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Jennifer L. Graff and Ted C. Schroeder

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Cattle Basis Risk and Grid Pricing

Jennifer L. Graff and Ted C. Schroeder*

The beef industry is increasingly moving towards a more value-based pricing system in attempt to send appropriate signals to producers. Beef packers have responded by developing grid pricing systems which value each carcass separately based on its own merit, as opposed to one price for an entire pen of cattle. This study estimates how the level of variability in basis is affected when cattle are sold on a price grid compared to traditional live and dressed weight pricing. In addition, we determine how basis risk is affected by general spatial price variability, uncertainty regarding cattle quality, variation in dressing percentage, and movement in the Choice-to-Select price spread. Weekly basis is evaluated using six alternative pricing methods over an eight-year period. Live-weight pricing has the lowest basis variability of the six pricing methods examined. Cattle sold using grids have greater basis variability primarily because of uncertainty regarding cattle quality and to a lesser extent, changes in grid premiums and discounts over time.

INTRODUCTION

Changing consumer demand for leaner, more consistent, higher quality beef has motivated the beef industry to move towards a more value-based pricing system. In attempt to send appropriate signals to producers, beef packers have developed grid pricing systems, which value each carcass separately based on its own merit, as opposed to one price for an entire pen of cattle. By using grid pricing systems, producers who market high quality cattle are rewarded with premiums. Producers marketing lower quality cattle receive sizeable discounts relative to average market prices.

Over the past 15 years, cattle marketed on a carcass basis have steadily increased from 27% in 1980 to 47% in 1995 (GIPSA). Much of this increase in carcass pricing is dressed weight pricing, which although not as value-based as grade and yield, it is a step closer to value-based pricing. As more cattle are priced on individual carcass grade and yield, price variability across carcasses definitely increases and price variability across pens of cattle may also increase. This study estimates the magnitude of increase in price variability associated with individual carcass merit pricing. In particular, the objective of this study is to estimate the level of variability in basis when cattle are sold on a price grid compared to traditional live and dressed weight pricing.

* The authors are graduate research assistant and professor, Department of Agricultural Economics, Kansas State University.

In addition, we will determine how basis risk is affected by general spatial price variability, uncertainty regarding cattle quality, variation in dressing percent, and movement in the Choice-to-Select price spread.

PREVIOUS RESEARCH

Several previous studies have compared expected profits and the variability of profits from three cattle pricing methods, live-weight, dressed-weight, and grade and yield or grid pricing (Beshear and Trapp; Feuz; Feuz, Fausti, and Wagner; and Schroeder). These studies generally concluded that price variability increased when cattle were sold on grids compared to live-weight pricing. They also determined that on average, revenues were statistically lower when cattle were sold using live-weight pricing. This is a result of lack of information regarding cattle value when they are sold on a live basis (Schroeder et al.) and because of producer risk aversion (Fausti and Feuz). Revenue increases using grid pricing when the cattle are of high quality or they fit the specifications of the grid, for example, selling Hereford cattle on the Certified Hereford Beef grid (Feuz).

A few studies have also examined fed cattle basis determinants. Leuthold modeled monthly average basis as a function of monthly beef slaughter, price of corn, fed cattle cash price, feeder cattle cash price, cattle on feed in various weight categories, and seasonal dummy variables over the 1965-77 period. For one-month prior to delivery, his model had an R-squared of only 0.26 suggesting it is difficult to explain nearby basis with market demand and supply measures. In an update of this study, Parcell, Schroeder, and Dhuyvetter used weekly data from 1990-96 and found similar basis determinants to Leuthold with models that explained 65% or more of nearby basis variability depending upon location.

Liu et al. developed models to forecast monthly nearby fed cattle basis one month ahead. They concluded that the lagged futures price spread and lagged basis were helpful in short-term forecasting of nearby fed cattle basis. Dhuyvetter and Parcell compared several fed cattle basis forecasting methods and concluded that a three-year moving average was as accurate of a forecast as others evaluated including an econometric model. These studies provide important information regarding traditional fed cattle basis determinants. However, no previous study has examined how basis risk changes when using various fed cattle pricing methods. With the increased use of carcass, dressed, and grid pricing, information is needed regarding basis variability of these pricing methods.

TRADITIONAL AND GRID PRICING BASIS

Traditional cattle basis has been defined as:

$$Traditional\ Basis = Cash\ Price - Futures\ Price \quad (1)$$

Basis risk results from unanticipated changes in local, relative to national, supply and demand. However, basis risk is more involved when cattle prices are discovered using a grid. Under grid pricing, with quality premiums and discounts for each carcass, basis risk includes price and cattle quality variability. Grid pricing basis can be formulated as:

Grid Pricing Basis = (Cash Price − Futures Price) + (Transaction Price − Cash Price) (2)

The first term in (2) is *Traditional Basis*. General local price variability relative to futures prices is traditional basis risk. The second term, however, adds another dimension to basis risk.

Transaction price is the price received per hundred-weight for cattle marketed using a value-based marketing, individual carcass price grid. When using a grid to price cattle, carcass quality risk is passed from the buyer to the seller. Several components of *transaction price* increase uncertainty, thus basis risk when using grid pricing. These include dressing percent, quality grade of the carcass, and varying market premiums and discounts (e.g., varying Choice-to-Select price spread).

Prices received when cattle are sold using a grid are based on the components contained in the *transaction price* variable. A base price is set for each grid, which is often based on a Choice, yield grade 3, 550-700 pound steer carcass. Premiums and/or discounts for specific carcass quality traits are added and subtracted to the base price to calculate the price of each carcass. Generally, premiums are awarded for quality grades of Choice and higher quality and discounts for Select and lower. Yield grade 1 or 2 carcasses generally receive premiums relative to 3's and yield grade 4 and 5 carcasses receive discounts. Discounts are also applied to extreme weight categories. Light carcasses (those weighing less that 550 pounds) and heavy carcasses (those weighing above 950 pounds) typically receive sizeable discounts ($20/cwt or more) relative to 550-950 pound carcasses.

When cattle are sold using a price grid, knowledge of cattle quality is essential in order for a producer to increase the probability and frequency of price premiums and reduce the probability of price discounts associated with carcass quality attributes. Carcass quality is uncertain because the producer has only an estimate of this before the cattle are slaughtered. At the pen level, some experienced cattle buyers and sellers may be able to predict the quality and yield grade distributions of cattle. However, national beef quality concerns suggest that visual inspection of live animals is generally a poor judge of carcass beef quality and yield grades (Smith et al.). In addition, cattle sellers are likely less able to predict beef carcass performance from live animals than buyers since they typically sell fewer cattle less frequently than buyers procure. Therefore, a significant source of grid pricing basis risk is uncertainty regarding cattle quality.

Another component of transaction price variability is changes in grid premiums and discounts. Although some grid premiums and discounts have remained relatively constant over time, others have been highly variable. For example, from October 1996 (the initiation of USDA reporting of grid premiums and discounts) through January 1998, the average weekly premium for Prime quality relative to Choice grade carcasses across seven packers surveyed by the USDA was $5.72/cwt with a coefficient of variation of 1.5%. During the same time period, the average Select grade discount relative to Choice was $7.86/cwt with a coefficient of variation of 41.7%. Grid premiums and discounts also vary across packers at a point in time. The USDA reports ranges in premiums and discounts across the seven packers in their weekly survey, which depending upon the attribute, can be $10/cwt or more (USDA). In addition, Schroeder compared

prices for selling pens of cattle on grids from several different packers and found sizeable differences in average revenues.
When pricing cattle live, the *transaction price* is often ignored in basis analysis because it is generally similar to *cash price* and they offset each other. However, on a grid price, *transaction price*, can deviate from *cash price* making *basis* more volatile.

Basis risk is defined here as the standard deviation of nearby weekly basis over time. In this study, weekly basis is evaluated using six alternative pricing methods over an eight-year period. Two methods are traditional basis measures for the live cattle direct trade cash markets in Western Kansas (*Kansas*) and the Texas-Oklahoma Panhandle (*Texas/Oklahoma*). These measures are used as benchmarks from which to compare basis risk of four different grid pricing alternatives. The grid pricing methods considered include two imaginary grids; one which prices on grade and yield but varies only the Choice-to-Select price spread over time (*CS Spread*), and one which prices cattle on a dressed basis, varying only the dressing percentage over time (*Dressed*). *CS Spread*, comprised of 50% Choice and 50% Select grade carcasses, provides a determination of how much basis risk increases when the seller knows the precise quality of the cattle and only the Choice-to-Select price spread varies as it actually did historically. *Dressed* provides an estimate of how basis risk changes as just the dressing percentage of the cattle changes. The dressing percentage used each week with *Dressed* is randomly drawn from a set of actual pens of fed cattle (discussed later).

The last two methods used to calculate basis are two Midwest commercial packers' actual price grids (*Grid 1* and *Grid 2*). These methods are intended to simulate what basis risk would have been historically using two different packers'grids to price individual carcasses and allowing the Choice-to-Select price spread to vary with historical spreads. The cattle quality grades, yield grades, dressing percentages, and carcass weights over time were randomly drawn with replacement from the same data set as used in *Dressed*. The grid pricing methods also assume the cattle feeder only knew the likely distribution of the cattle qualities and dressing percentages from which he was selling, not the actual carcass yields and qualities of the individual pen. In calculation of basis, all carcass prices are converted back to live animal prices by using actual dressing percentages for *Dressed*, *Grid 1*, and *Grid 2*. Base prices for each grid were the Western Kansas Direct, weekly Choice steer prices converted to a carcass price using a dressing percentage of 62.8%. Table 1 provides a summary of the various cattle pricing methods used to evaluate basis risk in this study.

DATA

Nearby weekly fed cattle futures and the Western Kansas Direct Choice steer and the Texas-Oklahoma Direct cash fed cattle prices were collected over the 1990-97 period. Both the futures and cash prices were simple weekly averages. The Texas-Oklahoma Direct series was the average price for all fed cattle in the region from the *Wall Street Journal*. The Kansas Direct Choice price data were the weekly average for mostly Choice 1100- to 1300-pound fed steers from the Dodge City, Kansas, Agricultural Marketing Service. Futures prices were rolled to the

next contract on the 16th of the month of expiration. For example, the April contract covered from February 16 to April 15 and on April 16, rolled to the June contract.
The packer grids were provided by two commercial, Mid-western, packers; one was an alliance grid and the other a commodity grid. Data on actual pens of cattle with detailed carcass quality and yield grade distributions, dressing percentages, and carcass weights were applied to the grids to simulate historical grid basis. These data included 972 pens of cattle. To simulate historical *transaction price*, pens of cattle were randomly selected with replacement from these 972 each week over the eight-year period. This assumes the producer knew the quality distribution of his cattle (i.e., that the distribution was that represented by the 972 pens) but not the precise merit of cattle being sold during any given week.

Table 2 provides summary statistics for all 972 pens in the data set and Table 3 reports the same for the 406 pens (eight years of weekly data) randomly selected with replacement from the 972 pens used in the empirical analysis. Data for the 972 pens were obtained from a Mid-western packer. They are from cattle sold using the particular packer's grid and therefore, represent cattle which would be expected to have less quality variability than a random pen selected from all fed cattle in the U.S. The averages of each trait are similar across the 972 and randomly selected 406 pen sample data sets. The pens were comprised mostly of cattle grading Select, Choice, and Certified Angus Beef (CAB), with few grading Prime. Over half of the cattle were Yield Grade 3 with an average hot yield dressing percentage of 63.77% in the 406 randomly selected pens and 63.70% in the 972 pens. In the sample used in the analysis, the hot yield dressing percentage ranged from a low of 61.67% to a high of 65.55%.

The Choice-to-Select spread was collected from weekly boxed beef prices from the United States Department of Agriculture, *Livestock, Meat, and Wool* for the period 1990 through 1997. The simple average of Choice and Select prices for two carcass weight categories, 550 to 700 pounds and 700 to 850 pounds, were used to calculate the spread.

RESULTS

Table 4 reports basis summary statistics calculated under each of the six methods. The average basis is smallest for live-weight, *Kansas* and *Texas/Oklahoma* sales at $0.05/cwt or less. Standard deviations are also smallest for the live markets at just under $2.00/cwt. This is because traditional basis has fewer components that affect its variability than when cattle are sold using a grid.

Following the live weight basis measurements, the *CS Spread* and *Dressed* grids have the next highest standard deviations of $2.029/cwt and $2.205/cwt, respectively. These grids have higher standard deviations than live-weight because they contain variability in the Choice-to-Select price spread and dressing percentage, respectively. The highest average standard deviation basis values are from *Grid 1* and *Grid 2*. These grids incorporate all components that may affect the *transaction price* variable. *Grid 1* has a basis standard deviation of $2.617/cwt and *Grid 2* has the highest standard deviation, $2.695/cwt.

To determine weather basis variances differed by pricing method, F-tests were performed on each combination of grids and live-weight basis values. Table 5 provides the resulting p-values from pair-wise F-tests. The variability of *Grid 2* basis is not statistically different from *Grid 1*. However, *Grid 1* and *Grid 2* have statistically larger basis variabilities than any of the other pricing methods. The grids each have basis risk that is about 35% greater than live pricing basis risk.

Although the *CS Spread* grid has higher standard deviations than the live weight basis, they are not statistically different from each other (Table 5). This suggests that variability in the Choice-to-Select price spread alone does not generally significantly increase basis variability when selling grade and yield relative to live. Variability in dressing percentage however, increases basis variability about 10% relative to live. *Dressed* basis risk is statistically greater than both live weight basis calculations and *CS Spread.*

Table 6 reports basis summary statistics calculated under each scenario by live cattle futures contract month. June has the greatest basis variability and April the least (Figure 1). Figure 2 depicts the means of each basis calculation by contract month. The largest mean is in June and the smallest in October. Live weight and grid pricing basis values and variances exhibit similar seasonal patterns. Overall, seasonality can be attributed to the different qualities of cattle that are marketed during the different times of the year and also the supply and demand conditions present during these times (Dhuyvetter and Parcell). The positive grid basis in June can be can be attributed to the lower supply of cattle during that time, so cattle grading Choice bring higher premiums, causing increased variability. Not only is the cattle supply typically seasonally low in June, but also from that low supply, the number of cattle grading Choice and above may be low. This may be because cattle marketed at this time are younger and are fed during the winter so quality may not be as high. Also, seasonal demand for high quality steaks increases into June as cookout season begins, which widens the Choice-to-Select price spread.

F-Tests were also conducted on the different combinations of basis calculations by futures contract month. Fifteen combinations were estimated for each month, with a total of 90 tests performed. Because of the large number, individual p-values are not reported.

The live weight basis values have the smallest variability in all months except April and August when *CS Spread* is smaller. However, in these two months, there is no statistical difference between the live-weight basis measurements and *CS Spread.* In fact, *CS Spread* basis was never statistically greater than other basis calculations in any contract month. As in the overall basis calculations, the *Dressed* grid has greater variability by contract month than live-weight and *CS Spread. Dressed* is also smaller than *Grid 1* and *Grid 2.* In 60% of the F-tests conducted, *Dressed* is statistically greater than other basis calculations. These three occurrences are in the month of October and *Dressed* basis variability is greater than the Kansas and Texas/Oklahoma basis, as well as the *CS Spread* basis.

The variabilities in *Grid 1* and *Grid 2* are similar in each respective month. However, *Grid 1* has statistically greater variability in 83.33% of the F-tests conducted. *Grid 1* basis variance was

also greater than the live-weight and the *CS Spread* basis. *Grid 2* had statistically greater variability in 75% of the tests. The majority of the time, *Grid 2* basis variability was greater than the live-weight and *CS Spread* basis.

Correlations were formulated for each basis calculation by contract month (Table 7). *Kansas, Texas/Oklahoma*, and the *CS Spread* grid were highly positively correlated with each other in each contract month with correlation values ranging from 0.928 to 0.998. In the months of June and December, *Dressed* was also highly positively correlated to these three basis measurements.

Grid 1 and *Grid 2* are not as highly correlated to live-weight and *CS Spread* basis values with correlations ranging from around 0.5 to 0.8. They are however, always positively correlated with all the basis measurements. The two grids are least associated with each other in October with a correlation value of 0.398. They are most related in June with a correlation value of 0.678. The two grids are never perfectly correlated due to differences in premiums and discounts of each packer. So, a given pen of cattle brings different prices under the two grids.

IMPLICATIONS

This analysis demonstrates that marketing on a grid pricing system increases basis risk. This is a direct result of increased price risk from grid pricing relative to live. As more grid pricing is adopted, not only does the price and basis risk increase, the risk of carcass quality is passed from the buyer to the seller.

In going from live weight pricing to grid pricing, the seller's value of knowledge about the cattle being sold increases. The more knowledge one has about expected carcass merit, the more price and basis risk can be managed. When selling on a live-weight basis, the seller does not need much information on the quality of the cattle however, the buyer must estimate the carcass weight and quality and yield grades. Therefore, carcass quality information is more valuable to the buyer, the one who possesses the risk. With a grid pricing system, it is the seller who must have the most information on the cattle.

Hedging is promoted as one way to decrease price risk. However, when selling cattle using grid pricing, because of changing premiums and discounts over time and uncertainty regarding cattle quality attributes, basis risk is considerably greater than traditional basis. The producer must be able to quantify cattle quality risk, changing premium/discount risk, and local demand and supply risk to anticipate and manage basis risk.

CONCLUSION

Fed cattle prices based on carcass grids are more variable than live fed cattle prices. This analysis showed that basis variability increases as the number of components included in the *transaction price* increase. Live-weight pricing has the lowest basis variability of the six pricing methods examined. As cattle are sold using grade and yield grids, basis variability increases. This added basis risk is mostly associated with uncertainty regarding cattle quality and to a lesser

extent, changes in grid premiums and discounts over time. Packers offer basis contracts, which eliminate traditional basis risk for cattle feeders. However, even basis contracts would not eliminate basis risk under grid pricing because cattle quality (and associated premiums and discounts) would still be uncertain, although such contracts could reduce basis risk some.

Basis variability is seasonal with greatest volatility in the months of June and December. The low supply and quality mix of cattle available, as well as seasonal meat demand during these times may contribute to these seasonal patterns.

The transition to fed cattle carcass grid pricing is occurring rapidly. In order to effectively use grid pricing, cattle feeders need to better understand the magnitude of variability and basis risk associated with grid-priced fed cattle compared with traditional live cattle basis risk. They must be aware of the addition components and the affects on basis associated with grid pricing.

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Table 1. Description of Various Cattle Pricing Methods Used to Evaluate Basis Risk

Method	Pricing Method	Base Price	Dressing % for Base	Dressing % for Converting to Live	Varies Relative to Live
Kansas	Live	W. KS Choice Direct 11-1300 lbs. Steer	------	------	------
Texas/Oklahoma	Live	TX/OK Direct Steer and Heifer Average			
CS Spread	CS Grid	W. KS Choice Direct 11-1300 lbs. Steer	62.8	62.8	Choice/Select Spread
Dressed	Dressed	W. KS Choice Direct 11-1300 lbs. Steer	62.8	Actual	Dressing %
Grid 1	Actual Grid	W. KS Choice Direct 11-1300 lbs. Steer	62.8	Actual	Dressing %, Quality and Yield Grades, Choice/Select Spread
Grid 2	Actual Grid	W. KS Choice Direct 11-1300 lbs. Steer	62.8	Actual	Dressing %, Quality and Yield Grades, Choice/Select Spread

Table 2. Summary Statistics of Cattle Traits from 972 Pens of Cattle

Trait	Average	Standard Dev.	Minimum	Maximum
Prime (%)	2.85	4.53	0.00	31.61
CAB (%)[a]	20.88	12.90	0.00	69.43
Choice (%)	42.41	10.32	3.63	82.04
Select (%)	32.21	15.52	0.00	85.98
Ungraded (%)	1.65	2.63	0.00	40.85
Yield Grade 1 (%)	4.20	5.05	0.00	49.67
Yield Grade 2 (%)	34.55	16.56	0.00	100.00
Yield Grade 3 (%)	56.36	17.02	0.00	94.76
Yield Grade 4 (%)	4.88	5.17	0.00	35.25
Yield Grade 5 (%)	0.01	0.39	0.00	12.22
<550 lbs. Carcass (%)	1.04	2.93	0.00	30.66
>950 lbs. Carcass (%)	1.36	3.24	0.00	38.45
Carcass Weight (lbs.)	754.44	71.38	566.00	1237.00
Hot Yield (%)	63.70	0.81	60.43	65.63
Head (Number)	111.25	58.83	12.00	257.00

[a]Certified Angus Beef

Table 3. Summary Statistics of Cattle Traits from 406 Pens of Cattle Randomly Selected with Replacement from 972 Pens

Trait	Average	Standard Dev.	Minimum	Maximum
Prime (%)	2.76	4.41	0.00	29.12
CAB (%)[a]	20.55	13.01	0.00	60.13
Choice (%)	42.71	11.24	16.56	82.04
Select (%)	32.12	15.76	4.09	78.95
Ungraded (%)	1.86	2.59	0.00	15.23
Yield Grade 1 (%)	4.50	5.04	0.00	49.67
Yield Grade 2 (%)	33.97	16.32	1.04	91.01
Yield Grade 3 (%)	56.69	17.06	0.00	93.84
Yield Grade 4 (%)	4.82	4.98	0.00	32.20
Yield Grade 5 (%)	0.04	0.62	0.00	12.22
<550 lbs. Carcass (%)	1.17	2.85	0.00	22.78
>950 lbs. Carcass (%)	1.28	3.07	0.00	21.63
Carcass Weight (lbs.)	748.45	68.87	574.00	918.00
Hot Yield (%)	63.77	0.79	61.67	65.55
Head (Number)	113.71	58.49	12.00	252.00

[a]Certified Angus Beef

Table 4. Overall Statistics for Weekly Basis Calculations on Live Weight and Grid Pricing Methods, 1990-97

Pricing Method	N	Mean ($/cwt)	Standard Dev. ($/cwt)	Minimum ($/cwt)	Maximum ($/cwt)
Kansas	406	0.007	1.976	-4.760	7.160
Texas/Oklahoma	406	0.053	1.963	-4.760	7.110
CS Spread	406	0.403	2.029	-4.320	7.486
Dressed	406	1.105	2.205	-4.521	8.895
Grid 1	406	2.474	2.617	-5.078	11.357
Grid 2	406	2.269	2.695	-4.964	11.843

Table 5. F-Statistic P-Values for Equality of Testing Weekly Basis Standard Deviations, 1990-97

	Pricing Method					
Pricing Method	*Kansas*	*Texas/ Oklahoma*	*CS Spread*	*Dressed*	*Grid 1*	*Grid 2*
Kansas[a]		0.445				
Texas/Oklahoma						
CS Spread	0.298	0.252				
Dressed	0.014	0.010	0.047			
Grid 1	0.000	0.000	0.000	0.000		
Grid 2	0.000	0.000	0.000	0.000	0.276	

[a]Basis values in this column have the higher variability

Table 6. Summary Statistics by Contract Month for Basis Calculations on Live Weight and Grid Pricing Methods, 1990-97

Contract Month/ Pricing Method	N	Mean ($/cwt)	Standard Dev. ($/cwt)	Minimum ($/cwt)	Maximum ($/cwt)
February					
Kansas	67	-0.062	1.410	-1.870	4.660
Texas/Oklahoma	67	0.128	1.400	-2.000	4.710
CS Spread	67	0.262	1.460	-1.467	5.392
Dressed	67	1.004	1.626	-2.466	5.700
Grid 1	67	2.018	2.094	-2.984	8.542
Grid 2	67	2.042	2.242	-1.500	10.751
April					
Kansas	67	-0.181	1.273	-2.400	2.950
Texas/Oklahoma	67	-0.197	1.327	-3.070	3.390
CS Spread	67	0.024	1.272	-2.171	3.185
Dressed	67	1.037	1.479	-2.146	5.047
Grid 1	67	1.605	1.711	-2.797	6.356
Grid 2	67	1.663	1.523	-1.953	5.745
June					
Kansas	69	2.124	2.066	-1.470	7.160
Texas/Oklahoma	69	2.074	2.075	-1.970	7.110
CS Spread	69	2.584	2.105	-1.123	7.486
Dressed	69	3.313	2.269	-1.370	8.895
Grid 1	69	4.917	2.613	-0.759	10.784
Grid 2	69	4.734	2.638	-1.238	9.274
August					
Kansas	68	-0.723	1.603	-4.760	3.230
Texas/Oklahoma	68	-0.630	1.649	-4.760	3.140
CS Spread	68	-0.316	1.590	-4.157	3.655
Dressed	68	0.310	1.843	-4.521	4.281
Grid 1	68	1.680	2.112	-4.917	5.648
Grid 2	68	1.748	2.240	-3.924	7.250
October					
Kansas	68	-1.453	1.281	-4.540	0.660
Texas/Oklahoma	68	-1.494	1.282	-4.540	0.660
CS Spread	68	-1.051	1.291	-4.114	1.105
Dressed	68	-0.482	1.608	-4.373	2.683
Grid 1	68	1.030	2.066	-5.078	6.835
Grid 2	68	0.367	2.132	-4.964	5.620
December					
Kansas	67	0.306	2.030	-4.720	4.680
Texas/Oklahoma	67	0.408	1.909	-4.350	4.680
CS Spread	67	0.883	2.146	-4.320	5.643
Dressed	67	1.415	2.273	-3.043	6.447
Grid 1	67	3.556	2.757	-1.350	11.357
Grid 2	67	3.020	2.998	-2.848	11.843

Table 7. Correlation Coefficients Between Basis calculation Methods by Contract Month

Contract Month/ Pricing Method	Pricing Method					
	Kansas	*Texas/ Oklahoma*	*CS Spread*	*Dressed*	*Grid 1*	*Grid 2*
February						
Kansas	1.000	0.956	0.995	0.797	0.702	0.713
Texas/Oklahoma		1.000	0.952	0.754	0.665	0.693
CS Spread			1.000	0.792	0.716	0.720
Dressed				1.000	0.819	0.755
Grid 1					1.000	0.642
Grid 2						1.000
April						
Kansas	1.000	0.935	0.998	0.807	0.583	0.702
Texas/Oklahoma		1.000	0.928	0.756	0.547	0.667
CS Spread			1.000	0.807	0.591	0.710
Dressed				1.000	0.826	0.786
Grid 1					1.000	0.672
Grid 2						1.000
June						
Kansas	1.000	0.988	0.997	0.928	0.835	0.776
Texas/Oklahoma		1.000	0.985	0.918	0.825	0.777
CS Spread			1.000	0.922	0.844	0.777
Dressed				1.000	0.896	0.839
Grid 1					1.000	0.678
Grid 2						1.000
August						
Kansas	1.000	0.980	0.998	0.858	0.693	0.729
Texas/Oklahoma		1.000	0.979	0.853	0.668	0.727
CS Spread			1.000	0.853	0.698	0.742
Dressed				1.000	0.849	0.749
Grid 1					1.000	0.613
Grid 2						1.000
October						
Kansas	1.000	0.960	0.992	0.800	0.610	0.645
Texas/Oklahoma		1.000	0.951	0.799	0.581	0.645
CS Spread			1.000	0.796	0.651	0.654
Dressed				1.000	0.778	0.683
Grid 1					1.000	0.778
Grid 2						1.000
December						
Kansas	1.000	0.983	0.991	0.928	0.841	0.733
Texas/Oklahoma		1.000	0.977	0.902	0.821	0.743
CS Spread			1.000	0.914	0.871	0.757
Dressed				1.000	0.894	0.731
Grid 1					1.000	0.629
Grid 2						1.000

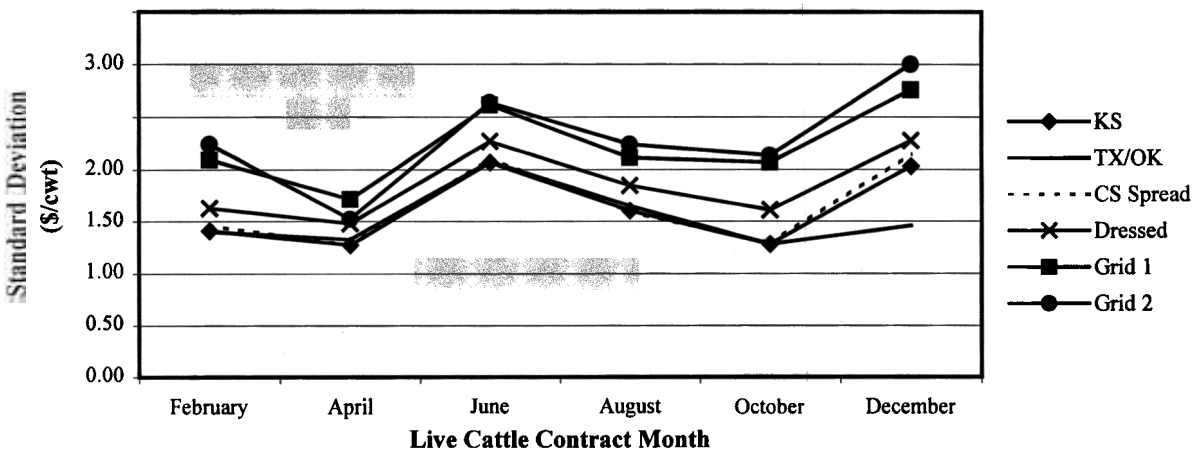

Figure 1. Seasonality of Weekly Cattle Basis Standard Deviations for Various Pricing Methods, 1990-97