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Ohio State University Extension  
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## **Livestock Gross Margin Insurance for Dairy Farms** **What is it? Do I need it? What will it cost?**

A guide for Ohio dairy producers.

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Ohio Farm Bureau and The Ohio State University Extension  
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by

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## **Introduction**

By now you may have heard of a newly available insurance product available to dairy producers, termed ‘Livestock Gross Margin Insurance’, or LGM-Dairy. This article will explore this product and help you decide if this is a product you may be interested using in your profit and risk management tool-kit. Let us begin with a little background on this new product.

## **What is the background on the Livestock Gross Margin Insurance product?**

Before we get into the details on LGM-Dairy, what it is and how it works, it is fair to ask about the origin of this insurance product. First a little background on agricultural insurance products. Many of you are familiar with agricultural crop insurance and may in fact purchase this insurance. Agricultural crop insurance has been around for many decades. These insurance products originated with the authorization of the Federal Crop Insurance Corporation, FCIC. This corporation was initially authorized and setup by the 75th U.S. Congress on February 16, 1938. The FCIC was created under Title V of the Agricultural Act of 1938. It is the stated “purpose of this subtitle to promote the national welfare by improving the economic stability of agriculture through a sound system of crop insurance and providing the means for the research and experience helpful in devising and establishing such insurance.” Each new agricultural act or farm bill reauthorizes the FCIC and this is true of the current Food, Conservation, and Energy Act of 2008, Public Law 110-246.

The actual LGM-Dairy Insurance product was developed by Iowa Agricultural Insurance Innovations Consortium, L.L.C.(IAII). Section 508(h) of the FCIA provides for the submission of new insurance products to the FCIC, which, if found to be actuarially sound, can be offered for sale by certified agricultural crop insurance agencies. The product itself is owned by IAII. IAII has created other livestock insurance products, such as LGM-Swine and LGM-Cattle prior to LGM-Dairy.<sup>i</sup>

## **What is Livestock Gross Margin – Dairy Insurance?**

The LGM-Dairy product was submitted to the FCIC in July of 2006 and approved in 2007.<sup>ii</sup> Starting with August 2008, the product was made available to dairy farmers in 32 states including Ohio, Indiana, Michigan and Pennsylvania.<sup>iii</sup> The LGM-Dairy product is now available in all 48 states. A few of the initial provisions for the LGM-Dairy were modified, such as now providing for a premium subsidy, extending the sales period, making premium payment at the end of the contract period, and extending the amount of the deductible. These changes became effective with the December 2010 contract month.

Simply put, LGM-Dairy is an insurance product which, *in exchange for a premium paid by the buyer, provides a payment in the event that actual gross margin is less than anticipated gross margin at the end of the insurance contract period.* Gross margin is calculated as the difference between expected gross revenue and expected purchased feed cost. Figure 1 shows the primary components required to calculate the LGM-Dairy indemnity payment.

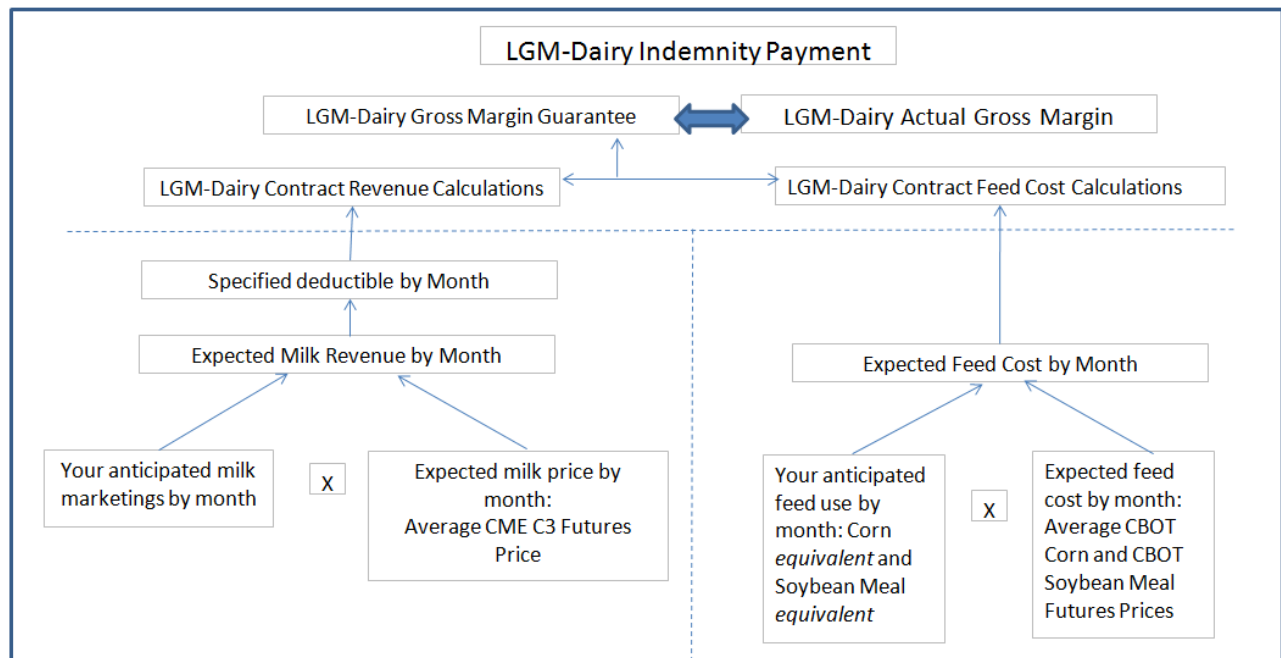


Figure 1. Primary components for calculating the LGM-Dairy insurance product indemnity.

Starting at the bottom left-hand side in Figure 1, for each month in the contract, the producer completes the following steps:

1. supplies information on anticipated or target milk marketing,
2. calculates an expected milk price using the Chicago Mercantile Exchange (CME) Class 3 futures contract,
3. decides on a deductible per cwt.,
4. arrives at anticipated or expected milk revenue.<sup>iv</sup>

Gross milk revenue is the sum of revenue each month.

On the bottom, right-hand side, Figure 1, for each month, the producer completes the following steps:

1. calculates anticipated or target feed usage,
2. calculates expected feed cost using CME and CBOT futures prices,
3. determines an anticipated feed cost.

Gross feed cost is the sum of monthly feed costs.

The difference between the calculated expected milk revenue and feed cost is the contract Gross Margin Guarantee GMG. As the contract months expire, an Actual Gross Margin AGM is calculated, the difference with GMG is calculated and an indemnity payment is made if this difference is positive.

Figure 1 depicts the flow of calculations for each month and for the contract. There are many details not depicted in Figure 1 which are best described by the use of a specific numerical example presented in the following section of this paper. Before starting with the specific numerical example, it is important to point out a couple of key elements in these calculations.

First, note that expected gross revenue is calculated using expected milk marketings and futures prices and not actual milk marketings and actual producer pay prices. Second, expected purchased feed costs are calculated using standardized corn and soybean feed factors and futures prices for corn and soybeans and not actual producer purchased feed prices.

### **Livestock Gross Margin Insurance: A specific example.**

An example will help clarify the calculations depicted in Figure 1. This example shows the calculations for a typical month, and these calculations are repeated for each contract month with new marketings and feed use and price data.<sup>v</sup> The data represent a typical Ohio dairy milking 450 head with an average of 65 pounds per cow per day. Thirty-one day production equals 9,068 cwt. The first insured month of the contract, purchased in January 2011 will be March 2011. Insured milk marketing is 50% of total production, 4,534 pounds. The deductible is chosen to be zero. Table 1 lists all of the data required to evaluate the March contract month.

Table 1: Livestock Gross Margin – Dairy Calculations for March 2011.				
	Variable Identifier	Excel Worksheet	Units	Contract Month
Milk Insured	MQ	TargetMarketings{1}	cwt.	4,534
CE Fed	CQ	FeedCostCalc{3}	Tons	173.9
SE Fed	SQ	FeedCostCalc{3}	Tons	22.4
Expected Milk Price	EMP	MilkPriceCalc{2}	\$ / cwt.	17.48
Expected Corn Price	ECP	FeedCostCalc{3}	\$ / bu	6.51
Expected Soybean Meal Price	ESP	FeedCostCalc{3}	\$ / ton	379
Expected Cost of Feed	ECF	FeedCostCalc{3}	\$ / equivalent ton	\$17,390
Expected Gross Margin	EGM	LGMarginCalcs{4}	dollars	\$61,859
Deductible	DL	LGMarginCalcs{4}	\$ / cwt.	\$0.00
Total Expected Gross Margin	EGM-T	LGMarginCalcs{4}	dollars	\$577,431
Gross Margin Guarantee	GMG-T	LGMarginCalcs{4}	dollars	\$577,431

Table 1 shows the input numbers required to calculate the Livestock Gross Margin. In this table, the calculations for only one month are shown. The Total Expected Gross Margin, EGM-T, and

Gross Margin Guarantee, GMG, listed are for the entire 10 month summation over the insurance contract. Now let's consider each entry in Table 1. In this section I will define each item. A complete discussion as to how each item is calculated by the rules of the insurance contract will be provided in a later section.

## **Livestock Gross Margin Terms and Definitions.**

**Milk insured (MQ)** is the number of hundredweights for expected milk marketings for the month. As the buyer for this contract you will need to provide this for each month of the contract. MQ may be specified between zero and your maximum target marketing for each month. Anticipated MQ is calculated on the OhioDairy 2011 Excel worksheet: *TargetMarketings{1}* and is automatically transferred to the *LGMarginCalcs{4}* worksheet.<sup>vi</sup> In this example the target marketing or MQ is 4,534 hundredweight.

### **How do I determine my feed equivalents for corn and soybean meal?**

You determine the corn and soybean meal equivalents of your feedstuffs using the LGM-Dairy Commodity Exchange Endorsement (CEE) table of feed conversion rates. Below is an example feed conversion based on the CEE conversion rate. For example if you fed 140 bushels of oats and 0.2 tons of meat meal, you would need to convert these to corn and soybean meal equivalents.

The conversion for the oats can be done in two steps:

Step 1. Converting feed to tons.

$$140 \text{ bushels of oats} \times (32 \text{ pounds}/1 \text{ bushel of oats}) \times (1 \text{ ton}/2000 \text{ pounds}) = 2.24 \text{ tons}$$

Step 2. Using the suggested conversion rates for corn and soybean meal equivalents.

$$2.24 \text{ tons of oats} \times 0.120 = 0.2688 \text{ tons of soybean meal equivalents}$$

$$2.24 \text{ tons of oats} \times 0.779 = 1.7450 \text{ tons of corn equivalents}$$

The conversion for the meat meal can be done in one step as the meat meal is already measured in tons:

Step 1. Using the suggested conversion rates for corn and soybean meal equivalents.

$$0.2 \text{ tons of meat meal} \times 1.227 = 0.2454 \text{ tons of soybean meal equivalents}$$

$$0.2 \text{ tons of meat meal} \times -0.349 = -0.0698 \text{ tons of corn equivalents}$$

So the corn and soybean meal equivalents for 140 bushels of oats and 0.2 tons of meat meal are 0.5142 tons of soybean meal ( $0.2688 + 0.2454$ ) and 1.6752 tons of corn equivalent ( $1.7450 - 0.0698$ ).

Feeds should be combined when creating corn and soybean meal equivalents. You should also note

that many of the protein meal feeds have negative corn equivalent values. Feed conversion software can be found on the website: [http://future.aae.wisc.edu/lgm\\_dairy.html#2](http://future.aae.wisc.edu/lgm_dairy.html#2)

**Corn equivalent fed (CQ)** is the tons of corn equivalent fed. You have the option of supplying the total number of tons of corn or corn equivalent that you expect to feed for each month in which you insure your milk. Feed equivalent quantities are bounded. The number of tons of corn or corn equivalent must be between 0.00364 and 0.0381 tons per hundredweight of milk. If you do not wish to provide corn equivalent tons fed, default values of 0.014 tons (0.5 bushels) of corn per hundredweight of milk can be used. CQ is calculated on the *FeedCostCalc{3}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet. In this example this is 173.9 tons.

**Soybean equivalent fed (SQ)** is the tons of soybean equivalent fed. You have the option of supplying the total number of tons of protein meal or protein meal equivalent that you expect to feed for each month in which you insure your milk. Protein feed quantities are bounded. The number of tons of protein meal or protein meal equivalent must be between 0.000805 and 0.013 tons per hundredweight of milk. If you do not wish to provide protein tons, default values of 0.002 tons (4 pounds) of soybean meal per hundredweight of milk can be used. SQ is calculated on the *FeedCostCalc{3}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet. In this example this is 22.4 tons.

**Expect Milk Price (EMP)** is the simple average of the daily settlement prices of the CME Group Class III milk futures contract for the month during the expected price measurement period. The expected price measurement period is the three days prior to and including the last Friday of the month that is a business day. Prices will be released by RMA after the markets close on the last day of the price discovery period. MEP is calculated on the *MilkPriceCalc{2}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet. The EMP for this example is \$17.48 per hundredweight.

**Expected Corn Price (ECP)** is calculated in two ways. For months in which a Chicago Mercantile Exchange (CME) Group corn contract expires, the expected corn price is the simple average of the settlement prices for the CME Group corn futures contract for the month during the expected price measurement period. For other months, the expected corn price is the weighted average of the immediately surrounding months' simple average of the daily settlement prices during the expected price measurement period. The expected price measurement period is the three days prior to and including the last Friday of the month that is a business day. (See the CEE for more information.) Prices will be released by RMA after the markets close on the last day of the price discovery period. The ECP is calculated on the *FeedCostCalc{3}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet. The ECP for this example is \$6.51 per bushel.

**Soybean Meal expect price (SEP)** is calculated in two ways. For months in which a CME Group soybean meal contract expires, the expected soybean meal price is the simple average of the daily settlement prices of the CME Group soybean meal futures contract for the month during the expected price measurement period. For other months, the expected soybean meal price is the weighted average of the immediately surrounding months' simple average of the daily settlement prices during the expected price measurement period. The expected price measurement period is

the three days prior to and including the last Friday of the month that is a business day. (See the CEE for additional information on the calculation of the expected soybean meal price.) Prices will be released by RMA after the markets close on the last day of the price discovery period. The ESP is calculated on the *FeedCostCalc{3}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet. The ESP for this example is \$379 per ton.

**Expected Cost of Feed (ECF)** for each month equals your target corn (or corn equivalent) to be fed times 2000/56 (to convert tons to bushels) times the expected corn price for that month, plus the target protein meal (or protein meal equivalent) to be fed times the expected soybean meal price for that month. Prices will be released by RMA after the markets close on the last day of the price discovery period. In this example the ECF for an operation that markets 4,534 cwt. of milk in a insured month with target feed levels of 61.89 tons of corn and 7.97 tons of soybean meal:

$$61.89 \text{ tons} \times (2,000/56) \times \text{Expected Corn Price} + 7.97 \times \text{Expected Soybean Meal Price}$$

In Table 1, the expected corn price is \$6.51 per bushel and the Expected Soybean Meal Price is \$376.27 per ton, then the expected feed costs would be \$17,390.83 [61.89 x (2,000/56) x \$6.51 + 7.97 x \$376.27 = \$17,390.83]. The ECF is calculated on the *FeedCostCalc{3}* worksheet and is automatically transferred to the *LGMarginCalcs{4}* worksheet.

**Expected Gross Margin (EGM)** for each insured month is the approved target marketings (MQ) times the expected milk price for that month less the expected feed costs for that month. In Table 1 the MQ is 4,534 cwt. of milk for the month, the expected milk price is \$17.48 per hundredweight, and the expected feed cost is \$17,390.83, then the EGM is equal to \$61,859.12 [(4,534 x \$17.48) – \$17,390.83 = \$61,859.83]. EGM is the difference between the expected total milk sales revenue and the sum of all expected feed expenses. EGM does not include any deductible you may specify.

**Expected Gross Margin Total (EGM-T)** is the summation of EGM for each contract month. For this example, the contract months are the maximum 10 months. The EGM T for the entire contract example is \$577,431.63

**Gross Margin Guarantee Total (GMG-T)** is EGM-T less any deductible amount. The deductible can be specified in increments of \$0.10 cwt., to a maximum of \$2.00 cwt. In this example the deductible is set to 0.0 which means the buyer wishes to insure 100% of EGM-T. Note, the deductible is applied to the entire contract, and not specified on a month-by-month basis. Also note that the subsidy applied to the insurance premium increases as the deductible rises. This will be addressed in the section on premium and premium subsidy.

Now that you have determined the GMG-T for this example 10 month contract is \$577,431.63 you need to determine what the premium will be for the contract. In the Excel workbook these calculations are simulated and completed on worksheets *IDEM-Calc{5}* and *LGPremCalc{6}*.<sup>vii</sup> Note that simulated and actual premiums must be calculated using the RMA Premium Calculator tool, located at the RMA website or at the University of Wisconsin *Understanding Dairy Markets* website.

<b>Table 2. Calculation of the Indemnity, Premium and Net Indemnity</b>			
Actual Corn Price	ACP	FeedCostCalc{3}	\$6.51
Actual Soybean Meal Price	ASP	FeedCostCalc{3}	\$376.27
Actual Cost of Feed	ACF	FeedCostCalc{3}	\$17,390.83
Actual Milk Price	AMP	MilkPriceCalc{2}	\$13.85
Actual Gross Margin	AGM-T	IDEM-Calc{5}	\$553,558.88
Gross Margin Guarantee	GMG-T	LGMarginCalcs{4}	\$577,431.63
Indemnity	INDEM	IDEM-Calc{5}	\$ 23,872.75
Premium	PREM	LGMPremCalcs{6}	\$36,130.00
Net Indemnity	NET-IDEM	IDEM-Calc{5}	<\$12,257.25>
Net Indemnity / cwt			<\$0.28>

**Actual Gross Margin AGM-T** is the ex-post margin calculated for each month. The actual gross margin per month is the actual marketings (MQ) times the actual milk price for that month less the actual feed costs for that month. In this example it is assumed that actual feed prices are equal to expected feed prices, but the actual milk price is lower than the expected milk price at the end of the contract month. In this case, the AGM is less than the EGM. Assuming that this holds for each of the 10 months in the contract, the AGM will be less than the EGM-T and the GMG-T. For this numerical example, the expected gross margin turns out to be higher than the actual gross margin. In this case, the indemnity, defined as the maximum of either the difference (AGM-T – GMG-T) or 0, is positive \$23,872.75.

**Actual corn price ACP** for months in which a CME Group corn contract expires, the actual corn price is the simple average of the daily settlement prices for the CME Group corn futures contract for the month during the actual price measurement period. For other months, the actual corn price is the weighted average of the immediately surrounding months' simple average of the daily settlement prices during the actual price measurement period. The actual price measurement period is the last three trading days prior to contract expiration. (See the CEE for more information.) In this example for one month, the actual corn price is equal to the expected corn price.

**Actual soybean meal price ASP** for months in which a CME Group soybean meal contract expires, the actual soybean meal price is the simple average of the daily settlement prices for the CME Group soybean meal contract for the month during the actual price measurement period. For other months, the actual soybean meal price is the weighted average of actual soybean meal prices in the immediately surrounding months. The actual price measurement period is the last three trading days prior to contract expiration. (See the CEE for more information.) In this example for one one month, the actual soybean meal price is equal to the expected soybean meal price.

**Actual cost of feed ACF** for each month equals the target corn to be fed times 2,000/56 (to convert tons to bushels) times the actual corn price for that month, plus the target soybean meal to be fed times the actual soybean meal price for that month. Calculation of the actual cost of feed uses the



same target corn and soybean meal to be fed as the expected cost of feed. Changes in feed rations from these target amounts are not covered under the LGM for Dairy Cattle policy. The actual cost of feed for an for this example is \$17,390.83 and equals the expected cost of feed shown in Table 1.

**Actual milk price AMP** is the simple average of the daily settlement prices of the CME Group Class III milk futures contract for the month during the actual price measurement period. The actual price measurement period is the last three trading days prior to the last trading day for the futures contract. (See the CEE for more information.) Note that the AMP is not the price that you receive in you milk check each month. In most cases your milk check price will be higher than this actual milk price used in the insurance product.

**Indemnity IDEM** is the maximum of the difference between the gross margin guarantee GMG-T and the actual gross margin guarantee AGM-T. As GMG-T and AGM-T are calculated over the entire insurance contract period, the indemnity is not for a single month (unless the contract is for only one month). In this example the indemnity for the entire contract is \$23,872.75. At the end of the contract period the payout as a result of low milk prices will be this amount. The indemnity per hundredweight of target marketings (milk insured) is \$0.54.

**Premium PREM** is the premium you will pay to purchase this insurance contract. The amount of the premium will depend on your target marketings, expected gross margin and the amount of subsidy (if any) for each contract period. Premium calculates for LGM-Dairy insurance product are designed to be actuarially fair. Premiums just equal indemnity for all contracts. The premium in this example is calculated as \$36,130. For this example this is \$0.81 per cwt of gross margin on milk sales insured. The actual premium for this contract can be simulated using the Internet web-based software at the University of Wisconsin *Understanding Dairy Markets*. Note that in this example, the indemnity per hundredweight of milk insured is 54 cents, while the cost is 81 cents. The insurance, while returning a positive payout has a net cost of 27 cents per hundredweight. {It is important to keep in mind, that if this were your dairy and you did not have LGM-Dairy insurance you would have suffered the entire loss without the indemnity.}

**Premium Subsidy PREM-S** is the amount that the actuarially fair premium is reduced as an incentive to encourage dairy farmers to purchase and use livestock gross margin insurance. The subsidy is only available if you contract for at minimum two months in and insurance period. The subsidy increases as the level of the deductible increases. At zero deductible, the subsidy is 18 percent of the premium and at \$1.10 deductible reaches 50 percent of the premium. Note that the overall premium declines as the deductible increases to the maximum of \$2.00 per hundredweight.

After reading this guidebook you will have a much better understanding of the LGM-Dairy insurance product. There will be many more questions to be address and these are best addressed by using the web software available at the University of Wisconsin website *Understanding Dairy Markets* and my contacting your local certified crop insurance agent. In the companion piece to this article I will address the question: Do I Need Livestock Margin Insurance?



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<sup>i</sup> A complete set of documents covering all aspects of the LGM-Dairy can be accessed at the USDA RMA website <http://www.rma.usda.gov/livestock/>.

<sup>ii</sup> A complete description of the Gross Margin Livestock Dairy application process can be found in the Livestock Gross Margin for Dairy Cattle Handbook, Handbook Number 20080. This handbook can be accessed at the USDA Risk Management Agency website <http://www.rma.usda.gov/livestock/>.

<sup>iii</sup> Any producer who owns dairy cattle in the contiguous 48 states is eligible for Livestock Gross Margin for Dairy Cattle Insurance Policy coverage.

<sup>iv</sup> The required LGM-Dairy forms to be completed and submitted can be found at the USDA-RMA website <http://www.rma.usda.gov/livestock/>.

<sup>v</sup> . The following calculations are from the companion Microsoft Excel Workbook: LGM\_Calc\_Ver2\_OSUE.xlsx (Excel 2007) or LGM\_Calc\_Ver2\_OSUE.xls (Excel 2003) which is available by request from Cameron Thraen [thraen.1@osu.edu](mailto:thraen.1@osu.edu) or the file can be retrieved from the OhioDairy 2011 Website at Livestock Gross Margin Tab <http://aeede.osu.edu/programs/ohiodairy>. Look for the Livestock Gross Margin tab at the bottom of the main page.

<sup>vi</sup> At the time of contract purchase, the buyer is expected to supply expected whole-herd milk marketing rates over the life of the contract. These milk marketing 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.

<sup>vii</sup> Actual premiums must be calculated using the USDA RMA premium calculator at the time the producer applies for a LGM-Dairy contract. The calculations described in this paper are examples using fixed data for teaching purposes only. You can access the USDA-RMA Premium Calculation webpage at: <http://www3.rma.usda.gov/apps/premcalc/>. Use of the premium calculator requires that the user setup an account with USDA-RMA and secure a user ID and password. The USDA-RMA premium calculator can be used to anticipate a contact premium based on expected market prices. You can also simulate the entire process by using the University of Wisconsin software at the Understanding Dairy Markets website. [http://future.aae.wisc.edu/lgm\\_dairy.html](http://future.aae.wisc.edu/lgm_dairy.html)

## **Ohio Crop Insurance Agents certified to sell Livestock Gross Margin Insurance**

(certified agents located outside Ohio can be found at the Understanding Dairy Markets University of Wisconsin website).

### **Dale Hamilton**

Hamilton Insurancy Agency Inc  
1277 Dyewood Rd. SW  
Carrollton, OH 44615  
1-888-865-7915  
[dahamil@hughes.net](mailto:dahamil@hughes.net)  
For sales in states: OH ,PA  
Our agency strictly specializes in crop insurance and livestock insurance in NE Ohio and Western PA.

### **Michelle Harsh**

Michelle Harsh Insurance  
507 5 State Route 203  
Radnor, Ohio 43066  
1-740-225-1212  
[mharshins@frontier.com](mailto:mharshins@frontier.com)