Lessons Learned From Livestock Gross Margin Insurance for Dairy (LGM-D)

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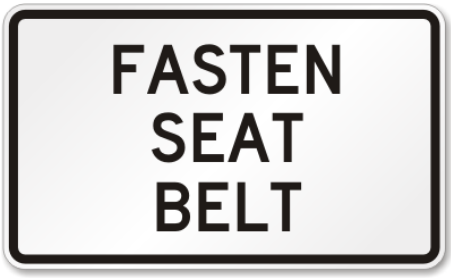
Insurance is like a seat belt; it has to be in place before you need it. Putting a seat belt on after a crash doesn't do any good.



Dairymen Need a Seatbelt

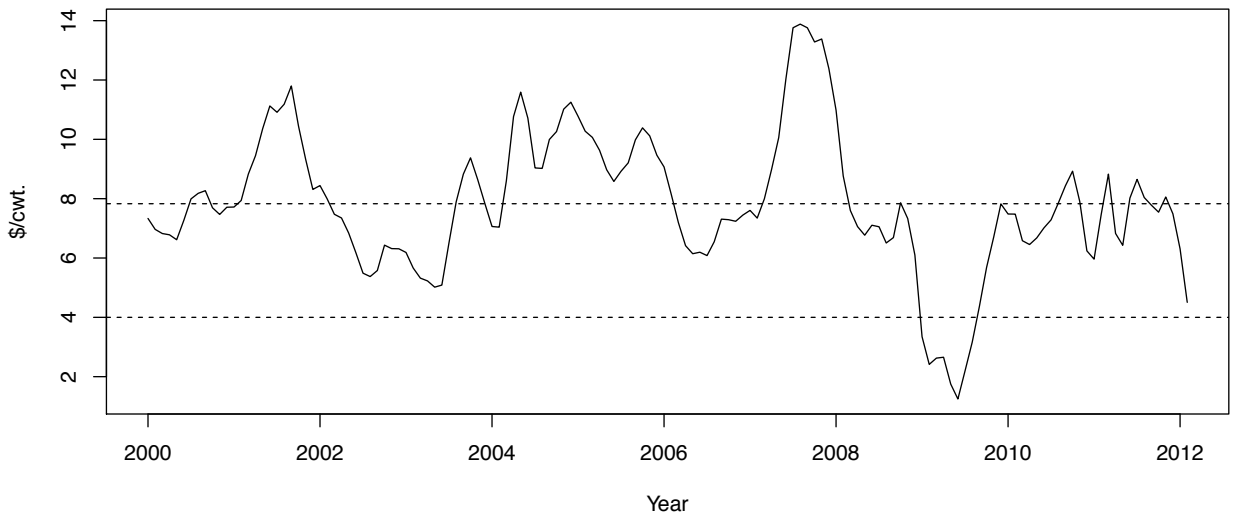


Figure : Estimated Dairy Producers Margins*, 2000 - 2012

* Based on Dairy Security Act 2011 Margin Calculations

Livestock Gross Margin Insurance for Dairy (LGM-D)

- LGM-D was introduced in 2008 by USDA/RMA as a pilot program
- LGM-D insures the *gross margin* between the milk price and the cost of certain feeds used to produce milk (corn & soybean meal).
- Designed to provide coverage against losses relative to the insured position (insurance based on average CME prices)
- LGM-D is customizable, meaning a producer can choose:
  - The cwt of milk insured
  - The tons of corn used in the feed ration (per month)
  - The tons of soybean meal used in the feed ration (per month)
  - The tons of corn and soybean meal equivalent for other feedstuff (e.g. oats, meat meal)
  - The coverage period (as little as one month)

LGM-D Gross Margin Calculation

The gross margin is the difference between the milk price and the cost of certain feeds used to produce milk. The gross margin formula is given by:

$$\sum_{i=2}^{N} \left\{ (F_{t+i}^{Milk} - D) M_{t+i} - F_{t+i}^{Corn} C_{t+i} - F_{t+i}^{SBM} SBM_{t+i} \right\}$$

Where:

- N is the number of months insured
- F_{t+i}^{j} is the price of the futures contract for j = Milk, Corn, SBM
- M_{t+i} is monthly target milk marketings
- C_{t+i} and SBM_{t+i} is expected feed equivalent per month
- D is the deductible

How Much Does It Cost?

In order to price the insurance actuarially fair, the premium at time t is given by:

$$P_t = (1.03)\mathbf{E}_t \max\{\text{Margin Guarantee - Realized Margin, } 0\}$$

- The expected payout is estimated using Monte Carlo simulation.
- A portion of the premium cost is subsidized by the taxpayer, the subsidy amount varies according to the declared deductible. For example:
  - \$0.00 deductible carries an 18% subsidy
  - \$0.50 deductible carries a 28% subsidy
  - \$1.00 deductible carries a 48% subsidy
  - \$1.10 - \$2.00 deductible carries a 50% subsidy

Indemnity Qualification

- An insurance payout will be made when the gross margin guarantee is greater than the actual margin (summed over the life of the insurance policy).
- Events that may lead to an insurance payout include:
  - Milk prices fall but corn and soybean meal remain unchanged.
  - Corn and Soybean meal prices rise but milk prices remain unchanged.
  - Co-movement in the prices result in actual margins below the gross guarantee.
- LGM-D insures the gross margin over the contract period, not individual month performance

LGM-D Oct 2011 Insuring the First 4 Months

Table : Gross Margin Using RMA Farm Profile*

Month	Class 3	Corn	SBM	Margin Insured
	$/cwt	$/bu	$/ton	$
Dec	17.43	6.48	319.33	20,531
Jan	16.78	6.52	321.37	19,475
Feb	16.40	6.56	322.85	18,844
Mar	16.43	6.60	324.33	18,853
Total				77,702

- With a $0 deductible this coverage would have cost $3,252.17, $0.52 per cwt (18% subsidy).
- With a $1.00 deductible the cost drops to $766.07, $0.12 per cwt (48% subsidy), but the margin insured drops $6,240

*RMA profile: 1,560 cwt milk / 732.14 bu corn/ 6 tons SBM

LGM-D Oct-11 Performance $0 Deductible

Table : Dec '11 - Mar '12 LGM-D Margins w/ $0 Deductible

Month	Margin Insured ($)	Actual Margin ($)	Difference ($)
Dec	20,531	23,148	2,617
Jan	19,475	19,849	374
Feb	18,844	18,434	-410
Mar	18,852	17,353	-1,499
Total	77,702	78,784	1,082

- LGM-D is insuring $77,702 in gross margin, not the individual monthly performance

LGM-D Oct-11 Performance $1 Deductible

Table : Dec '11 - Mar '12 LGM-D Margins w/ $1 Deductible

Month	Margin Insured ($)	Actual Margin ($)	Difference ($)
Dec	18,971	23,148	4,177
Jan	17,915	19,849	1,934
Feb	17,284	18,434	1,150
Mar	17,293	17,353	61
Total	71,462	78,784	7,322

- LGM-D is insuring $71,462 in gross margin, not the individual monthly performance

LGM-D Summary Statistics

Table : Policies Sold Summary

RI Year	2009	2010	2011	2012	Total
Policies Sold	40	153	1,412	1,772	
Δ Policies Sold		113	**1,259**	360	1,772
Contracts	68	221	1,738	949	**2,976**

- Participation increased dramatically in RI2011. The USDA/RMA subsidy a likely cause for the increase.
- RI2012 contracts sold would likely have been higher, but in Oct 2011 computer troubles limited access.
- \$20M budget may limit adoption of the program.
- Nearly 3,000 contracts have been sold since 2009.

LGM-D Summary Statistics

Table : Summary of Liability

RI Year	2009	2010	2011	2012	Total
Number of cwt. (M)	0.4	1.9	46.2	40.6	**89.0**
Total Liability (M\$)	4.7	24.9	769.6	705.4	**1,504.6**
Liability (\$/cwt)	11.74	13.31	16.67	17.39	16.91

- Over the life of LGM-D approximately 8.9B lbs of milk have been insured, representing over \$1.5B in total liabilities.
- The margins secured per cwt average \$16.91, this is a reflection of low feed coverage - similar to an out-of-the money put option on milk.

LGM-D Summary Statistics

Table : Premium and Subsidy

RI Year	2009	2010	2011	2012	Total
Total Premium (M$)	0.29	0.78	25.01	19.18	45.26
Producer (M$)	0.29	0.78	14.28	10.30	**25.65**
Subsidy (M$)			10.74	8.88	**19.61**
Subsidy (%)			43	46	43
Prem. ($/cwt)	0.72	0.42	0.54	0.47	0.51
Sub. Prem. ($/cwt)	0.72	0.42	0.31	0.25	0.29

- Over $45M has been collected in premiums, of which producers have paid $26M and the USDA has chipped in $20M.
- The USDA/taxpayer contribution represents approximately 43% of the LGM-D premium.

LGM-D Summary Statistics

Table : Premium and Indemnity

RI Year	2009	2010	2011	2012	Total
Premium (M$)	0.29	0.78	25.01	19.18	**45.26**
Indemnity (M$)	0.72	0.28	0.07	0	**1.06**
Payout Ratio	2.50	0.36	0.00	0	0.02

- Over $45M dollars has been collected in premiums while $1.06M has been paid out in indemnities.
- This leaves more than $44M in underwriter gain (may be used to pay future indemnities).

Lessons Learned From LGM-D

- Participation in LGM-D improved once the premium was subsidized (Dec 2010, but no increase in appropriation funding)
- LGM-D has collected over $45M dollars in premiums since 2009, $44M of which was collected during RI 2011 - 2012.
- More than 43% of the total premium has been paid by the US taxpayer.
- Spring and summer of 2011 gross margins were much better than expected so insurance payments to producers were limited ($1M).
- LGM-D if used strategically has the potential to offer effective disaster insurance.
- LGM-D is like a seat belt; it has to be in place before you need it.

Additional LGM-D Considerations

- Lack of class 4 coverage.
  - Class 4 futures and options data is available to price LGM-D for producers in class 4 markets.
- Feed ration does not include alfalfa hay conversion.
  - Hay can be incorporated to arrive at an equivalent feed cost, but this is not part of the official conversion table.
- A substantial increase in funding is be required for comprehensive LGM-D coverage (see Andy's Hoard's Article)
  - Taxpayers have paid $20M to insure 8.6B lbs. of milk, while U.S. is on pace for 200B annual production.
- Rating method for LGM-D needs consideration
  - Working with Profs Bozic, Thraen and Gould to provide methodological review.