Livestock Gross Margin Insurance for Dairy Cattle: Analysis of Program Performance and Cost Under Alternative Policy Configurations

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Introduction

A natural extension of the LGM-Cattle and LGM-Swine programs is the Livestock Gross Margin for Dairy Cattle (LGM-Dairy) insurance program. This program is used to establish a floor on dairy producer's Income Over Feed Cost (IOFC), which is defined as milk revenue less imputed purchased feed costs. This program was approved by USDA's Risk Management Agency in July 2007 with the first policy being offered in August 2008. This program is currently available in 35 states with the July, 2009 insurance offering.

Under the LGM-Dairy program, a dairy farm operator farmer is paid an indemnity if the difference between expected income over feed cost insured (expected IOFC) and actual income over feed cost (actual IOFC) is positive. Coverage begins one full month after the sales closing date. Expected IOFC is the difference between expected milk revenue and imputed feed costs determined at sign-up.
Unlike some crop insurance products, there are no producer premium subsidies under LGM-Dairy. As such, to be actuarially sound, producer premiums need to equal expected indemnities.

Objectives

1. Review the basic structure of LGM-Dairy
2. Examine the sensitivity of guaranteed IOFC and premiums to changes in insured feed quantities
3. Quantify impacts of changes in deductible level on important program characteristics.

Methods

Series of simulations for a hypothetical Wisconsin dairy farm using the University of Wisconsin's LGM-Dairy premium calculator (*http://future.aae.wisc.edu/lgm_dairy.html#2*) for four insurance contracts selected randomly: February 2000, May 2003, September 2006 and December 2008. The guaranteed IOFC and premium were estimated for constant levels of energy and protein meal equivalents for every coverage month and 25 different combinations of feed diets and 16 levels of deductible. Thus, IOFC guaranteed and producer premiums were obtained for 400 different contract combinations.

Assumptions

• Purchased insurance covers all production over the 10 month coverage period.

• For this analysis, the insured milk quantity for all insurance periods was considered to be at a constant level per month.

• The allowable bounds of energy and protein diets were divided into five equivalent ranges to understand the sensitivity of IOFC guaranteed and premium to the change in the insured feed quantities

Alternative insured energy and protein diets used in simulations

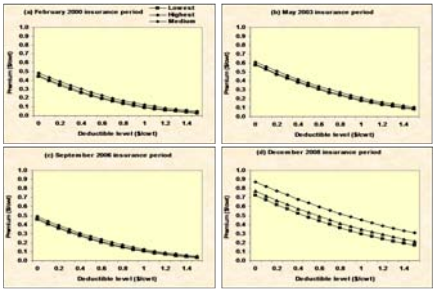
Energy and protein diet	Corn Equivalent (tons/cwt)	Soybean meal Equivalent (tons/cwt)
Lowest	0.00364	0.000805
Low	0.01001	0.00221
Medium	0.01638	0.003615
High	0.02275	0.00502
Highest	0.02912	0.006425

Results

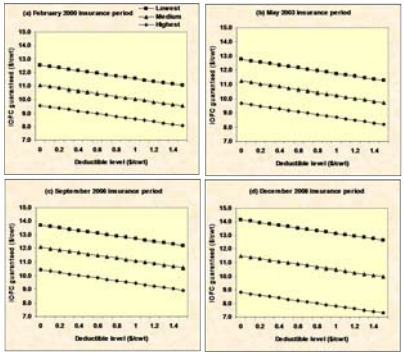
Correlation coefficients between contract characteristics

Correlated Variables	Insurance Period			
	February 2000	May 2003	September 2006	November 2008
Deductible level x Premium	-0.971	-0.984	-0.975	-0.962
Corn equivalent x IOFC guaranteed	-0.770	-0.785	-0.823	-0.866
Soybean meal equivalent x IOFC guaranteed	-0.312	-0.373	-0.331	-0.392
Corn equivalent x Premium	0.073	0.056	0.062	0.234
Soy meal equivalent x Premium	0.023	0.016	0.009	0.006

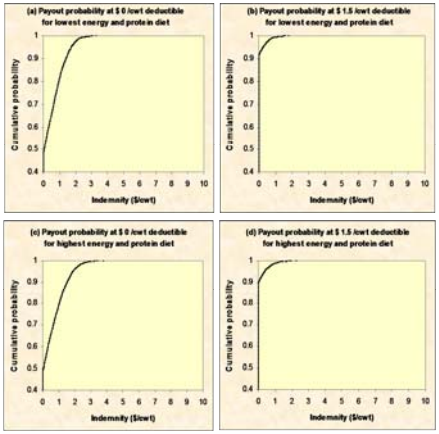
Sensitivity of deductible to premium: highest, medium and lowest feed diets



Sensitivity of expected IOFC to deductible levels and alternative feed diets



Cumulative probability of positive indemnities for September 2006 under alternative feed diets



Conclusion

• Results showed that premium levels are very sensitive to deductible level and insured feed diet. With an increase in deductible level, premiums decrease as it reduces the potential insurance liability. Further at constant insured milk quantity, IOFC decreases by an amount equal to the deductible level while sensitivity of premium to feed diets depends on the volatility in the milk and feed markets at sign-up. For example the change in premium with change in insured feed diets is significant in December 2008 compared to the other three insurance contracts, where the difference in premium is less. This is due to higher volatility in the Class III milk, corn and soybean meal futures settle prices at sign-up for the December 2008 insurance period. Further higher energy and protein diets correspond to higher levels of premium.

• IOFC secured is very sensitive to changes in the insured feed diets as well. Insured energy feed diet and IOFC guaranteed have a high negative correlation coefficient than insured protein diet, indicating a strong negative association between the two. With an increase in the insured feed quantities, IOFC guaranteed decreases and vice versa. For example for the February 2000 contract, at $0/cwt deductible, IOFC guaranteed for the highest energy and protein diet was $12.52 per cwt, at medium energy and protein diet, it was $11.05 per cwt and for the lowest energy and protein diet, it is $9.574 per cwt.

• Cumulative probability of payouts displays a definite trend with respect to deductible and insured feed diets as well. At higher levels of deductibles, there is lesser probability of payouts and vice versa. For highest energy and protein diet, range of indemnities is larger than for lowest energy and protein diet. For example, for September 2006 contract, the cumulative probability of payouts at $0/cwt deductible for highest and lowest energy and protein diets was about 52% and at $1.5 /cwt deductible, it was 10%. And for highest energy and protein diet, range of indemnities is larger than for lowest energy and protein diet.