.2	9.9	20.7	0.0
	Postmerger	0.0	0.0	0.0	31.5	33.3	2.8	22.2	10.2

[1] Packers 1 and 2 were merged.
[2] Packers 3 and 4 were merged.

Table 4: Parameter Estimates for the Transaction Price Model.

Variable	Firm A	Firm B
Intercept	85.484***	63.778***
	(21.279)	(9.244)
BBP_{t-1}	0.135***	0.254***
	(5.164)	(6.623)
TM_{t-1}	-0.169***	-0.083***
	(17.019)	(6.648)
TDL_t	-0.135***	-0.105***
	(16.572)	(6.095)
PPL_t	0.182***	-0.022
	(4.649)	(0.335)
WT1	2.317***	0.563
	(5.722)	(0.636)
WT2	-0.102	1.490***
	(0.582)	(5.954)
WT3	Base	Base
WT4	-0.638***	0.196
	(4.054)	(1.473)
WT5	-1.860***	-0.636**
	(6.081)	(2.196)
TYP1	BASE	BASE
TYP2	-0.221	-0.623***
	(1.239)	(3.245)
FDLT1	0.326	1.217***
	(1.521)	(5.697)
FDLT2	-0.314	1.360***
	(1.469)	(6.411)
FDLT3	-0.783***	1.211***
	(3.602)	(5.534)
FDLT4	-0.260	0.587***
	(1.114)	(2.062)
FDLT5	Base	Base
FDLT6	-0.858***	0.982***
	(4.188)	(4.585)
FDLT7	-0.487**	1.819***
	(2.272)	(8.518)
FDLT8	-1.096***	1.258***
	(5.158)	(5.948)
PKR1	0.150	0.736***
	(0.967)	(4.468)
PKR2	0.107	0.556***
	(0.682)	(3.409)
PKR3	0.308**	0.579***
	(1.976)	(4.019)
PKR4	Base	Base

MERGR1	-2.500***	-4.183***
	(9.400)	(17.131)
MERGR2	Base	Base
MERGR3	-0.351	-2.357***
	(1.528)	(7.767)
$\overline{R}^2$	0.906	0.883
N	1062	1083

[a] Figures in parenthesis are absolute values of t-statistics.

[b] Significance levels are denoted as follows: *** = 0.01, ** = 0.05, and * = 0.10.

Table 5. Packer Profitability Prior to and During the Merger and After Dissolving the Merger.

Packer	Premerger	Merger	Postmerger
	($/Head)		
	Firm A		
Packer 1	9.37	--	-13.83
Packer 2	0.49	--	-7.40
Merged Packer 1 and 2	--	7.48	--
Packer 3	10.92	-3.92	-12.04
Packer 4	11.80	-6.19	-17.58
	Firm B		
Packer 1	2.54	-19.71	-5.74
Packer 2	-7.79	-30.73	-7.68
Packer 3	30.90	--	5.36
Packer 4	18.08	--	35.90
Merged Packer 3 and 4	--	-10.36	--