



# PURDUE AGRICULTURAL ECONOMICS REPORT

FEBRUARY 2008

## Evaluating Livestock Risk Protection for Hogs

*George Patrick, Professor and Extension Economist; Metin Cakir, Graduate Student and Tim Baker, Professor*

**T**he Agricultural Risk Protection Act of 2000 allowed the development and sale of livestock insurance products. Like crop insurance, these programs could be subsidized and reinsured by the federal government. Livestock Risk Protection for hogs (LRP-Swine) was approved as a pilot program in Iowa with sales starting in early July 2002 and later expanded to a number of other states including Indiana. Sales were suspended for about four months in 2004 as a result of the BSE-scare in beef. LRP-Swine sales resumed on October 1, 2004 with minor modifications in the details of the insurance policy and its availability.

This article provides a general description of the LRP-Swine policy and coverage. The article also reports the financial results which would have occurred if a hog producer had routinely purchased LRP-Swine coverage at the middle of each month during the July 2002 to May 2007

period for different insurance endorsement periods and levels of coverage. Risk management tools such as insurance; typically involve paying a premium to avoid a loss associated with an unfavorable outcome. The net cost of insurance, the producer's premium minus the indemnities paid is used to evaluate LRP-Swine. It should be noted that actual performance information on LRP-Swine was available for a time period of less than five years. This should not be considered a long enough time period to evaluate fully the effectiveness of LRP-Swine as a risk management tool.

### Overview of LRP-Swine

LRP-Swine is designed only to insure against the decline in the lean carcass price of market hogs below the established level of coverage between the time that the insurance is purchased and the ending date of the insurance period (which is also referred to as the endorsement length). Thus, LRP-Swine also does

not provide protection against chronically low hog prices. Unlike crop or crop revenue insurance, LRP-Swine does not provide a producer with any protection from physical losses of hog production due to disease or adverse conditions.

Hog producers must submit a one-time application for LRP-Swine coverage. There is no charge for this application, and after being accepted, a producer can purchase coverage on 1 hog or up to 10,000 head of hogs for an insurance period. There is a limit of 32,000 head which may be insured by a producer during the annual period of July 1 to June 30.

Producers may purchase insurance coverage under LRP-Swine for 13-, 17-, 21-,

### In This Issue

Evaluating Livestock Risk Protection for Hogs . . . . .	1
New Faculty . . . . .	6

or 26- week periods. The lean weight of the carcass produced is anticipated to be in a range of 150 to 225 pounds per carcass which equates to about 203 to 304 pounds per head on a live basis. All prices refer to lean hog carcass prices. Live hog weights are converted as live weight X 0.74 to equal the carcass basis. The producer is expected to select an endorsement length for the insurance period that corresponds to the approximate date that the hogs will be marketed. Thus, a producer finishing feeder pigs would probably buy coverage for the 13-week period while the farrow-to-finish producer would probably buy coverage for the 26-week period.

Insurance coverage can be purchased from shortly after the time the hog futures market closes in the afternoon until 9:00 a.m. CT the following day. The effective day for the insurance is the day that the market closes. Insurance is not available on federal or market holidays. Unusual futures market conditions, such as two days of market

limit moves or limited trading activity, may result in a suspension of insurance availability. This occurred with the BSE-scare in beef. Some insurance coverage periods and levels may not be available due to insufficient market activity.

Hog producers can select coverage price levels ranging from about 70 percent to 95 percent of the expected ending values for each of the insurance periods. The expected ending values are a weighted average of the lean hog futures prices with expiration dates bracketing the end date of the insurance contracts. LRP-Swine's expected ending values, coverage prices, rates and cost of insurance per hundredweight (cwt.) can be viewed at the Risk Management Agency (RMA) website [http://www3.rma.usda.gov/apps/livestock\\_reports/](http://www3.rma.usda.gov/apps/livestock_reports/). For example, Table 1 summarizes some of the information that was available for Indiana for one day (October 16, 2006). This date was selected because the actual end values

were available at the time this study was completed.

The expected end value of \$63.092 (col. 2) for the period ending on January 15, 2007 is derived from the Chicago Mercantile Exchange (CME) lean hog futures price for that time period and is the same for all coverage levels of the 13-week insurance period. In Table 1, the expected end values for February 12, 2007 (17-week endorsements) and April 16, 2007 (26-week endorsements) are similar to the 13-week endorsements, suggesting that the futures market did not anticipate major changes in prices over those periods.

Coverage levels are based on the expected cash lean hog price as reflected by the CME lean hog futures contract. The highest insurance coverage price is about 95 percent of the expected end value. Typically, six coverage prices, corresponding to coverage levels ranging from about 70 percent to 95 percent, are available to producers. If the actual end value on the end date of the insurance contract is less than the coverage price selected, the producer may be paid an indemnity for the difference between the coverage level price and actual end value. For example, in Table 1 the actual end value for February 15, 2007 was \$58.29, which was below the \$59.87 coverage price. A producer insured at that level would have received an indemnity of \$1.58 (\$59.87 - \$58.29) per insured cwt.

Actual end values are based on a price data series, "National Daily Direct Hog Prior Day Report-Slaughtered Swine,"

*Purdue Agricultural Economics Report* is a quarterly report published by the Department of Agricultural Economics, Purdue University.

**Editor**

Gerald A. Harrison  
Purdue University  
Department of Agricultural Economics  
403 W State Street  
West Lafayette, IN 47907-2056  
E mail: [harrisog@purdue.edu](mailto:harrisog@purdue.edu)  
Phone: 765 494 4216 or  
toll free 1 888 398 4636 Ext. 44216

**Editorial Board**

W. Alan Miller  
Christopher A. Hurt  
Philip L. Paarlberg

**Layout and Design**

Cathy Malady

**Circulation Manager**

Linda Klotz  
**Agricultural Economics Department**  
[www.agecon.purdue.edu](http://www.agecon.purdue.edu)  
**PAER World Wide Web**  
[www.agecon.purdue.edu/extension/pubs/paer/](http://www.agecon.purdue.edu/extension/pubs/paer/)  
**Cooperative Extension Service Publications**  
[www.ces.purdue.edu/extmedia/](http://www.ces.purdue.edu/extmedia/)  
**Subscription to PAER**  
Paper copies of the PAER are \$12 per year (payable to Purdue University). Electronic subscriptions are free and one may subscribe at: [www.agecon.purdue.edu/contact/contact.asp](http://www.agecon.purdue.edu/contact/contact.asp)

Purdue University Cooperative Extension Service, West Lafayette, IN  
*Purdue University is an equal access/equal opportunity institution*

reported by the USDA Agricultural Marketing Service (AMS) at [http://www.ams.usda.gov/mnreports/lm\\_hg201.txt](http://www.ams.usda.gov/mnreports/lm_hg201.txt). The AMS price series is also used to settle the CME lean hog futures contracts. For LRP-Swine purposes, the days used in the weighted average price calculations are the end date of the insurance period and one day prior. For example, prices for February 14 and 15 would be used for insurance ending on February 15.

### Performance of LRP-Swine

LRP-Swine has been available for about five years. To evaluate the performance of LRP-Swine it was assumed that a producer would routinely purchase the insurance at or near the mid-point of each month when coverage was available. Information available on the RMA website on expected

ending values, coverage prices, rates, cost per cwt. and actual ending values was used to determine how this regular purchase of LRP-Swine would have performed for the July 2002 to April 2007 period.

Table 2 summarizes the ending hog prices, purchase cost of coverage, indemnities, and net cost of insurance. To reflect the variety of coverages available, endorsements of 13- weeks, 17-weeks, and 26-weeks were considered. The highest, second highest, and lowest available coverage prices that correspond roughly to the 95 percent, 90 percent, and 70 percent levels of coverage, respectively, were selected. As noted previously, some insurance coverage periods and levels may not be available due to insufficient marketing activity.

The average ending hog prices were similar for the 13-, 17- and 26-week contracts for the 2002 to 2007 period. Because of the longer time period involved, observations of completed contracts started later and ended earlier for the 26-week contracts, resulting in a slightly higher average price for the period. Over the 2002 to 2007 period considered, lean hog prices varied from about \$42 to \$82 per cwt. with an average of about \$63.50.

The producer's cost of coverage varied with the length of the insurance endorsement period. For longer insurance endorsement periods, there is greater uncertainty with respect to prices, and one would expect a higher cost of insurance coverage. For the highest level of coverage, the average producer's cost of coverage increased from \$1.81 per cwt. for 13-week contracts to \$2.10

**Table 1. LRP – Swine: Coverage Prices, Rates, Costs, and Actual Ending Values for Selected Endorsement Lengths (Insurance Periods) for Indiana, October 16, 2006.<sup>1</sup>**

Endorsement Length (weeks)	Expected End Value (\$/cwt)	Coverage Price (\$/cwt)	Coverage Level (percent)	Premium Rate	Cost per Cwt <sup>2</sup> (\$/cwt)	End Date	Actual End Value <sup>3</sup> (\$/cwt)
13	63.092	59.87	94.89	0.038584	2.310	01/15/07	58.29
13	63.092	57.87	91.72	0.023950	1.386	01/15/07	58.29
13	63.092	53.97	85.38	0.010934	0.939	01/15/07	58.29
13	63.092	49.87	79.04	0.005675	0.283	01/15/07	58.29
17	63.225	60.00	94.90	0.038217	2.293	02/12/07	66.91
17	63.225	58.00	91.74	0.024707	1.433	02/12/07	66.91
17	63.225	54.00	85.41	0.012667	0.684	02/12/07	66.91
17	63.225	50.00	79.08	0.007360	0.368	02/12/07	66.91
26	64.675	60.00	92.77	0.039767	2.386	04/16/07	65.52
26	64.675	58.00	89.68	0.029397	1.705	04/16/07	65.52
26	64.675	54.00	83.49	0.014722	0.795	04/16/07	65.52
26	64.675	52.00	80.40	0.010385	0.540	04/16/07	65.52

<sup>1</sup> A 20-week endorsement period was available for the October 2006 date but was not available for the entire period analyzed and thus is omitted from the table.

<sup>2</sup> Cost per Cwt. is the Coverage Price multiplied by the Premium Rate (i.e., \$59.87 x 0.038584 = \$2.31). The total LRP premium is subsidized 13 percent by the USDA. Thus, the producer's premium cost per cwt. is about 87 percent of the cost per cwt. (i.e., \$2.31 x 0.87 = \$2.01).

<sup>3</sup> The Actual End Values are of course not known until after the Endorsement End Dates of January 15, February 12 and April 16 for the 13, 17 and 26 week contracts.

for 17-week contracts (about 16 percent), and to \$2.36 for 26-week periods (about 12.3 percent). For the highest coverage level the increase was about 10.5 percent from 13- to 17-weeks and nearly 19 percent from 17- to 26-weeks.

The level of coverage, as would be expected, also affects the cost of insurance. With lower levels of coverage, both the frequency of indemnity payments and size of the indemnities would be reduced. A reduction in coverage levels about 5 percent (\$2.00 in most cases) reduced the price of insurance about 31.5 percent, 28.6 percent and 25.4 percent for 13-, 17-, and 26-week contracts, respectively.

During the period analyzed, the highest coverage levels of 13- and 17-week contracts resulted in indemnities being

paid in 23 percent and 21 percent of the periods analyzed, respectively (Table 3). The indemnities averaged \$0.91 per period for the 13-week contracts and \$0.69 per period for the 17-week contracts. Reducing the level of insurance coverage about 5 percent reduced the frequency of indemnities to 13 percent of the periods for both 13- and 17-week contracts, while the average indemnities dropped to \$0.45 and \$0.33 respectively. For the 26-week contracts, the frequency of indemnities dropped to 6 percent and the average indemnity for the highest level of coverage was \$0.20. If only the lowest levels of coverage were considered, 70 percent, there were no indemnities paid for any of the contracts in the period considered.

The net cost of LRP-Swine insurance was computed by subtracting the indemnities paid from the producer's cost of insurance. The net cost of the longer contracts was substantially higher than for the shorter endorsement lengths. For the 13-week contract with the highest level of protection, the net cost was \$0.90 per cwt. of carcass or about \$1.665 per head of a 250 pound live hog. Similar costs were \$1.41 per cwt. for 17-week contracts and \$2.16 per cwt. for 26-week contracts. These costs represent about 1.1 percent, 1.7 percent and 2.6 percent of the value of production for the 13-, 17-, and 26-week contracts, respectively.

To provide some perspective, LRP-Swine costs can be compared with crop insurance costs. The

**Table 2. LRP- Swine: Ending Hog Prices, Producer's Cost of Coverage, Frequency and Average Indemnities, and Net Cost of Insurance for Selected Contracts in Indiana, 2002-07.**

Coverage Level	Number of Observations	Ending Hog Price (\$/cwt.)			Producer's Cost of Coverage/cwt.			Indemnities		Net Cost of Insurance <sup>3</sup> (\$/cwt.)
		Ave.	High	Low	Ave.	High	Low	Freq. <sup>1</sup> percent	Ave. <sup>2</sup> (\$/cwt.)	
<b>13-week contracts</b>										
95 percent	52	62.88	82.27	41.65	1.81	2.75	1.02	23	0.91	0.90
90 percent	52	62.88	82.27	41.65	1.24	2.11	0.69	13	0.45	0.79
70 percent	52	62.88	82.27	41.65	0.25	0.90	0.10	0	0	0.25
<b>17-week contracts</b>										
95 percent	52	63.52	81.13	41.71	2.10	3.04	1.30	21	0.69	1.41
90 percent	51	63.52	81.13	41.71	1.50	2.26	0.42	13	0.33	1.17
70 percent	50	63.52	81.13	41.71	0.37	0.99	0.16	0	0	0.37
<b>26-week contracts</b>										
95 percent	48	64.18	82.27	44.48	2.36	3.61	1.24	6	0.20	2.16
90 percent	44	64.18	82.27	44.48	1.76	2.90	0.74	2	0.11	1.65
70 percent	41	64.18	82.27	44.48	0.67	1.81	0.15	0	0	0.67

<sup>1</sup> Frequency indicates the percentage of periods in which an indemnity is paid.

<sup>2</sup> Average is the total indemnities paid divided by the number of periods analyzed.

<sup>3</sup> Net cost of insurance is computed as the producer's cost of insurance minus indemnities received.

2007 crop insurance premiums for a corn producer in Carroll County, Indiana with a 160 bushel actual production history yield are about 1.1 percent of the value of production for Actual Production History (APH) coverage at the 75 percent level and 2.3 percent for Crop Revenue Coverage (CRC) at the 75 percent level. The net costs are about 0.8 percent and 0.6 percent for APH and CRC, respectively.\* The subsidy on the 75 percent coverage level of crop insurance is about 55 percent of the premium as compared with 13 percent for LRP-Swine.

Whether an individual hog producer considers LRP-Swine as expensive or cheap depends partially on their risk preferences. Most producers prefer to avoid risk and would be willing to pay something to avoid an unfavorable outcome. More risk adverse producers would be willing to pay more to avoid risk than less risk adverse producers.

### Summary and Conclusions

LRP-Swine is a relatively new federally subsidized and reinsured insurance designed to insure against declines in market hog prices. Hog producers can select from a variety of insurance periods (endorsement periods) to correspond to when their hogs would normally be marketed. A variety of levels of coverage, from about 70 percent to 95

percent, of the expected ending value are also available. Eligible producers can insure from 1 to 10,000 head for an insurance period. This flexibility provides a considerable advantage relative to futures and options for smaller scale producers.

LRP-Swine was evaluated for the July 2002 to May 2007 period. It was assumed that a producer would insure each month and the costs and indemnities were determined for several insurance contract periods and levels of insurance coverage. It was found that the net cost of insurance increases as the length of the insurance period increases. This is not unexpected, as longer time

periods generally involve greater uncertainty with respect to prices.

Results suggest that net insurance costs of LRP-Swine run from about 1.1 percent to 2.6 percent of the expected value of production. Risk preferences of hog producers are likely to have a significant effect on whether producers use LRP-Swine. Risk adverse producers are likely to use LRP-Swine or other risk management strategies. In contrast, risk neutral producers are likely to not use LRP-Swine and, based on the results of this analysis, are likely to have a higher average return with greater downside variability.

**Table 3. LRP-Swine: Size and Frequency (percentage of periods) of Indemnities for Selected Contracts in Indiana, 2002-2007<sup>1</sup>**

Contract and Indemnity	95% Coverage Level	90% Coverage Level
<b>13-week contract</b>	<b>n=52</b>	<b>n=52</b>
Less than \$2.00	0.02	0.12
\$2.00-3.99	0.12	0.06
\$4.00-5.99	0.06	0.04
\$6.00 or more	0.04	0
Total percent indemnities	0.23	0.21
Ave. indemnity	\$0.91	\$0.45
<b>17-week contract</b>	<b>n=51</b>	<b>n=51</b>
Less than \$2.00	0.08	0.06
\$2.00-3.99	0.06	0.06
\$4.00-5.99	0.06	0
\$6.00 or more	0.02	0.02
Total percent indemnities	0.21	0.14
Ave. indemnity	\$0.69	\$0.33
<b>26-week contract</b>	<b>n=48</b>	<b>n=44</b>
Less than \$2.00	0.04	0
\$2.00-3.99	0	0
\$4.00-5.99	0	0.02
\$6.00 or more	0.02	0
Total percent indemnities	0.06	0.02
Ave. indemnity	\$0.20	\$0.11

<sup>1</sup> No indemnities were received for coverage at the 70 percent level and it is excluded from the table.

\* IFARM Crop Insurance Payment Simulator, [www.farmdoc.uiuc.edu/cropins/index.asp](http://www.farmdoc.uiuc.edu/cropins/index.asp)

## New Faculty

**L**uc Valentin recently joined the Purdue University Agricultural Economics department. He recently completed his Ph.D in agricultural economics at Kansas State University, from which he also earned a Master's degree in 1999 in the same subject. In addition, Luc completed a Master's in Agriculture from L'Ecole Supérieure d'Agriculture in Toulouse, France.

Following the completion of his Master's degree at K-State, Luc spent two years as a layer complex manager at CalMaine Foods of Kansas, LLC before joining the Kansas Farm Management Association in Colby, Kansas. As an agricultural economist with the KFMA,



**Dr. Luc Valentin**

Luc worked with more than 100 farms in northwestern Kansas in assisting producers on various management and tax-related issues as well as developing programs to improve data analysis efficacy.

Luc's research experience has covered numerous topics,

including the economic impacts of BSE on the beef industry, the effects of best management practices on profitability and the consequences of policies aimed at reducing Atrazine pollution. In his dissertation, Luc analyzed Round-Up Ready soybeans and the distribution of welfare gains within the industry. Current interests are related land leasing agreements, particularly flexible cash rent, and analysis of site specific data. In recent years producers have gathered large amount of data such as yield maps, soil sample results, application maps... Linking all this information together in the future will prove to be very profitable and it is one of Luc's goal.

Contributors to this issue from the Department of Agricultural Economics:



Tim Baker  
Professor



Metin Cakir  
Graduate Student



George Patrick  
Professor and  
Extension  
Economist