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2010

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### Recommended Citation

McDonald, Tia and Diersen, Matthew, "Livestock Gross Margin for Dairy Products" (2010). *SDSU Extension Fact Sheets*. Paper 160.  
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## Livestock Gross Margin for Dairy Producers

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### INTRODUCTION

Dairy producers face price risk from two sides: milk prices may fall and the price of feed may increase. There are a number of ways to reduce price risks by forward contracting, by hedging, or by using options. In addition, the USDA's Risk Management Agency (RMA) administers a dairy-specific product to protect against adverse movements in price: Livestock Gross Margin (LGM) insurance.

By covering the feeding margin, LGM brings together different risk-management tools. Producers often contract or hedge milk and independently manage inputs. LGM is designed for a dairy operation that purchases and uses feed on an as-needed basis. Thus, feed costs are incurred (or managed) at the time the feed is converted to milk. LGM coverage is available from 2 to 11 months out. LGM is consistent with selective hedging, a marketing principal for livestock producers with continuous-production systems.

LGM is a single-peril insurance product, meaning that it only covers one type of risk. The insurance only covers defined movements in prices of milk and feed. This type of insurance will not cover animal mortality, disease, or production shortages. In this paper we summarize LGM and offers analysis of the effective use of this type of insurance.

The LGM-Dairy margin is defined as the difference between milk revenue and certain amounts of feed costs. Earlier endorsements had basis adjustments that are no longer used. Further, producers can now choose a default feed amount, simplifying the choices.

Producers who want basic policy information should contact an insurance agent licensed to sell LGM. In addition, the RMA website, [www.rma.usda.gov](http://www.rma.usda.gov), has a section dedicated to livestock products. Of note for producers, there

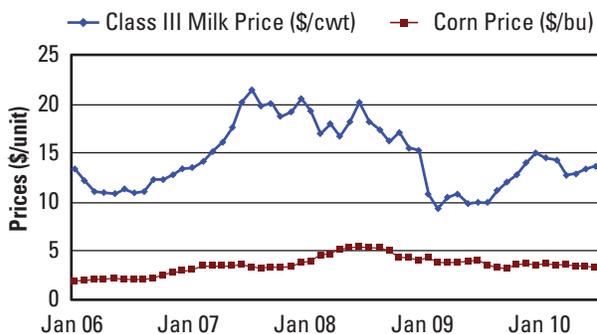
are links for an agent locator, policy documents, the specific coverage endorsement, a question and answer bulletin, and a premium calculator. Extensive supporting material and a premium estimator are available at the Understanding Dairy Markets website, [future.aae.wisc.edu](http://future.aae.wisc.edu). The estimator was used in the calculations in this paper.

Milk prices and the cost of feed are important determinants when assessing dairy profitability. In years when there is a positive correlation between feed and milk prices, the gross margin will hold, meaning a higher price for milk will offset an increased cost of feed. The problem arises in years when this relationship doesn't hold. For a couple of months in 2007 and 2008, the prices of corn and milk moved together. As figure 1 illustrates, the increase in corn prices corresponded with an increase in milk prices. In late 2008, though, these prices diverged, and producers were experiencing smaller margins due to increase feed costs and lower milk prices.

### MARGIN SPECIFICS

LGM-dairy uses an estimated margin, meaning that the prices used are based on national futures prices and not on a producer's specific margin. At the time of purchase, a producer decides on how long to insure, from 2 to 11

Figure 1. Monthly milk and corn prices



Sources: USDA-ERS and University of Wisconsin Dairy Extension

Additional resources can be found at:

<http://www.rma.usda.gov/>

<http://future.aae.wisc.edu/>

months out. Below is the formula used to determine the expected margin for a hundred weight of milk production: the formula contains the default feeding values (0.5 bushels of corn and 0.002 tons of soybean meal) per cwt—these values can be adjusted within bounds to fit specific production needs; the margin is per cwt of milk,  $Milk_t$  is the futures price of milk,  $C_t$  is the futures price for corn, and  $SM_t$  is the futures price for soybean meal:

$$\text{Margin}_t = \text{Milk}_t - (0.5 \text{ bu})(C_t) - (0.002 \text{ tons})(SM_t)$$

For example, a producer buying insurance in July for coverage in December would use December futures prices for milk, corn, and soybean meal.

$$\begin{aligned} \text{Expected Margin}_{\text{Dec}} &= \$14.61 - (0.5)(\$3.91) - (0.002)(\$277.86) \\ &= \$13.21 \end{aligned}$$

If the actual margin settles below \$13.21 per cwt, depending on the elected deductible level, the producer will receive an indemnity. Figure 2 shows a historical summary of expected and actual margins. Each data point represents a month of coverage 6 months from the contract month. The diagonal line represents zero deductible. The data points below the line represent months where the expected margin was greater than the actual margin. In general, one wants the expected margin to be unbiased.

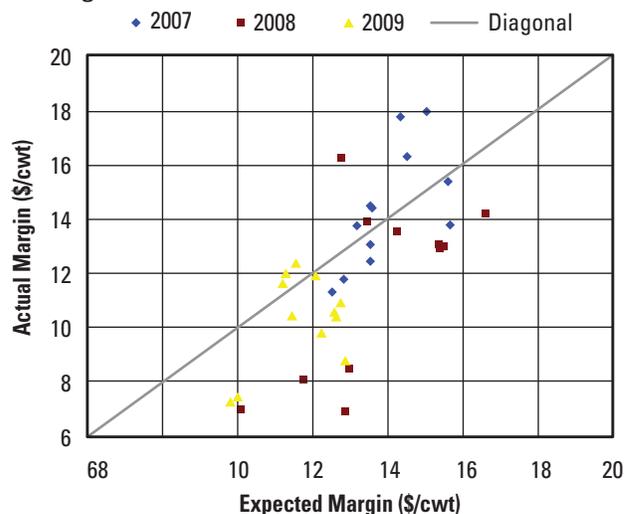
To purchase LGM insurance, a producer must pay a premium. The size of the premium is positively influenced by the size of the margin and the level of production. Premiums are highly dependent on the elected deductible level. With LGM, a producer can choose to purchase coverage with no deductible, but at a relatively high cost. In the example above, the coverage for December has an estimated premium of approximately \$0.79/cwt. By absorbing the effects of a \$0.50 deductible, the premium can be reduced by over 25%, in this example dropping to \$0.54/cwt. The deductible amounts are comparable to using a strike price on a put option of the same amount out-of-the-money.

## COMPARISON TO OPTIONS

LGM replicates the use of options to protect the margin. One could buy put options on milk and call options on corn and soybean meal. These options bundled together reflect the protection that LGM-dairy offers. Table 1 shows a comparison of buying LGM insurance and buying the protection for milk, corn, and soybean meal individually. Following the example above, the values are based on the purchase in July of coverage that extends to December, thus using the December options prices.

For this example, LGM insurance with a \$0 deductible would cost \$0.79/cwt. An *at the money* put option for December Class III Milk was \$0.80/cwt. Using 6 months of corn and soybean meal option coverage, assuming 20% implied volatility and converting to the LGM default amounts, the *at the money* corn and soybean meal call equivalents are \$0.13/cwt and \$0.03/cwt, respectively. The bundled protection, in the options market, would cost \$0.96/cwt. Keep in mind this example is just for a single contract month and does not reflect overall trends.

**Figure 2.** Calculated margins with six months of coverage



Sources: RMA and University of Wisconsin Dairy Extension

**Table 1** Comparison of LGM insurance to milk put and corn and soybean meal call options

Deductible	LGM	Class III Milk Put Option Premium	Corn Call Option Equivalent	Soybean Meal Call Option Equivalent
\$0.00	\$0.79	\$0.80	\$0.13	\$0.03
\$0.50	\$0.54	\$0.55		
\$1.00	\$0.35	\$0.35		
\$1.50	\$0.22	\$0.21		

Source: CME group, University of Wisconsin Dairy Extension

## **BENEFITS OF LGM**

- Can be tailored to any sized operation. Risk management through options requires a fixed contract size, which can be too large for producers to meet. LGM insurance does not have a minimum requirement.
- Protection of the margin. LGM insurance protects movements in both milk prices and feed costs. This allows producers to maintain a profitable margin.
- Leaves the upside open. In situations when the market is expected to improve, it is important not to lock in a fixed price but to preserve the ability to capture im-

provements in the market. LGM insurance allows for upside potential.

## **SUMMARY**

Dairy producers use a variety of methods to manage milk and input price risks. LGM insurance may help mitigate some risks when tailored to individual needs. LGM is cost-effective covering the margin, but it does not cover other costs. Thus, LGM can be a component of a marketing plan.



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FS960. 100 copies printed at a cost of \$.xx each. July 2010