

Forecasting and Using Live Cattle Basis

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Introduction

Price expectations are an integral part of the management decisions producers must make. All production and marketing decisions are either explicitly or implicitly based on price expectations. On any given day, the futures market represents the “market’s” expectation for future prices. However, the price producers are interested in is typically for a location or commodity other than that specified in the futures contracts. Because of this, producers need to convert or transform the futures price to a price that is useful for their production and marketing decisions. Futures prices are converted to cash prices by using the concept of basis. Basis is defined according to;

$$Basis_{ijt} = Cash\ price_{ijt} - Futures\ price_t, \quad (1)$$

where i refers to location, j refers to commodity, and t refers to a specific time. By definition, the futures price represents a specific commodity of a certain quality at a specific location, e.g. ??? pound steers of which 55% will grade Choice and 45% will grade Select at a Chicago Mercantile Exchange (CME) approved packing plant. If producers can forecast basis relatively accurately, they can use the futures price on any given day and convert it to a cash price expectation according to;

$$E[Cash\ price_{ijt}] = E[Basis]_{ijt} + Futures\ price_t, \quad (2)$$

where $E[\bullet]$ indicates the cash price and basis are expectations as opposed to actual values. Because the difference between cash prices and futures prices, i.e., basis, is typically less variable than price levels themselves for many commodities, forming cash price expectations by using the futures market and predicted basis levels is often easier than trying to forecast cash prices directly. Therefore, a thorough understanding of basis can be very helpful for producers as they form price expectations to guide their production and marketing decisions.

Knowledge of basis information is also critical for people interested in using the futures or options market to manage price risk by hedging. In this case, basis information is needed not only for forming price expectations, but also for making specific decisions regarding the lifting of hedge positions, the timing of cash sales, and the potential delivery of cattle. It is imperative that anybody who plans on hedging using either the futures or options market understands the concept of basis. However, as previously mentioned basis information is also extremely useful for forming price expectations regardless of whether or not an individual plans to hedge in the futures or options market.

The objectives of this paper are to discuss considerations regarding information required to forecast the basis for fed cattle (steers and heifers) in western Kansas and to compare alternative methods of forecasting basis. Additionally, historical basis information is provided that can be used in conjunction with the CME live cattle futures price for formulating price expectations for fed cattle in western Kansas.

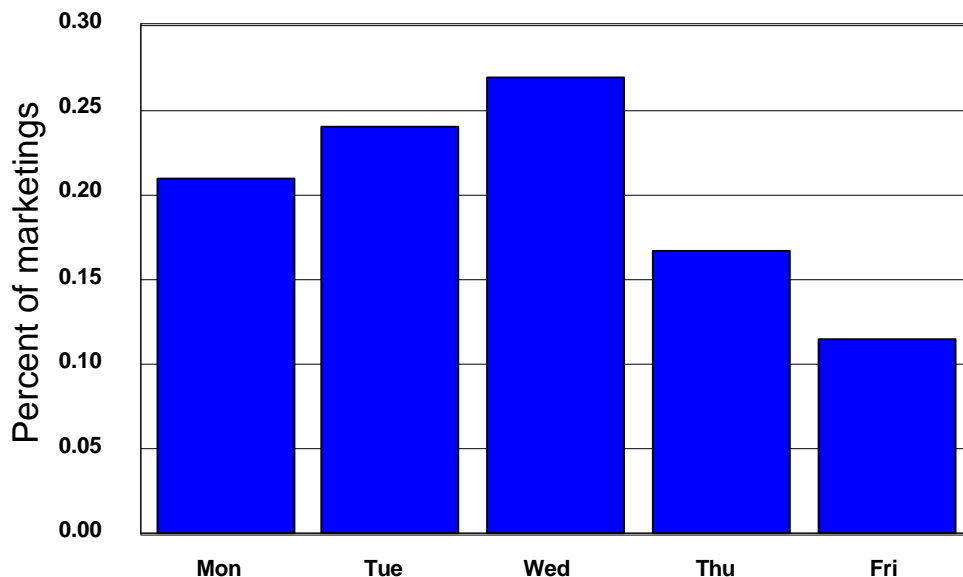
Information required to forecast fed cattle basis

From equation (1) it was seen that basis is the difference between cash and futures prices for a specific commodity, at a given location, at a given point in time. Thus, in order to forecast basis, historical cash and futures prices are needed. Before discussing cash and futures prices, addressing the subscript t , i.e., the specific time period, in equations (1) and (2) is important. In other words, what is the relevant time period to consider? The relevant time period is fairly obvious for feeder cattle where an auction at a specific location is held on a given day of the week, however, fed cattle are typically marketed each day of the week. Recording daily basis information is typically not recommended as the data requirements are large and the marginal benefit of daily versus weekly information is likely quite small.

Given that the general recommendation for fed cattle is to use weekly cash and futures price information, the next question is what weekly price series should be used? A concern of using a straight weekly average, i.e., each day assigned equal weights, is that cattle marketings are somewhat cyclical throughout the week. Figure 1 illustrates that over approximately a five year period slightly over half of the cattle marketed in a week were sold on Tuesday and Wednesday. Because of this, it may be inappropriate to use a weekly average price where each day is assigned an equal weight. Rather, it may be appropriate to calculate a volume weighted weekly average price where each day is weighted according to the volume of cattle marketed on that specific day. Calculating volume weighted weekly average cash and futures prices is much more difficult because information pertaining to the number of cattle marketed each day is not readily available.

Figure 1.

Frequency of Daily Fed Cattle Marketings in Kansas
Source: USDA AMS, January 1991- August 1996



Daily prices since 1991 were used to construct both a volume weighted weekly average basis and a simple average weekly basis (data not shown). Comparing these two weekly series it was found that there was little difference in either basis level or basis variability. Thus, given the marginal benefit of calculating a volume weighted weekly average it is recommended that weekly average prices are computed as simple weekly averages, where each day is assigned an equal weight. This holds true for both cash prices and futures prices, where the weekly average futures price is the average of the closing price for each day of the week. Therefore, all weekly prices used hereafter are computed using a simple average.

Cash Prices

As a general rule, the historical cash price to collect should reflect whatever commodity it is that basis information is desired for. For example, if a producer wants basis information for Choice steers and heifers then historical information should be collected for each of these "different" commodities. However, if the historical relationship is known between Choice steer and heifer prices, collecting basis information for one or the other of these commodities will be sufficient. For example, if it is known that historical Choice steer and heifer prices are similar, then knowing historical basis for steers infers that historical basis for heifers is also known. A producer may also be interested in basis information for Choice versus Select cattle. Similar to steers versus heifers, knowing basis for one of these quality grades and historical relationships between the two quality grades will be sufficient. Figure 2 shows the weekly average prices for western Kansas direct Choice steers and Select steers since 1984 and Choice heifers since 1988 as reported by USDA AMS. Note – prior to 1988, the quality grade Select was referred to as Good.

While figure 2 is useful for identifying price levels, it is not easy to discern price relationships between Choice steers and heifers or Choice versus Select steers. Figure 3 shows the differences between the different series which depicts historical relationships much better. Since 1990, with the exception of a few weeks, there has been little difference between weekly average steer and heifer cash prices. Because basis for both steers and heifers is calculated using the same futures price and cash prices are essentially equal, basis must also be equal. Comparing Choice versus Select steers it can be seen that Choice steers bring about a \$1/cwt. premium. Since the quality grade changed from Good to Select this relationship has been quite stable. As a quick rule of thumb, producers can probably use the relationship that the basis for Select steers is approximately \$1/cwt. less than the basis for Choice steers. However, the difference between Choice and Select, as reported by AMS, does possibly follow some seasonal patterns as the Choice-Select price spread is not constant throughout the year. Therefore, historical basis reported in this paper is for both Choice steers and Select steers.

Futures Prices

As previously discussed, the weekly average futures price to use is the simple average of the closing prices for each day. However, an issue that does need to be considered is what is the relevant futures contract month to use. The CME trades live cattle futures contracts for the months of February, April, June, August, October, and December. For live cattle the relevant contract to use when calculating basis (equation 1) is the nearby contract. Fed cattle that meet futures contract specifications are a perishable product that, unlike grain, cannot be stored and thus deferred futures contracts are not relevant. While this seems relatively straight forward,

there are some potential problems of identifying what the nearby contract is when using weekly average prices. A question that arises is if a contract expires during the week, which contract month should be used to calculate the weekly average price for that particular week? For example, if the April contract expires on a Wednesday the June contract becomes the nearby contract on Thursday and Friday of that week. Simply averaging the closing prices for the nearby contract from each day would result in using April prices for three days and June for two days. As a general recommendation, calculating a weekly average price using multiple futures contracts should be avoided.

When determining how to "roll over" from one contract to another it is important to establish a "rule" and remain consistent over time. While this may not seem like a critical issue in calculating basis it can have a very big impact on basis levels calculated as a contract approaches expiration. Figure 4 shows the weekly average nearby CME live cattle futures contract since 1984 using two different rollover methods. The first method changes contracts, on the Monday of the expiration week. Using this method, basis for a particular week is never calculated using a futures contract that is expiring that week. The second method is based on a weekly average of whichever contract is trading on Friday. In this case, if a contract expires on a Friday basis would be calculated with the expiring contract and then rollover to the next contract the following Monday.

It is difficult to distinguish any differences in the price series in figure 4 as would be expected. However, figure 5 shows the difference between the two nearby price series. By definition, the differences will always be zero unless a contract expires on a Friday. It can be seen that using these two different definitions, which have a very subtle difference, can result in nearby futures prices that are considerably different (+\$3/cwt. to -\$6/cwt.). Obviously, if the method of defining nearby futures impacts weekly average futures price it will also impact basis. Actually, the differences in prices in figure 5 also represents the difference in basis levels using the two different definitions of nearby futures because the cash price used will be the same regardless of how nearby futures is defined.

The method of defining nearby futures is not as important as being consistent over time and knowing how it is defined. For example, if basis information is obtained from somebody, as opposed to calculating it yourself, it is critical that you know what rollover method is used, i.e., how nearby futures is defined. In this paper, all basis information is based on using rollover method (1) previously discussed. Restating this method, the nearby futures contract rolls to the next contract on the Monday of expiration week.

Historical Basis

Tables 1 and 2 include basis since 1984 for Choice and Select steers in western Kansas, respectively, by futures contract. Historical information is useful because it can be used to make decisions regarding future basis levels and also give an indication as to how variable basis has been over time. Additionally, historical information is useful for examining trends over time. Historical basis information for Select quality grade prior to 1988 was based on the Good quality

grade and is included for comparison purposes only and should not be considered when looking at trends, variability, etc.

The basis data since 1988 in tables 1 and 2 are shown graphically in figures 6-11. Several trends or patterns emerge from these figures. First of all, as expected, Choice basis is more positive than Select basis reflecting the higher cash price of higher quality animals. Secondly, basis tends to converge towards zero as the contracts near expiration. However, this convergence occurs in different ways for different contracts. For example, the basis for the June contract tends to be positive 6-9 weeks prior to expiration and then converges towards zero as the contract nears expiration (basis becomes less positive). On the other hand, the basis for the October contract tends to be negative 6-9 weeks prior to expiration and then converges towards zero as the contract nears expiration (basis becomes more positive). The June and August contracts appears to have the most consistent patterns over the last ten years, but basis for both of these contracts has been trending down (basis level is becoming less positive).

Contract Specification Changes

Starting with the June 1995 contract there were several specification changes to the CME Live Cattle futures contract. There were two changes that could possibly have significant impacts on basis and thus it is important to be aware of these changes. The two changes were the following:

1. Buyers have the option of having the cattle delivered to a packing plant and the final settlement based on actual carcass results as opposed to a live weight evaluation (buyer's option).
2. Par delivery load was changed from 100% Choice steers to 55% Choice and 45% Select grade steers (quality change).

The first change would not be expected to affect basis if live weight evaluation of cattle could be done accurately. However, because of the difficulty of determining carcass quality based on live cattle evaluations this change will reduce the risk to buyers. Because of this reduced risk, buyers may be willing to pay a higher price, all else equal. With increased futures prices basis levels would decrease. The second change results in the futures price representing a lower quality animal which should lower futures price and hence increase basis levels. At this point, preliminary analysis of the impact these two contract specification changes have had on basis has been mixed. Murphy and Boris looking at average basis levels conclude that the contract specification changes have resulted in basis levels becoming less positive (more negative). They contend that the impact of the buyer's option is greater than the impact of the quality change. Parcell et al. using regression analysis conclude that the contract specification changes have resulted in basis becoming more positive (less negative). They contend that the basis levels becoming less positive since the contract specification change were the result of high corn prices.

It is important to keep in mind that there have been very few observations for analysis

purposes since the contract specifications have changed and thus any results should be taken with some caution. However, just as importantly, the contract specifications need to be recognized realizing that historical basis patterns and levels may no longer hold true. These contract specification changes may very well lead to more predictable basis levels in the future, however, in the near term they may lead to harder to predict basis levels.

Forecasting Basis

If basis is to be used for formulating price expectations and/or evaluating futures and options market hedging opportunities, an expected basis, i.e., a basis forecast, is required. As stated previously, basis levels are typically easier to forecast than price levels themselves which leads to the question what is the best way to forecast basis levels? Figures showing historical basis (figures 6-11) can be informative at showing trends in basis levels and basis variability and can be helpful when forecasting basis, but how they are interpreted is very subjective. It is often suggested to use multi-year historical averages as a basis forecast (CME; Dhuyvetter; and Wellman and Murra). However, recommendations as to how many years, i.e., time horizon, to use in the historical average are seldom, if ever, given.

In order to determine if there is an optimal multi-year historical average to use when forecasting basis, basis for Choice steers was forecasted using historical averages based on 1-7 years according to the following;

$$\hat{Basis}_{kjt} = \frac{1}{i} \sum_{t-i}^{t-1} Basis_{kji} , \quad (3)$$

where *Basis hat* represents the basis forecast, *k* refers to futures contract (FEB, APR, JUN, AUG, OCT, and DEC), *j* refers to weeks prior to expiration (1 through 9), *t* refers to year (1992 through 1997), and *i* refers to years included in historical average (1 through 7). Additionally, basis was forecasted using the following (regression model);

$$\hat{Basis}_{kjh} = \beta_0 + \beta_1(LCFut) + \beta_2(CNFut) + \beta_3(Weeks) + \beta_4(SpecChg) , \quad (4)$$

where *Basis hat* is the forecasted basis level; *LCFut* is the nearby live cattle futures price; *CNFut* is the nearby corn futures price; *Weeks* is the weeks to expiration; *SpecChg* is a dummy variable to account for contract specification changes for contracts starting with the August 1995 contract; *k*, *j*, and *t* refer to contract, week prior to expiration, and year (1992-1997) respectively; and *h* refers to the time period when the basis forecast is made (4,8,12,16, and 20 weeks prior to forecast period). The β_0 , β_1 , β_2 , β_3 , and β_4 parameters were estimated using the 5 years of data prior to the year being forecasted. For example, to forecast basis in 1994, equation (4) was estimated using data from 1989-1993.

Using equations (3) and (4) basis forecasts were generated out-of-sample for each week

prior to expiration for each contract for the years 1992 through 1997. Forecasts being out-of-sample simply means that forecasts were made based only on information available at the time the forecast was made. Using the forecasted and actual observed basis levels absolute errors were calculated according to;

$$ABSError_{kjm} = ABS[Basis_{kjm} - \hat{Basis}_{kjm}] , \quad (5)$$

where *ABSError* is the absolute value of the forecast error, *k* refers to contract, *j* refers to week prior to expiration, *t* refers to year, and *m* refers to forecast method (1-7 year averages and regression). Because it is unlikely that people interested in forecasting basis want to use a different forecasting method for different contracts or a different forecasting method over time, the absolute errors were aggregated according to;

$$MABSE_{km} = \frac{1}{n} \sum_{j=1}^9 \sum_{t=1992}^{1997} ABSError_{kjm} , \quad (6)$$

where *MABSE* refers to the average absolute error across all futures contracts and all years forecasted, *n* is the total number of forecasts for each forecast method (*m*), and all other variables are as previously defined. The average absolute error for the regression method, equation (4), was also averaged across time periods when the forecast was made.

The average absolute errors (MABSE) for each forecasting method, equation (6), are shown graphically in figure 12. The MABSE ranged from slightly over \$1.15/cwt. to approximately \$1.50/cwt. MABSE was lowest when basis for Choice steers was forecasted using a 2 or 3 year historical average. The regression forecast was more accurate than a 1 or 6 year historical average, but all of the other historical average forecasts were superior to the regression forecast. Using a 2 or 3 year historical moving average compared to a 5 year historical moving average to forecast Choice steer basis levels since 1992 would have resulted in approximately a \$0.10/cwt. more accurate forecast. Results are not shown for forecasting Select steer basis, but the trends were similar, i.e., a 2 to 3 year moving average forecast resulted in the lowest average absolute error. This indicates that it is important to continuously update historical basis information when trying to forecast future basis levels.

Summary and Conclusions

Basis information is a critical component of formulating price expectations that are used in making production and marketing decisions. As a general rule, basis information should be recorded for all commodities marketed. However, if two commodities have a constant relationship with regards to price, then recording basis information for both commodities is not necessary. The price of Choice steers and heifers in western Kansas is constant enough that maintaining basis information on steers is sufficient. The difference between cash prices for Choice steers and Select steers, as reported by AMS, are relatively constant at about \$1/cwt.

premium for Choice steers. Because of this, it may be adequate to maintain basis information for only one series. However, because of seasonal patterns in the Choice-Select price spread historical data for both series are provided.

On a weekly basis, the majority of fed cattle are typically marketed on Tuesday and Wednesday. This points to a potential problem of calculating weekly average prices based on equal weights assigned to each day (simple averages). While maintaining simple averages are considerably easier than weighting each day according to the volume of cattle marketed, it should not be done if it leads to inaccurate data. However, based on fed cattle marketings in Kansas from 1991 through 1996 there appears to be little benefit to calculating volume weighted averages.

There were several contract specification changes in the CME Live Cattle futures contract beginning with the June 1995 contract. Preliminary research considering how this has impacted basis has been mixed. It is important to be cognizant of these changes and continue to monitor the effect they may have on basis levels in the future.

Basis is typically forecasted using historical multi-year averages, however, optimal historical time horizons are seldom discussed. The results of this analysis indicate that a relatively short-term historical time horizon of 2 or 3 years results in more accurate basis forecasts than a long-term horizon of 5 or more years. Additionally, a 2 to 3 year average forecast was more accurate at forecasting actual basis levels from 1992 through 1997 than was a simple regression model.

References

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Figure 2.

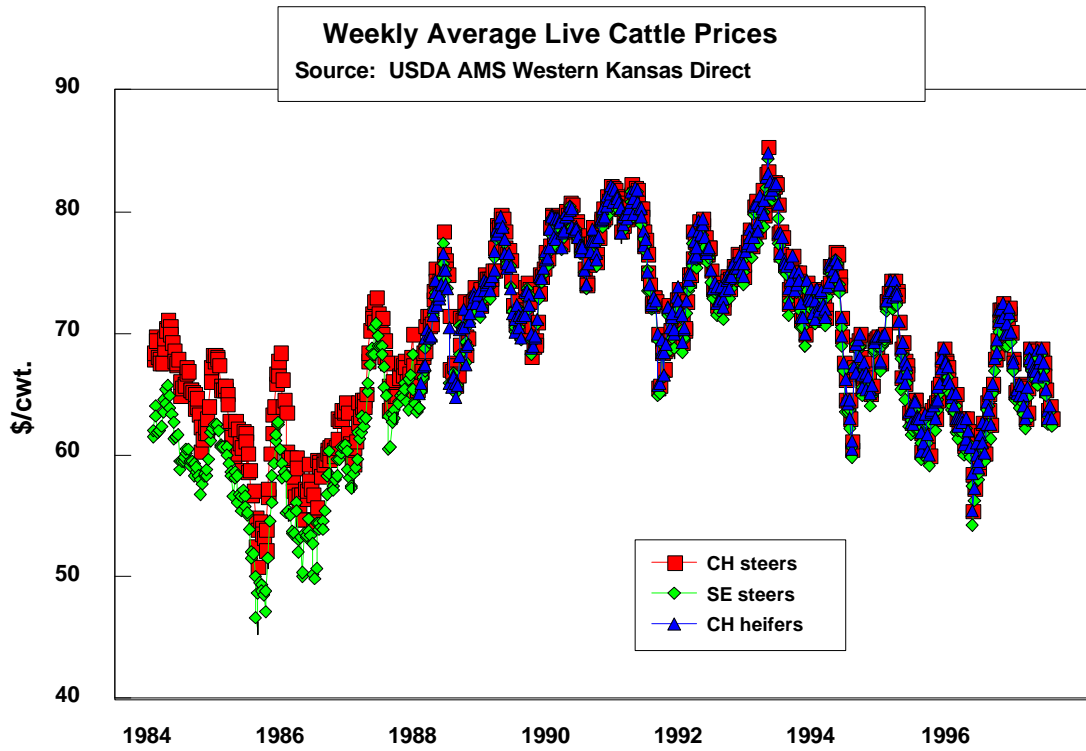


Figure 3.

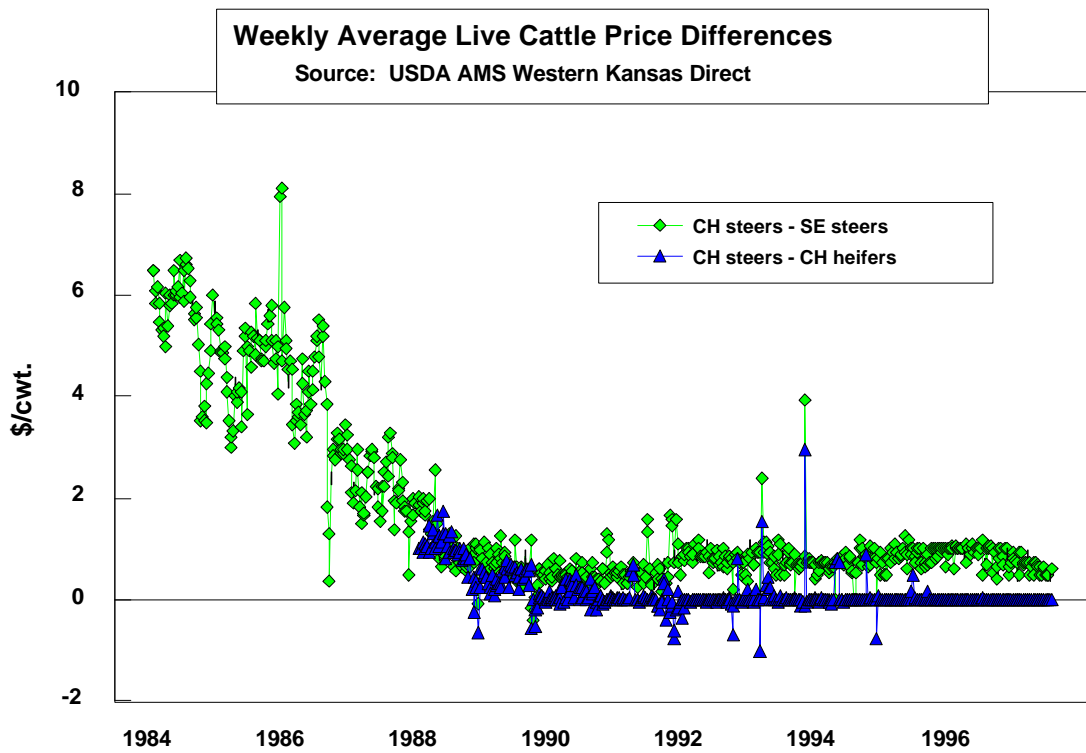


Figure 4.

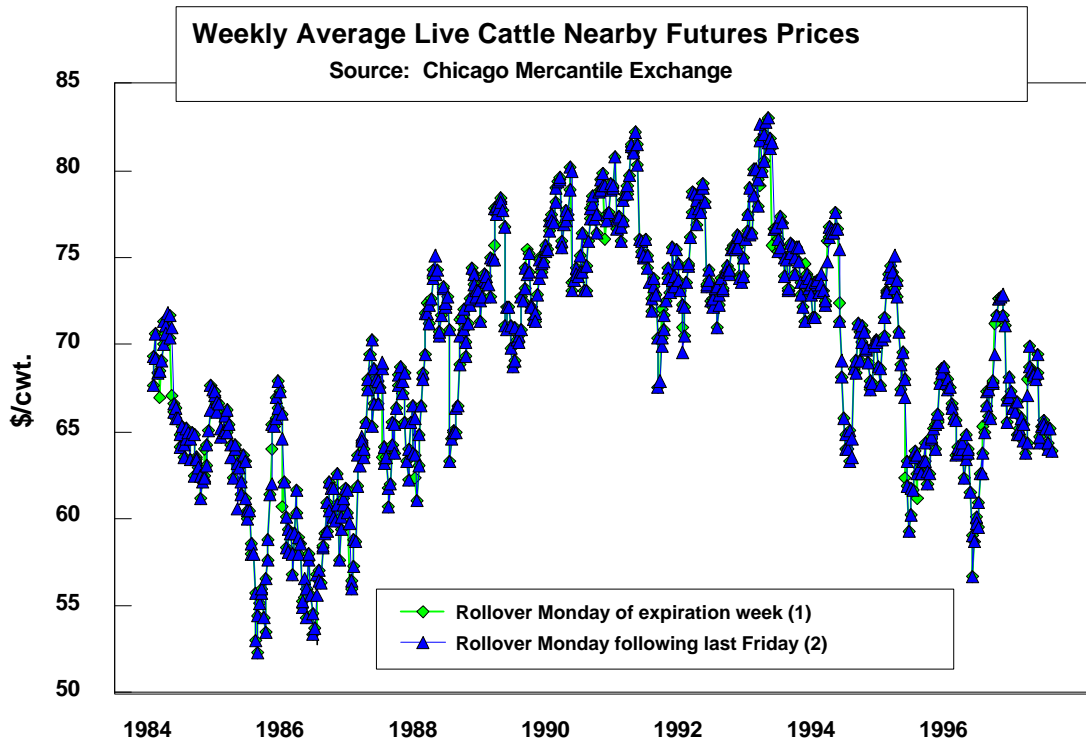


Figure 5.

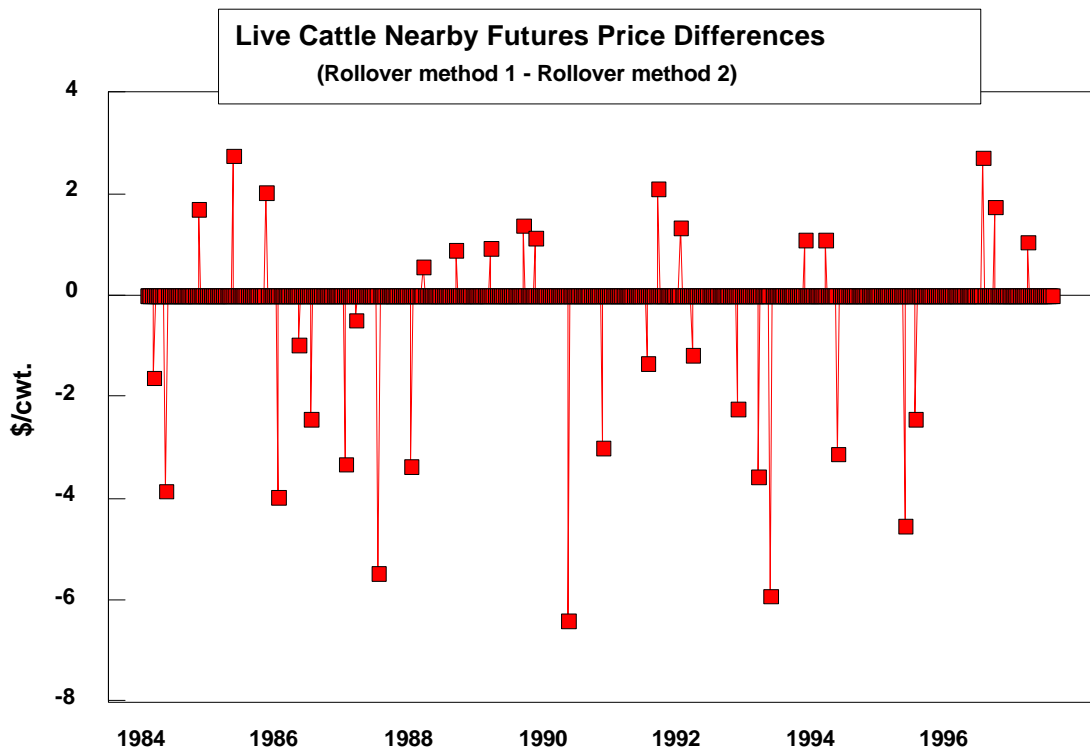


Figure 6.

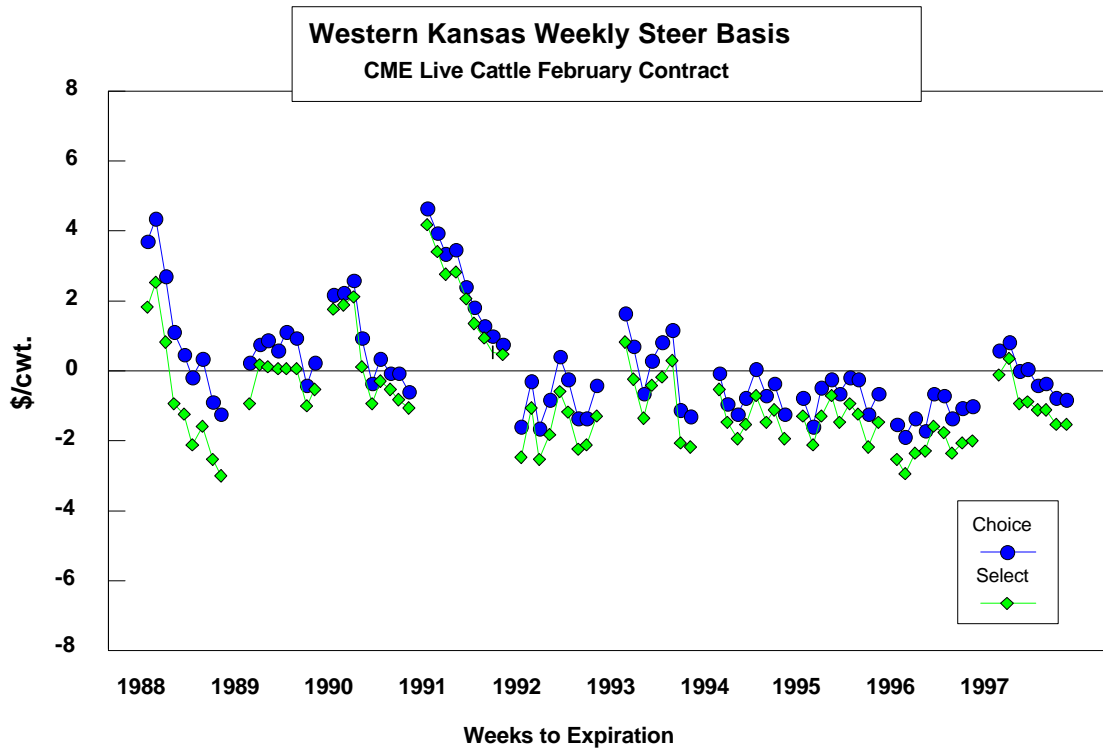


Figure 7.

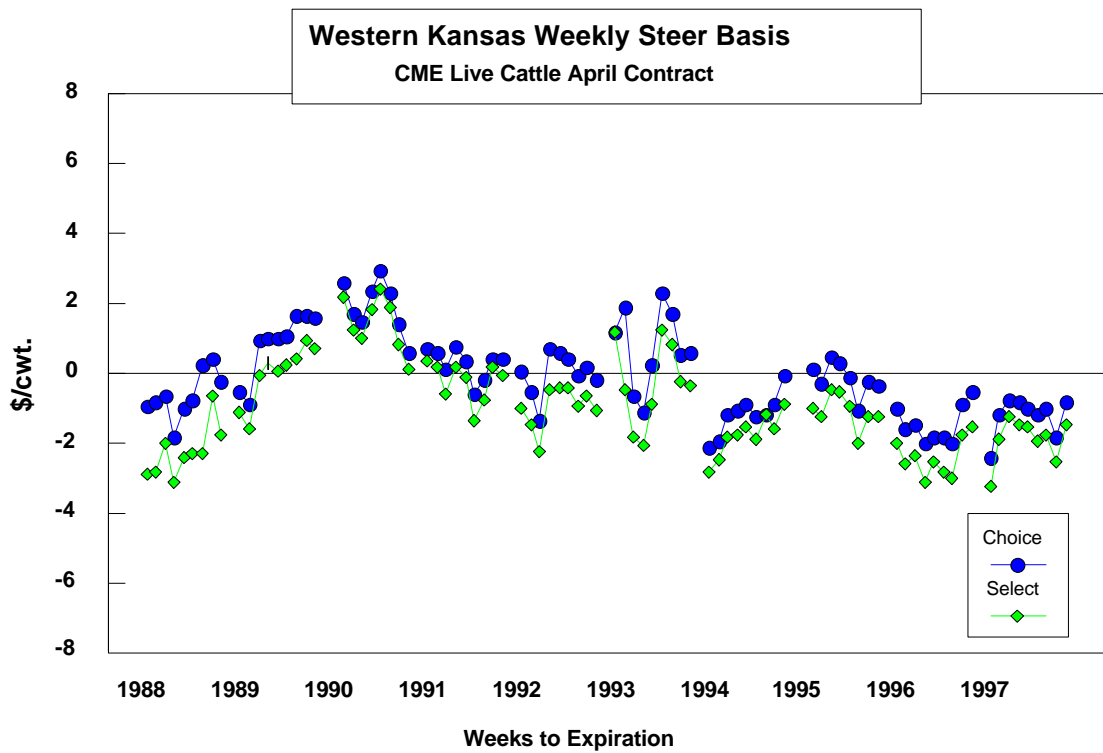


Figure 8.

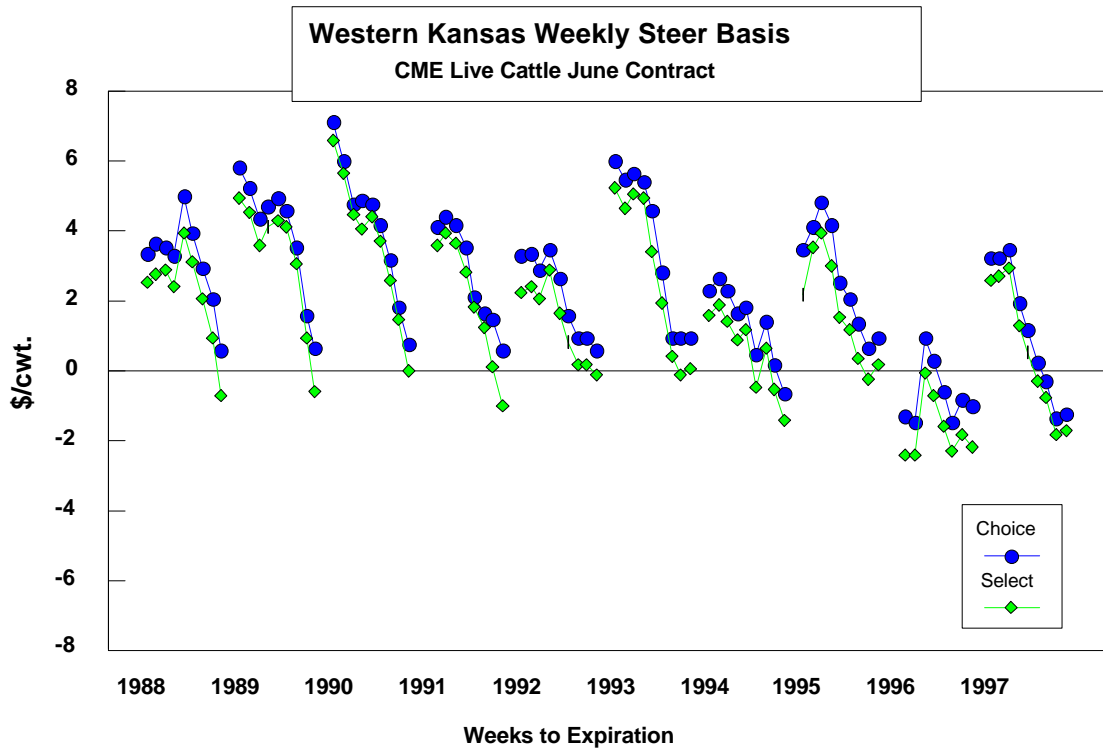


Figure 9.

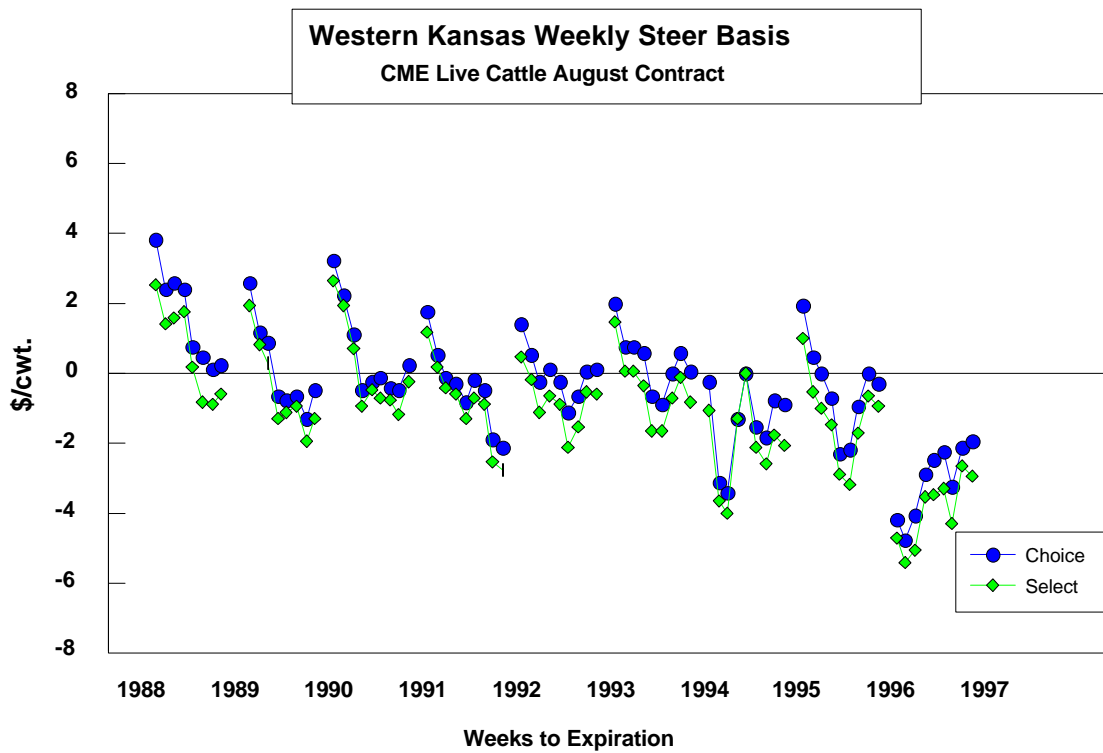


Figure 10.

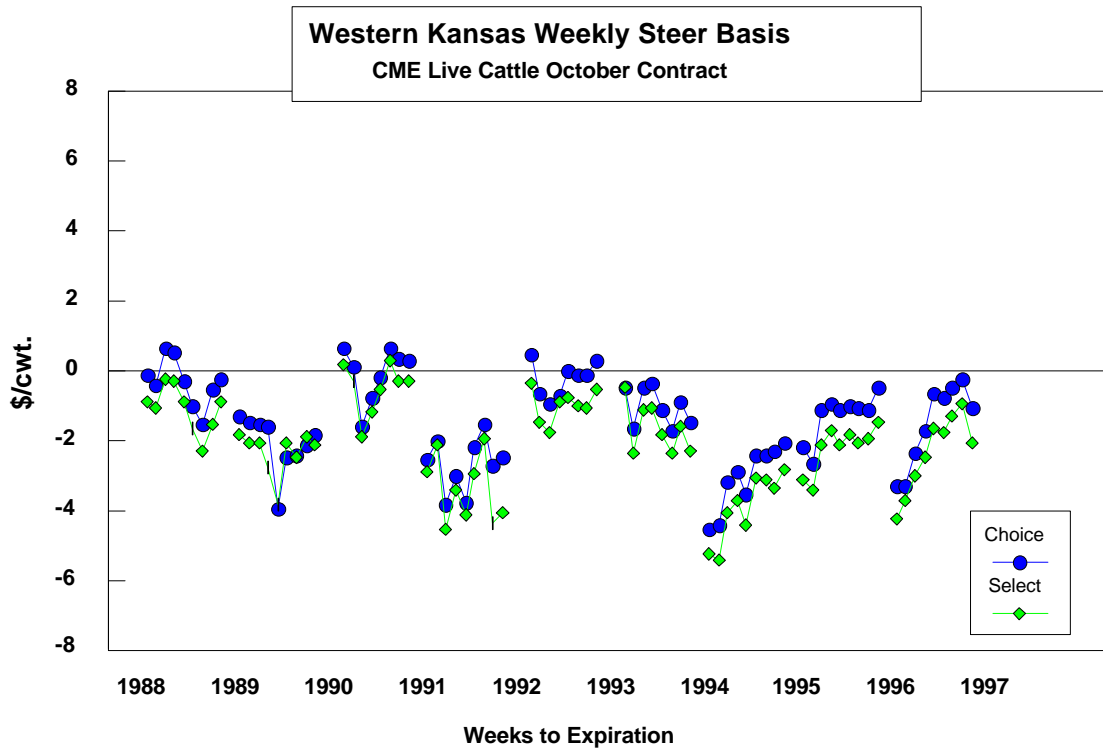


Figure 11.

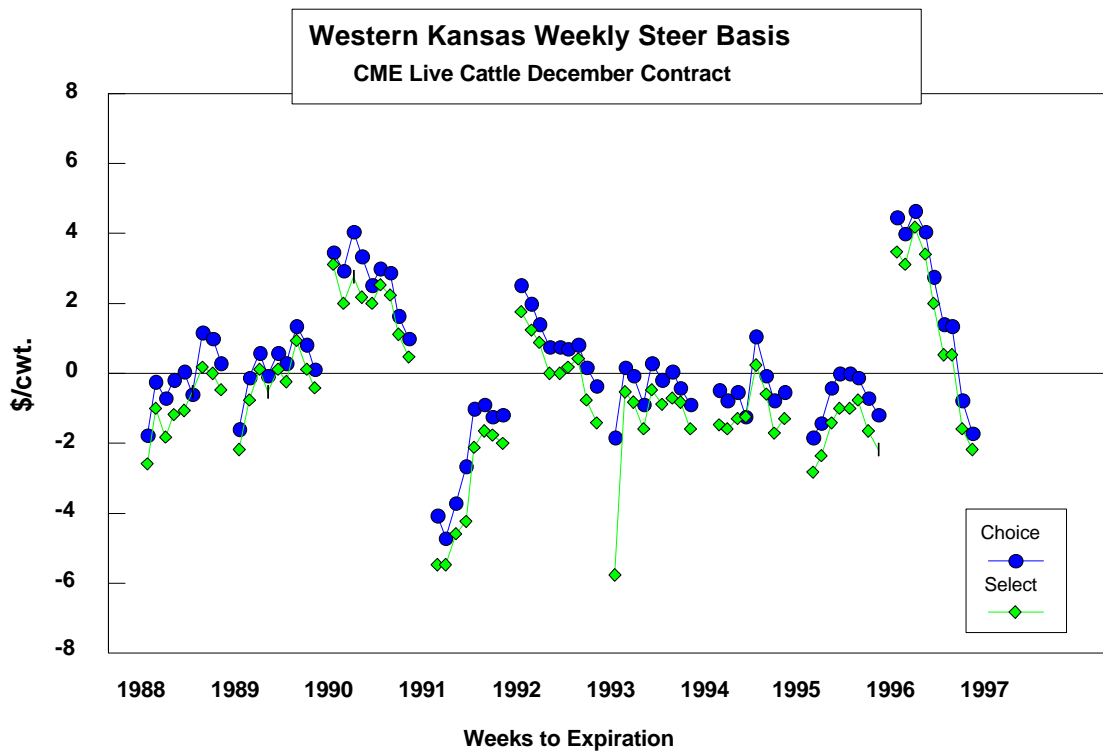


Figure 12.

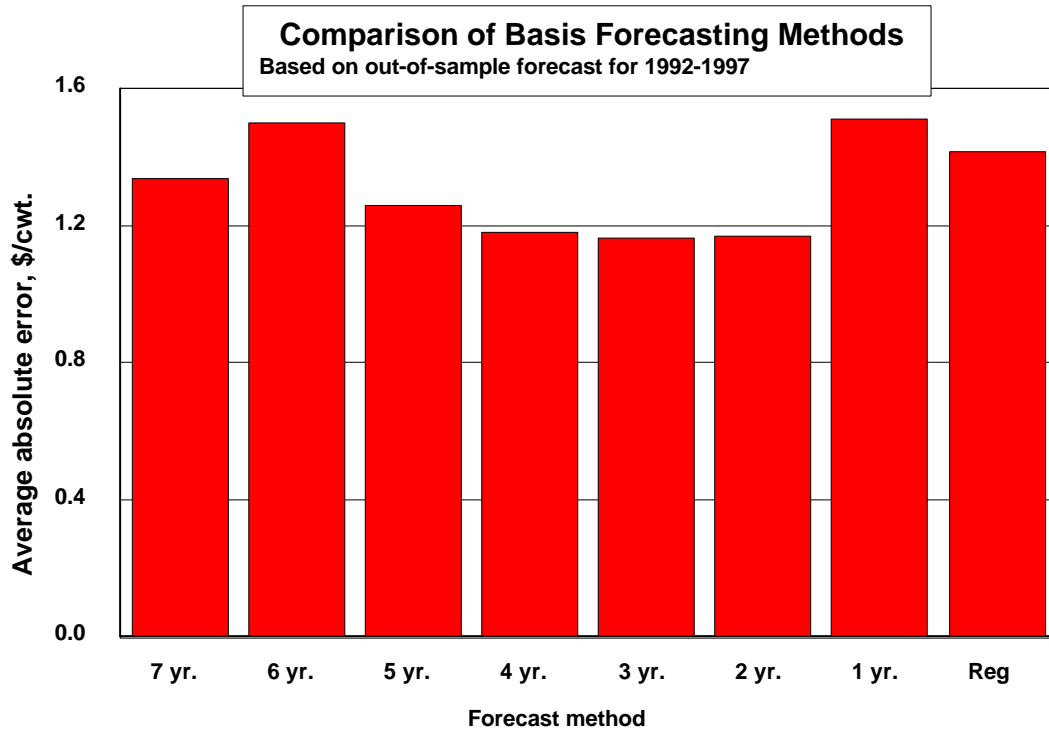


Table 1. Western Kansas Direct CHOICE Steer Basis**February CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	N/A	1.89	3.34	4.54	3.75	N/A	2.18	4.66	-1.62	N/A	N/A	-0.78	-1.52	N/A
8	N/A	1.23	2.43	3.71	4.38	0.23	2.27	3.96	-0.28	1.65	-0.04	-1.61	-1.87	0.61
7	N/A	0.82	3.35	3.47	2.71	0.77	2.58	3.36	-1.66	0.71	-0.92	-0.46	-1.36	0.84
6	0.32	1.04	1.97	2.08	1.10	0.86	0.93	3.49	-0.85	-0.63	-1.21	-0.23	-1.73	0.00
5	-0.79	0.26	1.71	1.92	0.48	0.61	-0.35	2.40	0.42	0.30	-0.76	-0.68	-0.62	0.06
4	-0.77	0.51	0.36	2.44	-0.20	1.10	0.33	1.84	-0.24	0.82	0.06	-0.20	-0.71	-0.43
3	0.14	-0.46	0.67	0.79	0.36	0.97	-0.05	1.27	-1.39	1.20	-0.74	-0.21	-1.34	-0.38
2	-0.33	0.69	0.17	0.71	-0.88	-0.40	-0.08	1.01	-1.36	-1.12	-0.35	-1.21	-1.08	-0.76
1	-0.54	0.12	0.32	0.22	-1.24	0.22	-0.59	0.77	-0.39	-1.27	-1.22	-0.67	-1.03	-0.80

* Weeks to expiration

April CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	0.65	N/A	N/A	-0.26	-0.97	-0.53	N/A	0.70	0.07	1.20	-2.11	N/A	-1.01	-2.40
8	-1.44	-2.08	-2.44	0.21	-0.84	-0.88	2.62	0.60	-0.56	1.89	-1.93	0.12	-1.62	-1.17
7	-1.15	-2.49	-1.73	0.93	-0.65	0.96	1.73	0.09	-1.35	-0.67	-1.20	-0.28	-1.47	-0.75
6	-1.67	-2.58	-1.28	0.07	-1.83	1.03	1.48	0.77	0.71	-1.10	-1.07	0.46	-2.03	-0.85
5	-0.58	-2.02	-2.14	-0.43	-0.99	0.98	2.36	0.36	0.60	0.25	-0.87	0.27	-1.82	-1.03
4	-0.25	-2.35	-2.24	0.31	-0.76	1.04	2.95	-0.60	0.44	2.30	-1.24	-0.11	-1.83	-1.21
3	-0.60	-1.83	-1.84	0.42	0.27	1.64	2.31	-0.21	-0.07	1.72	-1.17	-1.09	-1.99	-1.03
2	-1.01	-1.38	-0.03	0.79	0.42	1.67	1.43	0.40	0.19	0.52	-0.87	-0.22	-0.87	-1.85
1	-0.52	-1.08	-0.56	1.39	-0.26	1.62	0.62	0.43	-0.20	0.60	-0.06	-0.34	-0.53	-0.81

* Weeks to expiration

Table 1. Western Kansas Direct CHOICE Steer Basis (con't)**June CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	2.14	-3.15	1.78	N/A	3.39	5.84	7.16	N/A	3.28	6.02	2.32	3.45	N/A	3.24
8	2.52	-2.01	2.17	5.97	3.66	5.23	6.02	4.13	3.35	5.52	2.67	4.14	-1.32	3.24
7	1.22	-1.43	1.16	4.46	3.52	4.37	4.80	4.41	2.89	5.69	2.29	4.85	-1.47	3.45
6	1.17	-2.50	0.32	4.05	3.33	4.72	4.88	4.19	3.47	5.44	1.65	4.18	0.94	1.93
5	1.83	-1.66	1.28	5.05	5.02	4.95	4.76	3.54	2.65	4.61	1.85	2.56	0.27	1.17
4	2.13	-1.48	1.76	4.54	3.95	4.60	4.16	2.13	1.60	2.84	0.49	2.06	-0.57	0.21
3	1.32	-0.05	2.29	3.76	2.94	3.56	3.18	1.68	0.95	0.92	1.44	1.33	-1.45	-0.29
2	0.67	-1.35	1.39	2.93	2.05	1.60	1.81	1.48	0.97	0.97	0.16	0.63	-0.82	-1.34
1	0.23	-0.19	0.96	2.63	0.58	0.63	0.74	0.61	0.58	0.92	-0.63	0.92	-0.98	-1.22

* Weeks to expiration

August CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	2.43	-1.56	2.71	6.46	N/A	N/A	3.23	1.75	1.43	2.00	-0.24	1.94	-4.20	N/A
8	1.49	-1.18	2.87	5.38	3.82	2.59	2.23	0.50	0.53	0.76	-3.12	0.46	-4.76	N/A
7	2.10	-1.70	2.41	4.89	2.39	1.20	1.10	-0.11	-0.25	0.76	-3.43	0.01	-4.05	N/A
6	2.01	-0.84	2.72	4.11	2.59	0.86	-0.47	-0.27	0.10	0.58	-1.30	-0.72	-2.87	N/A
5	2.06	-0.86	2.01	3.98	2.44	-0.65	-0.23	-0.80	-0.23	-0.67	-0.02	-2.31	-2.46	N/A
4	2.00	-0.36	1.47	3.01	0.76	-0.76	-0.13	-0.19	-1.10	-0.90	-1.56	-2.18	-2.26	N/A
3	0.84	-1.43	0.91	2.00	0.45	-0.67	-0.42	-0.49	-0.67	-0.02	-1.82	-0.96	-3.27	N/A
2	0.31	-0.51	0.58	1.43	0.14	-1.28	-0.46	-1.86	0.07	0.61	-0.78	0.00	-2.12	N/A
1	0.22	-0.49	-0.34	0.55	0.23	-0.46	0.21	-2.13	0.13	0.06	-0.90	-0.27	-1.93	N/A

* Weeks to expiration

Table 1. Western Kansas Direct CHOICE Steer Basis (con't)**October CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	N/A	N/A	0.86	1.43	-0.13	-1.30	N/A	-2.51	N/A	N/A	-4.54	-2.20	-3.31	N/A
8	1.37	-1.63	-0.67	-0.52	-0.39	-1.45	0.66	-2.00	0.45	-0.49	-4.41	-2.65	-3.30	N/A
7	0.61	-2.40	-1.39	-1.40	0.65	-1.52	0.11	-3.86	-0.63	-1.64	-3.21	-1.12	-2.34	N/A
6	1.28	-1.13	-0.94	-1.62	0.56	-1.61	-1.58	-3.04	-0.94	-0.48	-2.88	-0.96	-1.70	N/A
5	0.47	-1.28	-1.28	-1.28	-0.30	-3.98	-0.78	-3.76	-0.71	-0.35	-3.53	-1.14	-0.64	N/A
4	-0.08	-2.61	-0.10	-1.10	-0.98	-2.46	-0.17	-2.21	-0.01	-1.14	-2.42	-1.03	-0.79	N/A
3	-0.85	-1.06	0.83	-0.50	-1.53	-2.44	0.64	-1.51	-0.12	-1.73	-2.42	-1.06	-0.45	N/A
2	-0.86	-1.59	0.64	-0.50	-0.52	-2.10	0.34	-2.72	-0.11	-0.88	-2.33	-1.10	-0.25	N/A
1	-0.51	-1.17	0.49	-0.61	-0.21	-1.85	0.28	-2.48	0.28	-1.45	-2.06	-0.47	-1.05	N/A

* Weeks to expiration

December CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	-1.74	-2.11	N/A	N/A	-1.76	-1.57	3.46	N/A	2.54	-1.83	N/A	N/A	4.49	N/A
8	-1.30	-2.01	5.26	1.68	-0.26	-0.13	2.96	-4.05	1.98	0.21	-0.47	-1.83	4.00	N/A
7	-1.16	-1.31	3.68	2.81	-0.72	0.57	4.07	-4.72	1.41	-0.05	-0.78	-1.44	4.68	N/A
6	-0.87	-1.03	3.59	2.90	-0.17	-0.03	3.38	-3.73	0.75	-0.87	-0.54	-0.44	4.06	N/A
5	-0.12	0.97	2.67	2.71	0.07	0.61	2.56	-2.66	0.75	0.27	-1.21	0.01	2.76	N/A
4	-0.41	0.20	2.48	2.54	-0.57	0.31	2.99	-1.00	0.70	-0.16	1.04	0.00	1.45	N/A
3	0.86	-0.08	2.61	3.47	1.19	1.37	2.90	-0.88	0.82	0.07	-0.06	-0.14	1.34	N/A
2	0.81	1.08	1.95	3.59	0.98	0.82	1.64	-1.27	0.15	-0.41	-0.77	-0.73	-0.80	N/A
1	0.94	0.16	1.41	2.67	0.32	0.14	1.02	-1.17	-0.35	-0.88	-0.56	-1.19	-1.71	N/A

* Weeks to expiration

Table 2. Western Kansas Direct SELECT Steer Basis**February CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	N/A	-3.66	-1.35	1.79	1.85	N/A	1.78	4.19	-2.47	N/A	N/A	-1.28	-2.52	N/A
8	N/A	-4.21	-3.33	1.08	2.56	-0.92	1.89	3.43	-1.06	0.84	-0.54	-2.11	-2.93	-0.14
7	N/A	-4.50	-1.78	1.34	0.84	0.18	2.14	2.80	-2.56	-0.23	-1.49	-1.28	-2.36	0.34
6	-6.18	-3.86	-2.98	0.18	-0.95	0.11	0.10	2.84	-1.85	-1.33	-1.94	-0.73	-2.33	-0.95
5	-7.29	-4.62	-2.59	-0.28	-1.27	0.06	-0.95	2.05	-0.58	-0.40	-1.51	-1.48	-1.62	-0.89
4	-6.62	-4.37	-4.19	0.29	-2.10	0.08	-0.29	1.34	-1.19	-0.20	-0.72	-0.95	-1.76	-1.13
3	-5.96	-5.19	-4.03	-2.16	-1.62	0.09	-0.53	0.95	-2.24	0.27	-1.49	-1.21	-2.34	-1.13
2	-6.48	-4.31	-4.38	-1.84	-2.53	-1.00	-0.85	0.53	-2.11	-2.05	-1.10	-2.16	-2.08	-1.51
1	-6.39	-4.25	-3.13	-1.63	-2.99	-0.53	-1.06	0.45	-1.30	-2.21	-1.97	-1.47	-2.03	-1.55

* Weeks to expiration

April CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	-4.85	N/A	N/A	-2.36	-2.91	-1.13	N/A	0.38	-1.03	1.20	-2.86	N/A	-2.01	-3.24
8	-6.75	-6.20	-5.54	-1.29	-2.84	-1.58	2.17	0.15	-1.46	-0.49	-2.48	-0.98	-2.62	-1.92
7	-6.50	-6.04	-5.58	-0.72	-2.03	-0.07	1.23	-0.61	-2.25	-1.82	-1.80	-1.23	-2.37	-1.25
6	-6.87	-5.58	-4.83	-1.63	-3.13	0.28	1.00	0.20	-0.49	-2.05	-1.77	-0.49	-3.13	-1.50
5	-5.58	-5.22	-5.74	-2.48	-2.39	0.08	1.81	-0.14	-0.40	-0.90	-1.52	-0.53	-2.57	-1.53
4	-6.30	-5.67	-5.94	-2.19	-2.31	0.24	2.45	-1.35	-0.41	1.25	-1.89	-0.96	-2.83	-1.96
3	-6.00	-5.83	-5.29	-2.08	-2.28	0.39	1.86	-0.76	-0.92	0.82	-1.17	-1.99	-2.99	-1.78
2	-6.81	-5.63	-4.78	-2.06	-0.68	0.92	0.80	0.17	-0.66	-0.23	-1.62	-1.22	-1.77	-2.55
1	-6.52	-4.98	-4.81	-1.54	-1.76	0.70	0.15	-0.05	-1.05	-0.35	-0.86	-1.26	-1.53	-1.48

* Weeks to expiration

Table 2. Western Kansas Direct SELECT Steer Basis (con't)**June CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	-3.71	-7.25	-1.87	N/A	2.56	4.99	6.59	N/A	2.23	5.27	1.57	2.20	N/A	2.59
8	-3.48	-6.21	-1.03	2.99	2.76	4.53	5.67	3.58	2.40	4.67	1.92	3.54	-2.42	2.74
7	-5.26	-5.53	-2.59	1.66	2.87	3.62	4.48	3.98	2.04	5.09	1.44	3.95	-2.42	2.95
6	-4.83	-5.90	-3.78	1.85	2.43	4.12	4.08	3.64	2.92	4.94	0.90	2.98	-0.06	1.31
5	-4.27	-6.56	-3.22	2.80	3.97	4.33	4.43	2.84	1.62	3.43	1.17	1.56	-0.73	0.52
4	-4.02	-6.68	-2.09	2.34	3.15	4.10	3.71	1.81	0.85	1.94	-0.46	1.16	-1.57	-0.29
3	-5.36	-5.42	-1.85	1.94	2.06	3.09	2.62	1.24	0.15	0.42	0.63	0.33	-2.33	-0.79
2	-5.28	-5.00	-3.11	1.37	0.95	0.93	1.46	0.13	0.17	-0.13	-0.54	-0.22	-1.82	-1.84
1	-5.82	-5.19	-3.84	0.38	-0.72	-0.57	0.01	-0.99	-0.12	0.07	-1.43	0.17	-2.18	-1.72

* Weeks to expiration

August CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	-4.07	-6.46	-2.39	4.71	N/A	N/A	2.68	1.15	0.45	1.50	-1.09	1.02	-4.70	N/A
8	-4.38	-5.78	-2.33	3.13	2.57	1.94	1.93	0.17	-0.18	0.08	-3.67	-0.54	-5.46	N/A
7	-4.50	-6.96	-3.09	2.36	1.39	0.85	0.69	-0.42	-1.10	0.04	-3.99	-0.99	-5.05	N/A
6	-4.74	-6.04	-2.08	1.38	1.62	0.27	-0.92	-0.62	-0.65	-0.37	-1.30	-1.47	-3.57	N/A
5	-4.47	-5.71	-2.24	1.54	1.77	-1.30	-0.46	-1.30	-0.88	-1.67	-0.02	-2.91	-3.46	N/A
4	-4.30	-6.21	-3.73	-0.19	0.18	-1.11	-0.73	-0.74	-2.10	-1.65	-2.11	-3.18	-3.31	N/A
3	-5.11	-6.58	-4.49	-1.30	-0.83	-0.92	-0.77	-0.89	-1.52	-0.72	-2.57	-1.71	-4.32	N/A
2	-5.44	-5.71	-3.72	-1.47	-0.86	-1.96	-1.19	-2.56	-0.53	-0.14	-1.78	-0.65	-2.67	N/A
1	-5.43	-5.59	-4.19	-2.24	-0.62	-1.32	-0.26	-2.75	-0.62	-0.84	-2.07	-0.96	-2.93	N/A

* Weeks to expiration

Table 2. Western Kansas Direct SELECT Steer Basis (con't)**October CME Live Cattle Contract**

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	N/A	N/A	-0.99	0.03	-0.88	-1.85	N/A	-2.91	N/A	N/A	-5.24	-3.10	-4.25	N/A
8	-4.13	-6.38	-1.98	-2.47	-1.04	-2.08	0.19	-2.15	-0.38	-0.49	-5.41	-3.40	-3.70	N/A
7	-4.94	-7.10	-1.76	-3.30	-0.25	-2.07	-0.29	-4.54	-1.48	-2.34	-4.08	-2.12	-2.99	N/A
6	-4.47	-5.82	-3.34	-3.81	-0.28	-2.80	-1.89	-3.41	-1.75	-1.11	-3.73	-1.71	-2.50	N/A
5	-4.58	-6.28	-4.23	-3.43	-0.88	-3.83	-1.18	-4.11	-0.91	-1.05	-4.43	-2.14	-1.64	N/A
4	-4.58	-7.71	-2.95	-3.85	-1.63	-2.06	-0.55	-2.96	-0.76	-1.84	-3.07	-1.83	-1.79	N/A
3	-4.40	-6.51	-1.92	-2.80	-2.28	-2.49	0.27	-1.96	-1.00	-2.38	-3.12	-2.06	-1.30	N/A
2	-4.46	-7.19	-2.51	-2.45	-1.52	-1.90	-0.28	-4.37	-1.06	-1.61	-3.38	-1.95	-0.95	N/A
1	-4.06	-6.77	-2.81	-2.46	-0.86	-2.15	-0.32	-4.08	-0.52	-2.30	-2.86	-1.47	-2.05	N/A

* Weeks to expiration

December CME Live Cattle Contract

<u>Weeks*</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
9	-5.56	-7.91	N/A	N/A	-2.61	-2.20	3.11	N/A	1.76	-5.78	N/A	N/A	3.49	N/A
8	-4.80	-7.11	2.11	-0.07	-1.01	-0.75	2.01	-5.50	1.23	-0.54	-1.47	-2.83	3.10	N/A
7	-5.41	-5.96	0.80	1.06	-1.82	0.09	2.77	-5.47	0.91	-0.85	-1.60	-2.39	4.18	N/A
6	-5.32	-5.78	0.64	1.55	-1.17	-0.55	2.20	-4.58	0.00	-1.62	-1.29	-1.44	3.41	N/A
5	-5.02	-4.13	-0.20	2.21	-1.03	0.11	2.01	-4.26	0.00	-0.48	-1.21	-0.99	2.03	N/A
4	-5.85	-3.85	-0.47	1.00	-0.50	-0.25	2.52	-2.10	0.20	-0.91	0.21	-1.00	0.51	N/A
3	-5.14	-5.09	-0.83	1.80	0.16	0.94	2.25	-1.63	0.44	-0.68	-0.56	-0.79	0.54	N/A
2	-4.79	-6.87	-1.30	1.59	-0.00	0.12	1.14	-1.75	-0.75	-0.81	-1.70	-1.63	-1.58	N/A
1	-4.81	-7.94	-1.54	0.74	-0.50	-0.41	0.50	-2.02	-1.43	-1.58	-1.31	-2.19	-2.21	N/A

* Weeks to expiration