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# Livestock Risk Protection Insurance vs. Futures Hedging: Basis Risk Implications

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## Summary

*This study analyzes the benefit of Livestock Risk Protection (LRP) insurance to cattle producers in reducing basis risk. Nebraska producers insuring fed cattle with LRP realize a basis risk reduction of one-third to one-half compared to futures or options hedging. Nebraska feeder cattle producers using LRP experience only a slight reduction in basis risk. Reduced basis risk results in smaller errors when forecasting basis levels for future time periods. With more accurate basis forecasts, producers can better estimate net hedged selling prices and, consequently, future cash flows.*

## Introduction

Livestock Risk Protection (LRP) is a relatively new insurance program offered by the USDA Risk Management Agency (RMA) that provides single-peril price risk insurance coverage to livestock producers. The insurance coverage provides minimum price protection for future livestock sales while allowing the user to benefit from price increases. For a complete review of how the LRP program works and how to hedge livestock sales with it, see Extension Circular 05-839 *Livestock Risk Protection Insurance: A Self-Study Guide* available at <http://www.lrp.unl.edu>.

Using LRP insurance to hedge future livestock sales involves basis risk just as traditional futures hedging does. However, when using LRP, futures basis is not relevant because price protection is not based on futures markets, but instead on cash market prices. Therefore the relevant basis to consider in an LRP hedge is the difference between a local cash price and the cash index on which

LRP is based. Price levels are locked in by purchasing LRP. When the cattle are sold at the end of the insurance policy, the producer receives the local cash market price and an LRP indemnity, if applicable. The variation between the local cash price and the cash index (Actual Ending Value, or AEV) which coverage is based on represents basis risk, in this case LRP basis risk.

Forecasting basis for either futures or LRP hedges enables better estimation of future selling prices, which are related to future cash flows. By anticipating future cash flows, producers' budgeting and financial planning can be improved. Consequently, hedging tools with less basis risk have the potential to improve livestock producers' estimation of selling prices and cash flows. Given that LRP basis is the difference between a local cash price and AEV and the AEV may incorporate the local cash selling price to a small or large degree depending upon the geographic location and market volume, there exists the possibility for LRP basis to be smaller and less variable than traditional futures basis. Less variability in basis indicates a possibility for more accurate basis forecasts. The objective of this study is to compare traditional futures basis and LRP basis risk over time.

## Procedure

To compare basis risk over time, traditional futures basis (Cash Price B Futures Price) and LRP basis (Cash Price B AEV) were calculated using weekly average prices from January 2000 to January 2005 for Nebraska fed steers and heifers and from January 2001 to January 2005 for feeder steers and heifers weighing between 600 and 800 lbs. in 100 lb. increments. Summary statistics were calculated to compare futures and LRP basis risk. The mean LRP and futures basis indicates how Nebraska cash prices

compare to both the futures and average cash markets (AEV) over time. To measure variability of forecasting basis for a specific week of the year, standard deviations were calculated each week of the year across a multiyear period for both fed and feeder cattle. Standard deviations were calculated over four years for fed cattle (2001-2004) and three years for feeder cattle (2002-2004) because of data limitations. These standard deviations for each week of the year were then averaged across years to compare the mean futures and LRP basis variability.

## Result

Summary statistics for futures basis and LRP basis for fed cattle are presented in Table 1. The mean LRP basis for Nebraska fed steers and heifers indicates that, on average, the Nebraska direct steer and heifer price was \$0.07/cwt and \$0.16/cwt higher than the AEV, respectively. The mean steer and heifer LRP basis was \$0.36/cwt and \$0.37/cwt higher than the traditional nearby futures basis. Thus, LRP fed cattle basis was closer to zero, as hypothesized. The range (difference between maximum and minimum) in LRP basis from January 2000 to January 2005 was about one-third to one-half of the range in futures basis. The standard deviation for Nebraska steer and heifer LRP basis was about a third of that for futures basis, confirming that LRP basis is less variable than futures basis. Thus, using an historical average for fed cattle LRP basis forecasts likely will be more precise than for futures basis.

Standard deviation of basis for each week within the year also showed reduced variability for LRP basis relative to futures basis for fed cattle. The average of these weekly standard deviations for fed steer and

(Continued on next page)

heifer LRP basis was \$0.85/cwt and \$0.76/cwt. The corresponding average standard deviations for futures basis were \$1.99/cwt and \$1.85/cwt. The substantial reduction in weekly basis variation for LRP further suggests that forecasting LRP basis using the historical average is less risky than for futures basis.

Summary statistics for futures basis and LRP basis for selected classes of feeder cattle are located in Table 2. Note that LRP basis for 600-700 lb. and 700-800 lb. heifers was substantially higher than futures basis. This is because the LRP program uses price adjustment factors to scale down heifer prices relative to steers, effectively raising LRP basis relative to futures basis. The range observed in LRP basis was slightly smaller than the range for futures basis for all classes of feeder cattle except 700-800 lb. heifers. However, the reduction was not as great as for fed cattle. Further, the variability as measured by standard deviation did not decline similarly for feeder cattle LRP basis. In most cases, the standard deviation was only slightly smaller for LRP basis. The benefit of the less variable LRP basis as observed for fed cattle did not appear to hold for feeder cattle.

Weekly standard deviations for feeder cattle showed a slight reduction in variability of LRP basis relative to futures basis. The average of these weekly standard deviations for 700-800 lb. steer LRP basis was \$1.72/cwt compared to \$2.20/cwt for futures basis. Similar reductions of less than 30% in the average weekly standard deviations for LRP basis compared to futures basis were observed for other types and weights of feeder cattle. This is smaller than the 40-50% reductions seen for fed cattle. So, while feeder cattle LRP basis was somewhat less variable than futures basis, the reduction in feeder cattle basis risk was not as large for Nebraska LRP users as for fed cattle.

**Table 1. Nebraska Direct Fed Steer and Heifer LRP Basis and Futures Basis Summary Statistics, January 2000-January 2005.**

	Mean	Minimum	Maximum	Standard Deviation
	(\$/cwt)	(\$/cwt)	(\$/cwt)	(\$/cwt)
Steers				
LRP Basis	0.07	-2.99	5.32	0.94
Futures Basis	-0.29	-7.52	13.24	2.46
Heifers				
LRP Basis	0.16	-2.34	4.17	0.82
Futures Basis	-0.21	-4.85	12.09	2.29

**Table 2. Nebraska Feeder Steer and Heifer LRP Basis and Futures Basis Summary Statistics, 2002-2004.**

	Mean	Minimum	Maximum	Standard Deviation
	(\$/cwt)	(\$/cwt)	(\$/cwt)	(\$/cwt)
600-700 lb. Steer				
LRP Basis	10.19	1.30	21.75	4.13
Futures Basis	11.07	1.74	26.60	4.34
700-800 lb. Steer				
LRP Basis	4.44	-3.13	13.58	2.62
Futures Basis	5.32	-1.02	18.43	2.77
600-700 lb. Heifer				
LRP Basis	11.63	3.10	18.55	3.21
Futures Basis	3.39	-5.14	11.73	3.36
700-800 lb. Heifer				
LRP Basis	7.31	-0.53	18.34	2.48
Futures Basis	-0.93	-9.15	8.10	2.59

The substantial reduction in basis variability when using LRP for fed cattle producers relative to futures or options is likely because Nebraska prices represent a greater proportion of the AEV on which the LRP insurance contract is indemnified for fed cattle when compared to feeder cattle. The fed cattle AEV, or 5-Area steer price, is weighted heavily with Nebraska prices. Therefore, the difference between Nebraska prices and the AEV (LRP basis) is relatively small and less variable. Basis variability did not decrease for Nebraska feeder cattle prices because the LRP AEV for feeder cattle (CME feeder cattle cash index) does not weight Nebraska prices as heavily as does the AEV for fed cattle. Further, the quality premiums and discounts observed geographically in the feeder cattle market increase the range of prices incorporated into the feeder cattle AEV.

## Implications

Livestock Risk Protection (LRP) insurance provides a reduction in basis risk for hedging fed cattle in Nebraska. Reduced basis variability indicates fed cattle producers would have less difficulty in accurately forecasting LRP basis levels for future livestock sales. If producers can forecast future basis levels with greater accuracy, they can better estimate future selling prices and the cash flows that result from those sales which could allow for better financial planning and budgeting. For feeder cattle users, there is little basis risk reduction when using LRP insurance relative to futures hedging.

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