

Hog Price Forecast Errors In The Last 10 Years By Iowa State University, The Lean Hog Futures Market & The Seasonal Index

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A major purpose of livestock price forecasts is to reduce the risk associated with decisions that producers make. Iowa State University and other Land Grant institutions often forecast commodity prices. Using information from USDA reports, historical relationships between supplies and price, and current market conditions, they provide a forecast of what prices may be in the future. Another forecasting method is the lean hog futures market, a single location where anyone with an opinion on what prices will be in the future can essentially vote their forecast by taking a position in the market. The resulting futures prices represent a “composite” forecast at a particular point in time. Because hog prices follow a fairly predictable seasonal pattern the current price coupled with this historical relationship can be used to forecast prices, as another option.

Table 1 summarizes the three forecasting methods described above for the 1999-2008 period. The same day of each quarterly hogs and pigs report, ISU Economists forecast prices four quarters into the future and published these in the ISU Iowa Farm Outlook Newsletter. The futures market forecast was evaluated by using the closing futures price one week after the hogs and pigs report was released and was adjusted for the previous 3-year average basis. A price was forecast for each month and the three months were averaged into the quarter. The 10-year average Seasonal Index was based on the monthly average price for the same month as the report (i.e., December average price following the December report) to forecast a price for each of the next 12 months and then averaged into quarters. These forecasts were then compared to the Livestock Marketing Information Center (LMIC) calculated, weighted average market hog price of the first quarter 1999 through the fourth quarter 2008.

Results

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, all three forecasts work fairly well for the four quarters, demonstrating average errors varying from \$0.99/head to \$3.46/head, showing the tendency for a positive error, implying an underestimation of the market hog price. The variability of the forecast is measured by the standard deviation and the extreme misses. We can see that variability increases with each quarter and all three forecasts are fairly similar in accuracy. Approximately 68% of the errors are expected to be within plus or minus one standard deviation from the average error. For example there is about a 68% chance that prices one quarter out will range from \$5.33/head below the ISU forecast to \$5.33/head above the ISU forecast (Table 1). There is also a 16% chance of errors one standard deviation higher than the average error and a 16% chance of errors one standard deviation lower than the average error. Table 1 also shows the errors as a percentage of the actual LMIC calculated, weighted average market hog price. This is perhaps the most informative method because it ignores dollar values, which can be misleading. All three forecasts are similar, but the Seasonal Index tended to have the smallest error, no matter how many

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quarters out. However, it also had the greatest variability. With the exception of three quarters out, the ISU errors were equal to or smaller than the futures errors.

Table 1 – Summary of Live Hog Price Forecasting Errors (\$/head), ISU Iowa Farm Outlook, Futures with Three-year Basis, and Ten-year Seasonal Index during the last 10 years (1999-2008).

Forecast Error: One Quarter Out			
	ISU	Futures	Index
Average	\$1.91	\$1.84	\$0.99
St. Dev.	\$5.33	\$3.55	\$4.41
Min	-\$14.97	-\$5.06	-\$7.14
Max	\$11.39	\$8.95	\$12.80
Forecast Error: Two Quarters Out			
	ISU	Futures	Index
Average	\$1.97	\$1.89	\$1.35
St. Dev.	\$6.22	\$5.55	\$6.20
Min	-\$11.46	-\$8.44	-\$10.24
Max	\$18.13	\$13.29	\$16.98
Forecast Error: Three Quarters Out			
	ISU	Futures	Index
Average	\$2.51	\$2.53	\$1.71
St. Dev.	\$6.61	\$6.72	\$7.75
Min	-\$9.66	-\$9.75	-\$13.82
Max	\$19.29	\$18.27	\$18.69
Forecast Error: Four Quarters Out			
	ISU	Futures	Index
Average	\$2.81	\$3.46	\$1.84
St. Dev.	\$7.53	\$7.42	\$8.74
Min	-\$14.43	-\$12.73	-\$16.44
Max	\$18.48	\$19.86	\$21.49

Forecast Error: One Quarter Out			
	ISU	Futures	Index
Average	3.27%	3.39%	2.60%
St. Dev.	11.82%	7.66%	11.61%
Min	-36.03%	-15.06%	-19.92%
Max	24.81%	19.50%	47.26%
Forecast Error: Two Quarters Out			
	ISU	Futures	Index
Average	3.02%	3.02%	2.82%
St. Dev.	13.04%	12.34%	14.80%
Min	-26.96%	-23.56%	-24.89%
Max	32.01%	24.43%	50.51%
Forecast Error: Three Quarters Out			
	ISU	Futures	Index
Average	3.91%	3.79%	2.86%
St. Dev.	14.04%	15.18%	18.76%
Min	-27.25%	-36.01%	-38.57%
Max	32.81%	31.08%	53.08%
Forecast Error: Four Quarters Out			
	ISU	Futures	Index
Average	3.93%	5.24%	2.81%
St. Dev.	17.59%	17.15%	21.10%
Min	-53.30%	-47.02%	-45.88%
Max	33.01%	35.47%	60.10%

It is also important to appreciate how much variability there is associated with a forecast. The standard deviation of the least variable forecast one quarter out indicates that prices are expected to fall into a \$7.10 range (+ and – one standard deviation) approximately 68% of the time. When looking four quarters into the future, the time necessary to make breeding decisions, the 68% range grows to over \$14.84 for the least variable forecast. While some may discard the forecast altogether because of the wide range, the value is helpful to quantify how low prices could be. Producers then can use that price protection if the forecast indicates an unacceptable risk.

Table 2 summarizes the average error and variability of each forecast for the last 10 years, 1999 to 2008, for each forecast month. In January, the ISU forecasts had the lowest average errors for each number of quarters into the future with the exception of four quarters into the future. In April and July, the Seasonal Index had the lowest average errors for all quarters into the future. In October, the Seasonal Index had the lowest average errors in all quarters into

the future with the exception of two quarters into the future. As expected, the variability tends to increase as the distance forecasted into the future increases.

On average, all forecasts did a fairly good job predicting hog prices in the volatile markets. As shown by the average errors, the January Forecast itself was best at predicting one quarter into the future, and worst at predicting three quarters into the future. The April Forecast was best at predicting four quarters into the future and worst one quarter into the future. The July and October Forecasts were best at predicting two quarters into the future, and worst four quarters into the future.

Table 2 – Summary of Live Hog Price Forecasting Errors (\$/cwt), ISU Iowa Farm Outlook, Futures with Three-year Basis, and Ten-year Seasonal Index during the last 10 years (1999-2008).

January Forecast Error						
	One Quarter Into The Future			Two Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$0.16	\$1.74	\$2.73	\$2.18	\$3.08	\$3.18
St. Dev.	\$7.00	\$3.07	\$4.68	\$8.61	\$6.01	\$8.33
	Three Quarters Into The Future			Four Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$2.66	\$3.43	\$3.16	\$1.29	\$1.03	\$2.58
St. Dev.	\$8.67	\$7.49	\$9.55	\$8.39	\$7.47	\$10.01

April Forecast Error						
	One Quarter Into The Future			Two Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$3.33	\$2.73	\$1.10	\$3.51	\$1.52	\$0.44
St. Dev.	\$5.12	\$4.10	\$5.51	\$7.27	\$5.58	\$6.53
	Three Quarters Into The Future			Four Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$2.09	-\$0.56	\$0.23	\$0.76	\$1.73	\$0.84
St. Dev.	\$6.46	\$6.78	\$6.62	\$7.55	\$8.04	\$7.47

July Forecast Error						
	One Quarter Into The Future			Two Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$2.31	\$2.23	\$0.30	\$1.24	\$0.96	-\$0.18
St. Dev.	\$4.56	\$3.92	\$3.54	\$3.79	\$6.19	\$4.94
	Three Quarters Into The Future			Four Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$1.16	\$3.53	\$0.74	\$4.38	\$6.19	\$1.29
St. Dev.	\$4.79	\$7.12	\$5.97	\$6.92	\$7.36	\$9.08

October Forecast Error						
	One Quarter Into The Future			Two Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$1.84	\$0.67	-\$0.15	\$0.96	\$1.99	\$1.97
St. Dev.	\$4.62	\$3.25	\$3.73	\$4.70	\$5.04	\$4.74
	Three Quarters Into The Future			Four Quarters Into The Future		
	ISU	Futures	Index	ISU	Futures	Index
Average	\$4.13	\$3.72	\$2.69	\$4.81	\$4.90	\$2.66
St. Dev.	\$6.65	\$5.35	\$9.10	\$7.47	\$6.57	\$9.47

Summary

These three forecasting methods all provide valuable information regarding risk in the hog market. They, and the information they provide, are best used to avoid the risk of low prices and variability whenever possible.