CATTLE PRICE FORECAST ERRORS, 1990-2008:
Live Cattle Futures & Seasonal Index

by John Lawrence & Clay Hoffman[1]

The Live Cattle Futures Market is a single location where anyone with an opinion on what prices will be in the future can essentially vote their forecast. The resulting futures prices represent a "composite" forecast at a particular point in time. In addition, because cattle prices follow a fairly predictable seasonal pattern, it is possible to forecast prices based on the current price and the assumption that history is a predictor of the future. These methods are two of the most prominent tools used to predict these future prices.

Table 1 summarizes the two quarterly forecasting methods described above for the 1990-2008 period. We evaluated the Live Cattle Futures Market forecast by using the closing futures price one week after the Cattle on Feed report was released for January, April, July, and October and adjusted it for the previous 5-year average basis. A price was forecast for each month and the three months were averaged into the quarter. The Seasonal Index was based on the monthly average price for the same month as the report (i.e., January average price following the January report) to forecast a price for each of the next 12 months, and then three months were averaged into each corresponding quarter. These forecasts were then compared to the actual average price for the first quarter of 1990 through the fourth quarter of 2008.

The forecast error was defined as the actual price minus the forecast price. A positive error means the forecast was too low. A negative number means the forecast was too high. On average, both forecasts work very well for the four quarters, ranging from -.3% to 1.1% of the actual average quarterly prices (1% of $90/cwt is $.90). The Index varies between over and under prediction. On average, it over predicted from one and two quarters out, and under predicted from four quarters out. From three quarters out, it had an average error of zero. Futures consistently underestimated actual prices by a small amount ranging from .4%-1.1%. Overall, the Seasonal Index's forecasts were slightly better with an average error of -.1% versus .7% for the Futures.

Perhaps more important than the average errors is the variability of errors. One measure of the variability is the standard deviation. If the errors are distributed in a "bell-shaped" curve around the average, then about two-thirds of the time the actual price will be within plus or minus one standard deviation of the average. For example referring to Table 1, there is about a 68% chance that first quarter prices will be from 4.1% ($3.69/cwt on a $90/cwt basis) below the Seasonal Price Index forecast to 4.1% above the Seasonal Price Index forecast. The standard deviation is higher for the Index in the first two quarters in the future than it is for the Futures and is lower in the last two quarters. The extreme misses are, in most cases, worse for the Futures than the Index. Overall, the standard deviation for the Index at 7.9% is slightly higher than the standard deviation of the Futures at 7.8%. However, the combination of all this evidence from the errors, standard deviations, and extremes points to the Index being more accurate and less volatile on average than the Futures forecasts.

[1] ISU Extension Economist & Undergraduate Research Assistant

To put the variability of forecast errors in perspective consider a two quarters out Futures price forecast. On average we would expect the actual price to be .4% higher (the average forecast error) than the basis adjusted Futures price. For example, assume Futures one week after the July report forecast a $90 cash price for October - December (two quarters out from July). The .4% adjustment suggests that prices in October - December will average $90.36. However, the 7.7% standard deviation warns us of prices higher or lower than this range. Thus, there is a 16% chance, about one in six, that prices will be below $81.62, and a 16% chance they will be greater than $96.93.

Table 1 – Summary of Cattle Price Forecasting Errors ($/cwt), Futures with Five-year Basis, and Ten-year Seasonal Index (1990-2008).

Forecast Errors		
One Quarter Out		
	Index	Futures
Average	-0.3%	0.4%
Std Dev	6.2%	4.1%
Min	-23.7%	-8.6%
Max	17.3%	11.0%
Two Quarters Out		
	Index	Futures
Average	-0.2%	0.4%
Std Dev	8.4%	7.7%
Min	-19.6%	-24.4%
Max	23.1%	26.4%
Three Quarters Out		
	Index	Futures
Average	0.0%	1.1%
Std Dev	8.9%	9.3%
Min	-18.5%	-35.7%
Max	27.5%	32.4%
Four Quarters Out		
	Index	Futures
Average	0.3%	1.0%
Std Dev	8.3%	10.0%
Min	-18.3%	-32.8%
Max	22.1%	31.5%
Overall		
	Index	Futures
Average	-0.1%	0.7%
Std Dev	7.9%	7.8%
Min	-20.0%	-25.4%
Max	22.5%	25.3%

Table 2 is a comparison between two periods, 1990 to 1999 and 2000 to 2008. This provides an idea of how the forecasts are behaving and if our forecasting tools are still effective. Comparing across the two time periods we can see two different behaviors in the method of forecasting. The Index demonstrates a greater standard deviation in 1990-1999, than the Futures in the same period. However, during the 2000-2008 period, the Index has a lower overall standard deviation than the Futures. The Index's errors average higher than the Futures' errors from 1990-1999, but are lower from 2000-2008. Between the two periods, the Index became more accurate and volatile on average, while the Futures became more volatile and less accurate.

Table 2 – Summary of Cattle Price Forecasting Errors ($/cwt), Futures with Five-year Basis, and Ten-year Seasonal Index (1990-1999 and 2000-2008).

One Quarter Out				
	1990-1999		2000-2008	
	Index	Futures	Index	Futures
Average	-0.5%	-0.2%	-0.2%	1.0%
Std Dev	4.7%	4.1%	7.6%	4.0%
Min	-9.5%	-8.6%	-23.7%	-3.8%
Max	9.5%	11.0%	17.3%	11.0%
Two Quarters Out				
	1990-1999		2000-2008	
	Index	Futures	Index	Futures
Average	-1.0%	-0.1%	0.7%	0.9%
Std Dev	7.0%	6.2%	9.9%	9.2%
Min	-14.1%	-13.5%	-19.6%	-24.4%
Max	12.9%	12.0%	23.1%	26.4%
Three Quarters Out				
	1990-1999		2000-2008	
	Index	Futures	Index	Futures
Average	-1.3%	0.7%	1.5%	1.5%
Std Dev	8.1%	7.1%	9.6%	11.3%
Min	-16.3%	-15.3%	-18.5%	-35.7%
Max	16.0%	13.5%	27.5%	32.4%
Four Quarters Out				
	1990-1999		2000-2008	
	Index	Futures	Index	Futures
Average	-1.6%	0.3%	2.5%	1.8%
Std Dev	7.9%	7.5%	8.2%	12.1%
Min	-18.3%	-17.9%	-17.6%	-32.8%
Max	15.5%	16.6%	22.1%	31.5%
Overall				
	1990-1999		2000-2008	
	Index	Futures	Index	Futures
Average	-1.1%	0.1%	0.7%	1.3%
Std Dev	5.9%	4.7%	7.4%	7.9%
Min	-11.1%	-10.6%	-14.2%	-24.2%
Max	9.3%	9.1%	13.8%	17.2%

Table 3 shows the average forecast error by month of the report for the last 19 years, 1990 to 2008. With a few exceptions, variability follows the usual model and increases with the quarters as shown by the increases in standard deviation with increases in distance from the present. On average, the Futures' forecast errors are greater than the Index forecast errors in January, April, and October, and the Futures' standard deviations are higher than the Index's in April and July.

Table 3 – Summary of Cattle Price Forecasting Errors ($/cwt), Futures with three-year Basis, and Ten-year Seasonal Index during the last 19 years (1990-2008).

January/1Q Forecast Error										
	One Quarter Out		Two Quarters Out		Three Quarters Out		Four Quarters Out		Overall	
	Futures	Index	Futures	Index	Futures	Index	Futures	Index	Futures	Index
Average	0.2%	-0.3%	-0.4%	-1.2%	1.3%	-0.2%	1.5%	-0.3%	0.7%	-0.5%
Std Dev	2.6%	8.8%	6.7%	8.9%	8.0%	9.3%	12.0%	7.7%	7.3%	8.7%
April/2Q Forecast Error										
	One Quarter Out		Two Quarters Out		Three Quarters Out		Four Quarters Out		Overall	
	Futures	Index	Futures	Index	Futures	Index	Futures	Index	Futures	Index
Average	0.7%	-0.9%	1.9%	-0.1%	1.9%	-0.6%	1.2%	0.3%	1.4%	-0.3%
Std Dev	5.5%	4.7%	7.6%	7.8%	11.8%	10.9%	9.7%	8.0%	8.6%	7.9%
July/3Q Forecast Error										
	One Quarter Out		Two Quarters Out		Three Quarters Out		Four Quarters Out		Overall	
	Futures	Index	Futures	Index	Futures	Index	Futures	Index	Futures	Index
Average	-0.2%	0.9%	-0.6%	0.4%	0.5%	1.7%	-0.7%	0.9%	-0.2%	1.0%
Std Dev	3.0%	5.0%	10.5%	9.7%	10.2%	7.2%	11.1%	8.7%	8.7%	7.7%
October/4Q Forecast Error										
	One Quarter Out		Two Quarters Out		Three Quarters Out		Four Quarters Out		Overall	
	Futures	Index	Futures	Index	Futures	Index	Futures	Index	Futures	Index
Average	0.7%	-1.0%	0.6%	0.0%	0.5%	-0.7%	2.0%	0.2%	0.9%	-0.4%
Std Dev	4.7%	5.7%	5.7%	7.7%	6.9%	8.0%	6.6%	9.2%	6.0%	7.6%

Summary

Basis adjusted Live Cattle Futures and Seasonal Price Indexes were compared as Live Cattle price forecasting tools. In general, the Index forecast had a smaller forecast error and variability, but both methods are very accurate. This study quantifies the amount of forecast error, so producers can use this information to determine their need for price risk protection, and become as informed and profitable as possible.