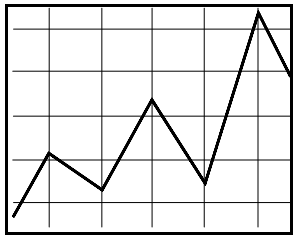
MARKETING AND POLICY BRIEFING PAPER



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USDA's Gross Margin Insurance Program for Dairy: What is it and Can it be Used for Risk Management

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Introduction

Livestock Gross Margin (LGM) insurance programs have existed for swine and feeder cattle for a number of years. These insurance programs, administered through USDA's Risk Management Agency (RMA), are designed to offer protection against a decline in livestock feeding margins (i.e., selling price minus feed costs). For cattle, the insurance product pays producers an indemnity when the spread between fed cattle sales value and the costs associated with feeder cattle and corn feed are reduced. With swine, an indemnity is paid based on the sale price of market hogs and the costs associated with the feeding of corn and soybean.

In 2007, the Federal Crop Insurance Corporation approved Livestock Gross Margin insurance for dairy farms (LGM-Dairy). This program will be available starting in August 2008 for dairy producers in Wisconsin and across the U.S.[2] LGM-Dairy is a natural extension of the cattle and swine insurance programs and represents a new risk management tool that allows dairy farm operators to purchase insurance to protect against unanticipated decreases in their gross margin, where this gross margin is the difference

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[2] As noted in the program rules, only milk sold for commercial or private sale primarily intended for final human consumption from dairy cattle fed in any of the eligible states can be covered by LGM-Dairy.

between estimated milk revenue and purchased feed costs.[3] Under this policy, the indemnity at the end of insurance period is the difference, if positive, between the expected and actual gross margin. LGM-Dairy uses futures prices and historical state corn and milk basis information to determine the expected gross margin and the actual gross margin used in the above indemnity calculation.

Unlike most other crop insurance policies, this policy is revenue neutral in that the USDA does not provide producer premium subsidies.[4] The purpose of this briefing paper is to provide an overview of the structure of this program by detailing specific program characteristics. To illustrate how the program works, we then use data for May 2008 as an example of the use of LGM-Dairy for a hypothetical 150 head Wisconsin dairy herd.[5] For additional background information, the University of Wisconsin *Understanding Dairy Markets* website has a dedicated section devoted to LGM-Dairy. The website URL is: http://future.aae.wisc.edu/lgm_dairy.html .

General Overview of LGM-Dairy Program Structure

Insurance under the LGM-Dairy program will be available starting at the end of August 2008, with production coverage to start in October. To participate in LGM-Dairy, the dairy herd will need to be located in one of the 31 LGM-Dairy eligible states shown in Figure 1. The key relationships that determine the premium for this insurance (and the effect of each on the premium) are the level of expected milk marketings at the time of sign-up (+), expected per cwt gross revenue (+), expected per cwt feed costs (-), that portion of gross revenue elected not to be insured (-) and the volatility in milk and feed markets (+).

As noted above, for the purposes of this program, the gross margin for the dairy farmer is milk-based revenue minus purchased feed costs. Milk-based revenue is the

[3] Note that the policy does not insure against death or other loss or destruction of dairy cattle, production loss of milk, or unexpected changes in feed rations.

[4] The Federal Crop Insurance Act requires that when determining premiums for LGM-Dairy a reasonable "reserve load" be added to account for the occurrence of unanticipated catastrophic events. A 3% reserve load is added to initial producer premiums to determine the total producer premium.

[5] The Risk Management Agency maintains an on-line premium calculator for LGM-Dairy located at: http://www3.rma.usda.gov/apps/premcalc/index.cfm. You must first establish a username and password account to use the calculator. Once logged in, premium calculation requires supplying the expected target marketings, corn equivalents and soybean equivalents to be fed for the desired months.

product of the farm's target milk marketings (e.g. cwt of milk elected to be insured each month) and the state-specific All-Milk price.[6] Feed costs are the costs of feeding the desired corn and soybean meal equivalents over the insurance period, multiplied by the associated state-specific corn and soybean meal prices. Notice that the actual the milk price received and actual feed prices paid by the producer are not used in the gross revenue calculations used to determine indemnities. LGM-Dairy pays indemnities when the gross margin is less than the expected gross margin, where the expected margin is set when the policy is purchased.

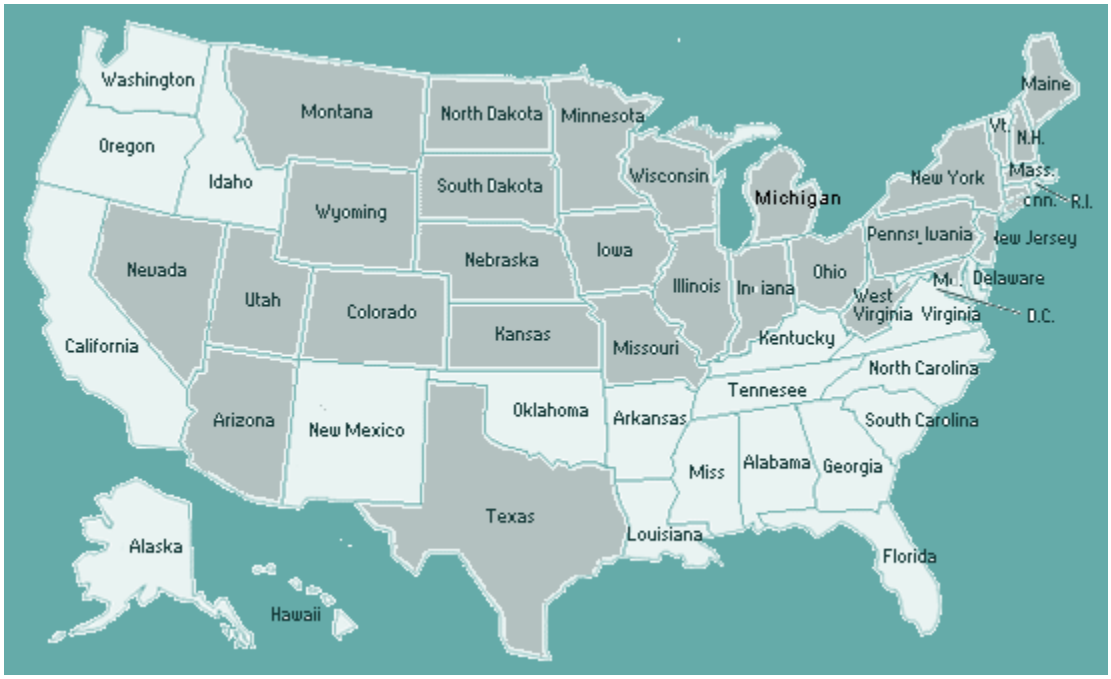

Figure 1. States Eligible to Participate in the LGM-Dairy Program (Darker Gray), 2008

As specified in the insurance underwriting rules, LGM-Dairy can only be purchased during a very short window at the end of each month. Specifically the insurance sales period begins as soon as the RMA reviews the market data after the markets close on the last day of the expected price measurement period.[7] The sales period then ends at 9:00 AM the following day. LGM-Dairy can only be purchased from an authorized crop

[6] Notice that the actual the milk price received and actual feed prices paid by the producer are not used in the gross revenue calculations. State-specific prices form the foundation of program performance.
[7] Technically, the expected price measurement period is the 3 days prior to the 2nd-to-last trading day of the month in which the insurance purchase is being made.

insurance agent's office from an agent certified by an insurance company to sell LGM. These agents are paid an administrative and overhead fee by USDA's Risk Management Agency.

There are twelve insurance periods in each calendar year. Each insurance period lasts 11 months and no milk can be insured the first month of any insurance period. This implies that, at most, 10 months of revenues can be insured under any one policy. For example, if a producer wants to cover his margins starting in October 2008, the contract must be purchased on August 27, 2008. Note that this contract then has the potential to cover expected milk marketing over any/all months between October 2008 and July 2009.

To purchase LGM-Dairy insurance, a producer must provide the number of cwt of milk intended to be marketed in each calendar month and the amount of corn (or corn equivalent) and soybean meal (or soybean meal equivalent) expected to be fed each month.[8] Appendix Table A1 provides an example of feed conversion coefficients that convert alternative feeds to corn and soybean meal equivalents. A producer cannot change the estimated milk marketings and feeding amounts over the insurance period, even if the actual production and feeding practices do not follow the expected pattern detailed at sign-up.

Expected monthly milk, corn grain and soybean meal prices at the time of sign-up are derived from the futures market settle prices at that time. For milk and corn grain, monthly historical-based state specific cash-futures basis are added to the futures settle prices for these commodities. To calculate the expected monthly soybean meal prices, no state basis is used, as cash price data for the soybean meal market are limited.

The monthly state-specific milk basis information is obtained from the historical difference between the USDA-NASS monthly All-Milk price published in USDA's *Agricultural Prices* report and the USDA's Announced Class III price. For corn, the cash/futures basis is based on state-specific data for the price received by farmers for corn grain published in the same report and the corn grain futures settle price at the end of

[8] Approved target marketings are certified by the producer and are subject to inspection by the insurance company.

each futures contract. For states where no cash market data is available, a proxy state is identified for use in basis calculations.[9]

Over the course of the insurance period, calculations are undertaken using the futures contracts that expire each month to determine actual gross revenue. If actual gross revenue is less than the expected gross revenue, then an insurance indemnity is paid.

The above discussion provided an overview of the workings of LGM-Dairy. We next provide more detail as to the calculation of gross margins, which is followed by a more detailed description of how program indemnities are calculated. Finally we will present an example using recent actual dairy market data.

Detailed Calculation of Expected Gross Margin and Gross Margin Guarantee

When the insurance contract is purchased, monthly expected gross margin (EGM) in the t^{th} month for a dairy herd located in the s^{th} state is calculated as follows:

$$EGM_t = MM_t * (ECL3P_t + MB_{st}) - CF_t(2000/56)*(ECP_t + CB_{st}) - SMF_t*ESP_t \quad [1]$$

where: t = Month of concern
s = State of residence
EGM = Expected gross margin ($)
MM = Number of cwt of milk expected to be marketed and desired to be covered by LGM-Dairy. The producer can set marketings to 0 in any month over the 10 months encompassed by the current insurance contract.
ECL3P = Expected Class III milk price ($/cwt)
MB = Milk basis defined as the state All-Milk price – Class III milk price ($/cwt)
CF = Corn equivalent expected to be fed (tons); set to zero for months with no insured marketings.
ECP = Expected monthly corn price ($/bu)
CB = Corn basis defined as price received for corn grain – corn futures final settle price ($/bu).
SMF = Soybean meal equivalent expected to be fed (tons); set to zero for months with no insured marketings.
ESP = Expected monthly soybean price ($/ton)

As noted above, at contract initiation, the producer identifies the production months to be covered by the insurance contract. At most, 10 months of production can be covered by the program. Additional insurance contracts can be purchased over the course of a year to cover additional months not covered by the current insurance contract. It

[9] An annual adjuster is used to adjust the proxy basis to be more representative of the state basis of concern.

should be emphasized that at the time of contract purchase, expected monthly milk production covered by the insurance program (MM) needs to be specified. This production profile does not change and may not represent the actual level of production that occurs over these covered months.

At the time of enrollment, expected Class III milk (ECL3P) price for each month is defined as the simple average of the daily settlement prices of the CME Class III milk futures contracts where the average is calculated over the expected price measurement period. As noted above, this period is defined as the 3 trading days prior to the 2nd to last trading day of the month in which the insurance purchase decision is being made. For the above example, where the producer wants to insure his expected milk gross margin (EGM) for the October 2008 to July 2009 period, this coverage can be obtained by purchasing an 11 month contract at the end of August 2008.[10] For this purchase, the expected price measurement period is August 25th, 26th and 27th. Calculating expected Class III milk prices (ECL3P) for October 2008 – July 2009 uses the average of the daily settlement prices over these same three days for each for the Class III futures contracts for these 10 months.

Once the expected Class III milk price is determined, the expected state-specific All-Milk price used to calculate Expected Revenue is obtained by adding a Class III/All-Milk basis (MB) that varies across state and month. The basis is calculated using historical data on All-Milk prices published by USDA-NASS in its *Agricultural Prices* report and the USDA's announced Class III milk price. Appendix Table A.1 shows the state-specific All-Milk price – Class III basis matrix that will be used for contracts initiated in 2008. These basis values will be updated annually.

To evaluate monthly expected gross margins, a producer needs estimates of expected monthly feed costs at the time of contract purchase. For LGM-Dairy, feed costs are composed of the cost for energy (corn) and protein (soybean meal). Expected monthly feedings for other feedstuffs must be converted to corn and soybean meal equivalents

[10] The last trading day during the month of August is Friday, August 29th. Note that the August Class III contract trades until September 4th. For the Class III contract evaluation, we use data only for the month of concern (August in this case), since the Corn and Soybean Meal contracts expire on the last business day of August.

using the predefined conversion ratios shown in Table A.2.[11] At the time of contract purchase, the producer is expected to supply expected whole-herd feeding rates over the life of the contract. Similar to the milk production, these feeding rates do not change over the life of the contract and may not reflect the actual feed composition and the amounts actually used over the contract period.

Using a similar procedure as used to calculate expected milk revenue, expected monthly corn equivalent feed costs are the expected feeding of corn equivalents (set at time of contract purchase, CF) multiplied by the state-specific expected corn grain price (i.e., ECP + CB). Expected Corn Grain prices (ECP) are based on the futures markets corn grain settlement prices during the expected price measurement period and calculated basis between the corn futures settlement prices and prices received for corn grain as reported in USDA's monthly *Agricultural Prices* report. Table A.3 shows the state- and month-specific corn basis used for LGM-Dairy policies during 2008.

Unlike Class III milk futures, which has 12 futures contracts traded per year, only 5 contracts are traded for corn grain each year and only 8 for soybean meal. Table 1 shows the contract months available for Class III, Corn and Soybean Meal. For months in which the CBOT trades futures contracts, the expected corn price is the simple average of the settlement prices for CBOT corn futures contract for those months, calculated over the same expected price measurement period used in the calculation of ECL3P, plus the state-specific corn cash-futures basis (CB). For our August 2008 example, the expected price measurement period to calculate expected corn prices is August 25th, 26th and 27th. For insurance months with no corn futures contracts that expire, the expected corn grain price is the state-specific corn basis for the month, plus the weighted average of the immediately surrounding months' simple average of the daily settlement prices during the expected price measurement period. The weights are based on the distance between the desired month and the futures contract months actually used and are proportional to the number of months until the futures contract expires.

[11] If a producer does not use corn grain or soybean meal, the expected amount of mixed feed must be converted to express the tons of feedstock used for energy into tons of corn equivalent and the tons of feedstock used for protein into soybean meal equivalent. The LGM-Dairy underwriting rules specify a minimum and maximum amount of corn and soybean meal equivalents used per cwt of milk produced.

Table 1
Contract Months for Class III, Corn and
Soybean Meal and Last Trading Day

Contract	Trading Months	Last Trading Day
Class III	Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec	The day prior to the release of USDA's Announced Price. This day will be on a Thurs on or before the 4th of the month following the contract month
Corn	Dec, Mar, May, Jul, Sep	The business day prior to the 15th calendar day of the contract month
Soybean Meal	Oct, Dec, Jan, Mar, May, Jul, Aug, Sep	The business day prior to the 15th calendar day of the contract month

Note: The Class III cash settles to the Announced Class III which occurs on a Friday on or before the 5th of the month following the month of production.

Similarly, expected energy (soybean meal equivalent) feed costs are based on the soybean meal equivalent (SMF) used as a protein source and the expected soybean meal price (ESP). The producer reports the expected amount of soybean meal (or equivalent) fed each month over the entire contract period at the time of insurance contract purchase. Unlike milk and corn grain, no state basis is used to obtain state-specific soybean meal prices. Similar to corn, there are 8 trading months during any one calendar year. For months with no soybean meal futures contracts that expire, the expected soybean meal price is the weighted average of the immediately surrounding months' simple average of the daily soybean meal settlement prices during the expected price measurement period. The weighting system is similar to that used to calculate the expected corn price (ECP).

The above projected milk price and feed costs are used to estimate expected gross margins (EGM) for the coverage months. The coverage months (CM) identify those months covered by the insurance program specified by the farmers at sign-up. The sum of the monthly EGM's covered by the insurance program $\left(\sum_{t \in CM} EGM_t \right)$ divided by the

sum of expected marketings over this same period $\left(\sum_{t \in CM} MM_t \right)$ provides a measure of the expected gross margin per cwt of milk marketed (EGM_C):

$$EGM\_C = \frac{\sum_{t \in CM} EGM_t}{\sum_{t \in CM} MM_t}. \quad [2]$$

Similar to any insurance policy, the dairy producer declares a deductible (DL) that is the portion of the expected gross margin not being insured. For LGM-Dairy, allowable deductibles range from zero to $1.50 per cwt of milk in $0.10 per cwt increments. Higher deductibles imply lower insurance premiums as they, by definition, reduce the potential insurance liability.

Given the chosen gross margin deductible DL and the expected gross margin EGM, the Gross Margin Guarantee (GMG) is the total expected gross margin minus the total deductible:

$$GMG = \sum_{t \in CM} GMG_t = \sum_{t \in CM} \left(EGM_t - DL*MM_t \right). \quad [3]$$

Detailed Description of the Determination of Indemnity Payments

At the end of the 11-month insurance period, the total insurance indemnity (INDEM) is the difference, if positive, between the GMG and the actual gross margin (AGM), where the AGM is the gross margin estimated at the end of each month as the contract matures.[12] Similar to the expected gross margin, because the AGM is calculated using state-level price and cost data, the AGM may not reflect the gross margins actually earned by the farmer. The indemnity is then calculated as follows:

$$INDEM = Max(GMG - AGM, 0) \quad [4]$$

where: $AGM = \sum_{t \in CM} AGM_t$

$AGM_t = MM_t * (ACL3P_t + MB_{st}) - CF_t(2000/56)*(ACP_t + CB_{st}) - SMF_t*ASP_t$

ACL3P = Actual Class III milk price

ACP = Actual corn price

[12] Individual monthly indemnities are available before the end of the end of the 11 month contract.

ASP = Actual soybean meal price

The actual Class III milk price (ACLSP) is the simple average of the daily settlement prices of the CME Class III milk futures contract for the month of concern during the actual price measurement period (the last three trading days prior to contract expiration).

As shown in Table 1, unlike corn and soybean meal futures contracts, Class III futures contracts cash settle to USDA's Announced Class III price. Trading in Class III contracts ends the day prior to that announcement. By regulation, Class III prices are released at 10:00 a.m. EST/EDST by USDA no later than the 5th of the following month if that date is on a Friday; otherwise the release date is the nearest Friday before the 5th. Table 2 lists the last trading days for the Class III futures contract for August 2008 – July 2009, as well as the trading days defining the actual price measurement period used to define ACL3P.

Continuing with our previous example where a producer purchases an insurance contract at the end of August 2008, the actual October 2008 Class III price (ACL3P) will be obtained from the October 2008 Class III settle prices on October 28th – 30th. The actual state milk price (ASMP) for October is calculated as the ACL3P plus the state-specific October milk basis (MB).

For months in which a CBOT corn contract expires, the actual corn price (ACP) for the month of concern is the simple average of the daily settlement prices for the CBOT corn futures contract for this month during the actual price measurement period. For corn, each futures contract expires on the 15th calendar day of the contract month. The last trading day is the last business day prior to the 15th of each month. Table 2 shows both the last trading day and actual price measurement period used in the calculation of ACP. The actual state-specific corn price (ASCP) is calculated as the ACP plus the state-specific corn basis (CB) for this month.

Table 2
Last Trading Day for Class III, Corn and Soybean Meal Futures Contracts and Associated Actual Price Measurement Period, Aug. 2008 – July 2009

Month	Class III		Corn		Soybean Meal	
	Last Trading Day	Actual Price Measurement Period	Last Trading Day	Actual Price Measurement Period	Last Trading Day	Actual Price Measurement Period
Aug '08	Sep. 4	Sep. 1 – 3	-----	Jul. 9 – 11, Sep. 9 – 11	Aug. 14	Aug. 11 – 13
Sep '08	Oct. 2	Sep. 29 – Oct. 1	Sep. 12	Sep. 9 – 11	Sep. 12	Sep. 9 – 11
Oct '08	Oct. 30	Oct. 27 – 29	-----	Sep. 9 – 11, Dec. 9 – 11	Oct. 14	Oct. 9,10, 12
Nov '08	Dec. 4	Dec. 1 – 3	-----	Sep. 9 – 11, Dec. 9 – 11	-----	Oct. 9, 10, 12 Dec. 9 – 11
Dec '08	Dec. 31	Dec. 28 – 30	Dec. 12	Dec. 9 – 11	Dec. 12	Dec. 9 – 11
Jan '09	Jan. 29	Jan. 26 – 28	-----	Dec. 9 – 11, Mar. 10 – 12	Jan. 14	Jan. 10, 12–13
Feb '09	Feb. 26	Feb. 23 – 25	-----	Dec. 9 – 11, Mar. 10 – 12	-----	Jan. 10, 12–13 Mar. 10 – 12
Mar '09	Apr. 2	Mar. 30 – Apr. 1	Mar. 13	Mar. 10 – 12	Mar. 13	Mar. 10 – 12
Apr '09	Apr. 30	Apr. 27 – 29	-----	Mar. 10 – 12, May 11 – 13	-----	Mar. 10 – 12, May 11 – 13
May '09	Jun. 4	Jun. 1 – 3	May 14	May 11 – 13	May 14	May 11 – 13
Jun '09	Jul. 2	Jun. 29 – Jul. 1	-----	May 11 – 11, Jul. 9, 10, 13	-----	May 11 – 11, Jul. 9, 10, 13
Jul '09	Jul. 30	Jul. 27 – Jul. 29	Jul. 14	Jul. 9, 10, 13	Jul. 14	Jul. 9, 10, 13

For months with no corn futures contract, the actual corn price (ACP) is the weighted average of the immediately surrounding months' simple average of the daily settlement prices during the actual price measurement period. This weighting system is the same as used in the calculation of expected corn prices. To obtain state-specific estimates of actual corn prices, the state-specific corn basis for the month is added to the ACP.

Similar to corn futures contracts, for months in which a CBOT soybean meal contract expires, the actual soybean meal price (ASP) is the simple average of the daily settlement prices for the CBOT soybean meal contract for the month during the actual price measurement period. The last trading day for soybean meal contracts is the last business day prior to the 15th of each month of the contract month. Table 2 shows both the last trading day and actual price measurement period used to calculate the ASP. For other months, the actual soybean meal price is the weighted average of actual soybean meal prices in the immediately surrounding months as was used to calculate the ASCP.

Comparing the actual price measurement periods illustrates one characteristic of LGM-Dairy. Specifically, the ASCP and ASP values can potentially be calculated for months 1 to 2 months in advance of a particular ASMP. This will occur when calculating the ASMP, ASCP and ASP values for October 2008. The October 2008 ASMP is based on the average settle price for the October 2008 Class III contract during October 28th – 30th. To calculate the ASP, the average settle price for soybean meal futures over the dates of October 10th, 13th and 14th, an approximate 2-week difference. In contrast, to calculate the ASCP, the weighted average settle prices will be based on the September and December corn settled prices over the September 10th, 11th and 12th and December 10th, 11th, and 12th trading days, respectively. Each of these periods is 1.5 months apart from the actual price measurement period of the October Class III price.

What Factors Impact LGM-Dairy Insurance Premiums?

Producers must make several decisions when purchasing an LGM-Dairy policy that impact the total insurance premium and expected policy payout. These decisions include the choice of coverage month(s) (CM), the amount of milk marketing per month (MM), the expected quantity of feed to use (CF, SMF) and the gross margin deductible (DL).

The producer's approved target marketings are the maximum amount of milk that may be stated as target marketings on the application. Approved target marketings are certified by the producer and are subject to inspection by the insurance company. A producer's approved target marketings will be the lesser of the capacity of the producer's dairy operation as determined by the insurance provider and the underwriting capacity

limit as stated in the special provisions. In terms of the total premium, the premium bill will increase with the level of milk produced and the number of months covered.

The target monthly feeding of corn and soybean meal equivalents must be within the bounds specified in the underwriting rules. For corn equivalents, the expected feeding must be between 0.00364 tons (7.28 lbs) and 0.02912 tons (58.24 lbs) per cwt of milk. For soybean meal, expected feeding must be between 0.000805 tons (1.61 lbs) and 0.006425 tons (12.85 lbs) per cwt of milk.

As noted above, the deductible is the chosen portion of expected total gross margin not insured. LGM-Dairy deductibles range from zero to $1.50 per cwt in $0.10 increments. The total deductible is the selected per hundredweight deductible multiplied by the sum of target marketings across all months of the insurance period. As with any insurance policy, increasing the deductible decreases the premium.

An Example of the Use of LGM-Dairy in Wisconsin

To further illustrate the workings of LGM-Dairy, we construct an example for an average Wisconsin dairy farm. For this example, we assume the producer is making the decision at the end of May 2008, which implies that the marketings for June 2008 – April 2009 can be covered by the insurance contract. We assume this producer has a 150 cow herd with a per cow productivity profile that follows the 2007 per cow production pattern for Wisconsin. Column [1] in Table 3 shows the assumed per cow productivity.

The total herd production (marketings) shown in column [2] of Table 3 are used to estimate expected milk revenues. We estimate the expected Class III price from the Class III futures settlement prices observed during the expected price measurement period, which in this case is May 23rd, 28th, and 29th (a holiday occurs on May 27th). Table 4 provides the steps used to calculate the expected Class III milk price for each month, the expected Wisconsin All-Milk price and the resulting expected total revenue stream given the production profile shown in Table 3. Given the average daily settle price for each contract on the above dates, we obtain the average Class III settle price for each month. We then add the month-specific All-Milk/Class III basis to obtain the expected Wisconsin All-Milk price, which is then multiplied by monthly production to

obtain an estimated milk value. This is shown in the last column of Table 4. Over the effective 10 month coverage period, total expected gross revenue for the herd is $525,068.

Table 3
Monthly Production Profile and Feed Use
Hypothetical Wisconsin Dairy Farm:
150 Milking Cow Herd, July '08 – April '09

Month	Prod/Cow (lbs) [1]	Total Production (lbs) [2]	Corn Equiv. (Tons) [3]	Soybean Meal Equiv. (Tons) [4]
July '08	1,675	251,250	34.32	4.43
Aug '08	1,645	246,750	33.71	4.35
Sep '08	1,575	236,250	32.27	4.17
Oct '08	1,600	240,000	32.79	4.24
Nov '08	1,550	232,500	31.76	4.10
Dec '08	1,600	240,000	32.79	4.24
Jan '09	1,630	244,500	33.40	4.31
Feb '09	1,470	220,500	30.12	3.89
Mar '09	1,640	246,000	33.61	4.34
Apr '09	1,615	242,250	33.09	4.28
Total	19,305	2,895,750	327.85	42.35

Source: The Wisconsin 2007 average production/cow was obtained from NASS and contained within the Understanding Dairy Markets Website: (http://future.aae.wisc.edu/data/monthly_values/by_area/98?tab=production). Note that we are only displaying 10 months of data

To complete the calculation of expected gross margins, we need monthly estimates of feed costs. Table 3 displays the expected corn and soybean meal equivalent feed amounts. We use average settle prices for corn and soybean meal calculated over the same expected price measurement period as used in the estimation of expected milk revenues. Table 5 shows the data necessary to calculate the expected feed costs.

Table 4
Calculation of Expected Milk Price and Revenues

Month	Class III Settle Price				Milk Basis ($/cwt)	Milk Price ($/cwt)	Total Prod. (lbs)	Total Revenue ($)
	May 23 ($/cwt)	May 27 ($/cwt)	May 28 ($/cwt)	Avg. ($/cwt)				
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
July '08	21.42	21.38	21.24	21.35	1.11	22.46	251,250	56,431
Aug. '08	21.25	21.28	21.13	21.22	1.16	22.38	246,750	55,223
Sep. '08	21.16	21.12	21.00	21.09	1.37	22.46	236,250	53,062
Oct. '08	20.79	20.70	20.57	20.69	1.77	22.46	240,000	53,904
Nov. '08	20.68	20.58	20.45	20.57	1.91	22.48	232,500	52,266
Dec. '08	20.59	20.50	20.35	20.48	1.77	22.25	240,000	53,400
Jan. '09	19.85	19.85	19.80	19.83	1.94	21.77	244,500	53,228
Feb. '09	19.20	19.24	19.24	19.23	1.79	21.02	220,500	46,349
Mar. '09	19.20	19.22	19.20	19.21	1.94	21.15	246,000	52,029
Apr. '09	18.90	18.90	18.90	18.90	1.4	20.30	242,250	49,177
							Total Revenue	525,068

Note: [4] = ([1] + [2] + [3])/3
[6] = [4] + [5]
[8] = [6] + [7]

Columns [1]-[3] display the corn futures settle prices during the expected price measurement period. Average corn settle prices are shown in column [5]. As noted above and unlike Class III milk, corn futures are not traded for every month. For those months for which corn is not traded, a weighted average of the imputed settlement prices in column [4] for the months prior and following the month of concern are used to obtain the missing settlement prices. The monthly Wisconsin specific corn basis in column [6] is added to the imputed monthly corn prices to give the effective corn price shown in

Table 5
Calculation of Expected Feed Prices and Costs

Month	Corn Settle Price				Imputed Corn Price ($/bu)	Corn Basis ($/bu)	Corn Price ($/bu)	Soybean Meal Settle Prices				Imputed SBM Price ($/ton)	Total Corn Fed (Tons)	Total Corn Costs ($)	Total SBM Fed (Tons)	Total SBM Costs ($)
	May 23 ($/bu)	May 27 ($/bu)	May 28 ($/bu)	Avg. ($/bu)				May 23 ($/ton)	May 27 ($/ton)	May 28 ($/ton)	Avg. ($/ton)					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
July '08	6	5.98	5.92	5.97	5.97	-0.12	5.85	336.60	335.00	343.70	338.43	338.43	34.322	7,167	4.433	1,500
Aug. '08					6.03	-0.15	5.88	338.00	337.70	345.80	340.50	338.13	33.707	7,080	4.354	1,472
Sep. '08	6.13	6.11	6.05	6.10	6.10	-0.11	5.99	335.00	336.50	342.00	337.83	337.83	32.273	6,900	4.169	1,408
Oct. '08					6.14	-0.15	5.99	327.50	329.00	333.70	330.07	330.07	32.785	7,018	4.235	1,398
Nov. '08					6.19	-0.18	6.01					329.82	31.761	6,817	4.103	1,353
Dec. '08	6.27	6.25	6.19	6.24	6.24	-0.22	6.02	327.00	329.00	332.70	329.57	329.57	32.785	7,045	4.235	1,396
Jan. '09					6.28	-0.14	6.14	327.60	329.50	334.00	330.37	330.37	33.4	7,327	4.314	1,425
Feb. '09					6.33	-0.13	6.20					332.15	30.122	6,667	3.891	1,292
Mar. '09	6.4	6.39	6.33	6.37	6.37	-0.17	6.20	331.30	333.00	337.50	333.93	333.93	33.605	7,445	4.341	1,450
Apr. '09					6.31	-0.11	6.20					334.93	33.093	7,330	4.275	1,432
May '09	6.25	6.47	6.41	6.38	6.38	-0.12	6.26	333.30	335.00	339.50	335.93	335.93				
												Total Costs		70,796		14,127

Note: [4] = ([1] + [2] + [3])/3
[5] detailed in test
[7] = [5] + [6]
[11] = ([8] + [9] + [10])/3
[12] detailed in text
[14] = [7] * [13]
[16] = [12] * [15]

column [7]. Similar calculations are used to estimate soybean meal costs. Unlike corn, no soybean meal basis is added to the imputed soybean meal prices (column [12]).

Columns [13] and [15] list the amounts of corn and soybean equivalents fed that were originally displayed in Table 3. Multiplying these amounts by the imputed feed prices gives the total expected corn and soybean meal feed costs. Combining the corn and soybean meal costs gives a total feed cost over the 10 month period of $84,923.

Combining the expected gross milk revenues with the expected feed costs gives an estimated Gross Margin Guarantee of $440,145 (Table 6). The premium for this coverage is $29,235 or $1.22/cwt, or about 6.64% of the guarantee. This may seem a relatively high premium, but should be considered in light of the expected milk price at the end of May 2008. The weighted-average expected Wisconsin All-Milk price over the 10 month coverage period was $21.88. The above policy and associated premium imply a net All-Milk price of $20.66, after deducting the premium. Table 6 shows the tradeoffs between the deductible, the gross margin guarantee and the premium. Given the amount of milk produced, every $0.10 increase in the deductible level implies a $2,400 drop in the insured gross margin. At the maximum allowable deductible of $1.50, the gross margin guarantee decreased from $440,125 to $404,145, a decrease of 8.2%. The associated premium decreases from $1.22/cwt of milk marketed to $0.57/cwt, a decrease of 53.3%. With increases in the deductible the relative cost of the premium decreases continuously from 6.64% with zero deductible to 3.37% when a $1.50 gross revenue deductible is chosen.

Summary

There is no doubt that dairy farm operators are faced with a tremendous amount of variability not only in terms of the farm price of milk but also the costs of purchases feeds. There currently exist risk management tools that can be used to help mitigate the effects of such price risk, namely Class III and grain-based futures and options contracts. For example dairy producers could use Class III put options to control for the downside risk associated with reductions in Class III milk prices and corn/soybean call options to control for possible increased feed costs.

Starting in August, 2008 there is available a insurance program that has the combined effect of controlling for lower gross revenue defined as the value of milk produced minus feed costs. This program known as Livestock Gross Margin-Dairy is administered by USDA's Risk Management Agency and made available via authorized crop insurance agents to dairy farm operators in 31 states.

This program is quite flexible in terms of being able to be used by farms with a variety of sizes of dairy herds, productivity, feeding practices, months covered and farm location. Expected gross returns are based on Class III, corn grain and soybean meal futures prices at the time of contract initiation. The level of indemnities are determined by the difference in expected and actual gross revenues where the actual gross revenues are based on futures markets milk and grain settle prices at contract expiration.

Initial analyzes show that insurance premiums are very sensitive to changes in gross revenue deductible levels. Using May 2008 as an example, increasing the deductible from 0$/cwt to $1.50/cwt the guaranteed gross revenue target is decreased by approximately 10% while the total premium is cut in half. Additional work needs to be undertaken to determine the effects of alternative market conditions (e.g. volatility) impact the deductible/premium relationship.

Table 6
Gross Margin Guarantees and Premiums
Under Alternative Deductible Scenarios

Deductible Rate ($/cwt) [1]	Deductible Amount ($) [2]	Gross Margin Guarantee ($) [3]	Total Premium ($) [4]	Total Premium as % of GMG [5]	Premium Per Cwt ($) [6]	Market Price - Premium ($) [7]
0	0	440,145	29,235	6.64	1.22	20.65
0.10	2,400	437,745	27,956	6.39	1.16	20.71
0.20	4,800	435,345	26,710	6.14	1.11	20.76
0.30	7,200	432,945	25,498	5.89	1.06	20.81
0.40	9,600	430,545	24,320	5.65	1.01	20.86
0.50	12,000	428,145	23,174	5.41	0.97	20.90
0.60	14,400	425,745	22,062	5.18	0.92	20.95
0.70	16,800	423,345	20,983	4.96	0.87	21.00
0.80	19,200	420,945	19,944	4.74	0.83	21.04
0.90	21,600	418,545	18,940	4.53	0.79	21.08
1.00	24,000	416,145	17,968	4.32	0.75	21.12
1.10	26,400	413,745	17,033	4.12	0.71	21.16
1.20	28,800	411,345	16,136	3.92	0.67	21.20
1.30	31,200	408,945	15,271	3.73	0.64	21.23
1.40	33,600	406,545	14,431	3.55	0.60	21.27
1.50	36,000	404,145	13,618	3.37	0.57	21.30

Appendix A

Table A.1
All Milk/Class III Settle Price Basis

Milk Basis												
State	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
AZ	1.20	0.97	1.04	0.16	0.47	0.69	0.91	0.84	0.67	0.85	1.07	0.85
CO	1.80	1.37	1.36	0.36	0.23	0.63	0.83	0.76	0.91	1.11	1.45	1.25
CT	2.92	2.71	2.92	1.64	2.03	2.17	2.21	2.04	1.99	2.39	2.77	2.57
DE	2.82	2.61	2.74	1.36	1.65	2.05	2.03	1.80	1.79	2.29	2.61	2.43
IL	1.56	1.45	1.56	0.80	0.73	1.03	0.91	0.78	0.95	1.45	1.65	1.35
IN	2.26	1.87	2.06	0.72	1.41	1.59	1.79	1.50	1.31	1.83	2.13	1.91
IA	1.92	1.83	1.76	0.96	1.07	1.05	1.09	1.02	1.21	1.71	1.93	1.65
KS	1.16	0.83	0.86	0.00	0.13	0.51	0.71	0.38	0.39	0.77	1.11	0.85
ME	3.32	3.09	3.36	2.04	2.33	2.63	2.65	2.38	2.47	2.93	3.21	2.93
MD	2.78	2.57	2.70	1.32	1.61	2.01	1.99	1.76	1.75	2.25	2.57	2.39
MA	2.94	2.71	2.98	1.66	1.95	2.25	2.27	2.00	2.09	2.55	2.83	2.55
MI	1.86	1.69	1.72	0.80	0.97	1.13	1.19	1.08	1.03	1.37	1.65	1.49
MN	1.66	1.51	1.68	1.18	1.03	0.93	0.95	1.10	1.31	1.59	1.73	1.57
MO	1.92	1.59	1.62	0.76	0.89	1.27	1.47	1.14	1.15	1.53	1.87	1.61
MT	1.56	1.29	1.68	1.26	0.65	0.71	0.87	0.96	0.93	1.05	1.41	1.23
NE	2.12	2.03	1.96	1.16	1.27	1.25	1.29	1.22	1.41	1.91	2.13	1.85
NV	0.70	0.34	0.66	-0.11	-0.31	-0.15	-0.07	0.08	0.02	-0.01	0.28	0.21
NH	2.82	2.59	2.86	1.54	1.83	2.13	2.15	1.88	1.97	2.43	2.71	2.43
NJ	2.20	1.99	2.12	0.74	1.03	1.43	1.41	1.18	1.17	1.67	1.99	1.81
NY	2.32	2.11	2.32	1.04	1.43	1.57	1.61	1.44	1.39	1.79	2.17	1.97
ND	1.22	1.07	1.24	0.74	0.59	0.49	0.51	0.66	0.87	1.15	1.29	1.13
OH	2.32	2.15	2.34	0.98	1.25	1.51	1.63	1.26	1.33	1.91	2.31	2.23
PA	3.40	3.19	3.32	1.94	2.23	2.63	2.61	2.38	2.37	2.87	3.19	3.01
RI	3.18	2.97	3.18	1.90	2.29	2.43	2.47	2.30	2.25	2.65	3.03	2.83
SD	1.88	1.73	1.90	1.40	1.25	1.15	1.17	1.32	1.53	1.81	1.95	1.79
TX	2.26	1.95	1.94	0.68	0.83	1.23	1.49	1.44	1.59	1.69	1.95	1.81
UT	1.18	0.95	1.02	0.14	0.45	0.67	0.89	0.82	0.65	0.83	1.05	0.83
VT	2.38	2.15	2.42	1.10	1.39	1.69	1.71	1.44	1.53	1.99	2.27	1.99
WV	2.22	2.01	2.14	0.76	1.05	1.45	1.43	1.20	1.19	1.69	2.01	1.83
WI	1.94	1.79	1.94	1.40	1.23	1.11	1.11	1.16	1.37	1.77	1.91	1.77
WY	1.18	0.91	1.30	0.88	0.27	0.33	0.49	0.58	0.55	0.67	1.03	0.85

Table A.2
Example Corn and Soybean Equivalent Conversion Factors

Feed Stuff	Soybean Meal Ratio	Corn Ratio
Barley	0.111	0.866
Blood Meal	2.025	-1.235
Brewer's grain, dry	0.433	0.357
Brewer's grain, wet (21% DM)	0.099	0.081
Brewer's grain, wet (40% DM)	0.188	0.155
Corn, shelled	0.000	1.000
Corn and cob meal (ear corn)	-0.007	0.985
Corn gluten meal, dry	1.408	-0.420
Corn gluten feed, dry	0.304	0.597
Whole cottonseed	0.323	0.850
Cottonseed meal (41% CP)	0.905	0.036
Cottonseed meal (36% CP)	0.867	0.015
Distiller's grain with solubles, dried (92% DM)	0.394	0.686
Distiller's grain with solubles, dried (60% DM)	0.257	0.447
Feather meal	1.600	-0.743
Fish meal, herring	1.875	-0.865
Fish meal, menhaden	1.651	-0.768
Hominy	0.057	0.977
Meat meal	1.227	-0.349
Meat and bone meal	1.426	-0.555
Molasses, cane, dry	0.075	0.791
Molasses, cane, wet	-0.037	0.747
Oats	0.120	0.779
Peanut skins	0.265	0.439
Whole soybeans	0.836	0.279
Soybean meal	1.000	0.000
Soyhulls	0.100	0.819
Thin stillage (slop) (6% DM)	0.026	0.045
Wheat	0.161	0.884
Wheat bran	0.235	0.585
Wheat middlings	0.274	0.523

Table A.3
Corn Grain Price Received/Futures Settle Price Basis

Corn Basis												
State	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
AZ	0.98	0.90	0.91	0.91	0.96	0.99	1.05	1.03	1.10	0.99	0.94	0.86
CO	0.08	0.00	0.01	0.01	0.06	0.09	0.15	0.13	0.20	0.09	0.04	-0.04
CT	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
DE	0.29	0.29	0.32	0.35	0.42	0.42	0.37	0.35	0.31	0.14	0.19	0.20
IL	-0.02	-0.06	-0.07	-0.03	-0.03	-0.01	-0.06	-0.09	-0.09	-0.12	-0.10	-0.08
IN	-0.01	-0.03	-0.04	-0.03	0.02	-0.04	-0.03	-0.06	-0.09	-0.18	-0.16	-0.04
IA	-0.16	-0.19	-0.18	-0.17	-0.17	-0.16	-0.21	-0.24	-0.18	-0.22	-0.22	-0.19
KS	-0.01	-0.05	-0.06	-0.04	-0.04	-0.02	-0.01	-0.04	-0.01	0.08	0.07	-0.02
ME	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
MD	0.23	0.23	0.26	0.29	0.36	0.36	0.31	0.29	0.25	0.08	0.13	0.14
MA	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
MI	-0.13	-0.15	-0.14	-0.12	-0.10	-0.10	-0.11	-0.10	-0.12	-0.22	-0.25	-0.25
MN	-0.23	-0.28	-0.27	-0.25	-0.25	-0.24	-0.25	-0.27	-0.26	-0.28	-0.30	-0.31
MO	-0.03	-0.01	-0.02	-0.02	-0.01	0.01	-0.05	-0.05	-0.13	-0.19	-0.12	-0.08
MT	0.30	0.29	0.31	0.36	0.37	0.40	0.34	0.40	0.43	0.33	0.27	0.23
NE	-0.11	-0.16	-0.17	-0.17	-0.14	-0.13	-0.16	-0.17	-0.17	-0.15	-0.15	-0.19
NV	0.08	0.00	0.01	0.01	0.06	0.09	0.15	0.13	0.20	0.09	0.04	-0.04
NH	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
NJ	0.19	0.19	0.22	0.25	0.32	0.32	0.27	0.25	0.21	0.04	0.09	0.10
NY	0.29	0.29	0.32	0.35	0.42	0.42	0.37	0.35	0.31	0.14	0.19	0.20
ND	-0.30	-0.31	-0.29	-0.24	-0.23	-0.20	-0.26	-0.20	-0.17	-0.27	-0.33	-0.37
OH	-0.02	-0.03	-0.05	-0.03	0.00	0.03	-0.01	-0.05	-0.10	-0.16	-0.17	-0.09
PA	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
RI	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
SD	-0.29	-0.28	-0.29	-0.25	-0.23	-0.21	-0.32	-0.27	-0.26	-0.34	-0.39	-0.35
TX	0.25	0.23	0.26	-0.41	0.18	0.24	-0.38	0.09	0.27	0.36	0.31	0.22
UT	0.54	0.46	0.47	0.47	0.52	0.55	0.61	0.59	0.66	0.55	0.50	0.42
VT	0.34	0.34	0.37	0.40	0.47	0.47	0.42	0.40	0.36	0.19	0.24	0.25
WV	0.24	0.24	0.27	0.30	0.37	0.37	0.32	0.30	0.26	0.09	0.14	0.15
WI	-0.14	-0.13	-0.17	-0.11	-0.12	-0.12	-0.12	-0.15	-0.11	-0.15	-0.18	-0.22
WY	0.11	0.03	0.04	0.04	0.09	0.12	0.18	0.16	0.23	0.12	0.07	-0.01