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Understanding Risk Management Using Livestock Gross Margin Insurance

Home Study Course

Chapter 2

How Does Livestock Gross Margin Insurance Work?

Nebraska EXTENSION — Agricultural Economics

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Chapter 2 Objectives

- **LGM terminology**
- **Calculating Expected and Actual Gross Margins, Gross Margin Guarantees, indemnity payments**
- **Determining premiums**
- **Collecting an indemnity**

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LGM Terminology

- **Target Marketings:**
  - ✓**Number of slaughter-ready livestock insured with LGM and expected to be marketed during the insurance period**

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LGM Terminology

- **Adjusted Futures Price:**
  - ✓**LGM futures price plus state- and month-specific basis**
    - **Basis = NASS 10-year average (cattle & corn) and 5-year average (swine) cash price for the state**
    - **No basis adjustment for soybean meal (LGM for Swine)**
- **LGM Basis:**
  - ✓**Historical difference between adjusted futures price and local cash selling price**

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LGM Terminology

- **Expected Gross Margin (EGM):**
  - ✓Difference between expected fed cattle or market hog selling price and expected input prices
  - ✓Based on LGM adjusted futures prices
- **Deductible:**
  - ✓The portion of an insured value that producers elect not to insure
    - Cattle: $0 to $150 per head in $10 per head increments
    - Swine: $0 to $20 per head in $2 per head increments

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LGM Terminology

- **Gross Margin Guarantee (GMG):**
  - ✓Total EGM minus the deductible
- **Actual Gross Margin (AGM):**
  - ✓Difference between the actual fed cattle or market hog selling prices and the actual input prices
  - ✓Based on LGM adjusted futures price
- **Indemnity:**
  - ✓Amount paid by insurance policy if GMG is higher than the total AGM

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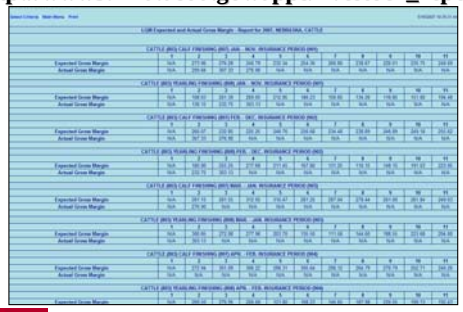
USDA's Expected and Actual Gross Margin Web Page

http://www3.rma.usda.gov/apps/livestock_reports



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Expected Gross Margin (EMG)

Yearling Finishing Operation

- EGM_t = (12.50 cwt × Live Cattle Price$_t$)
  - (7.50 cwt × Feeder Cattle Price$_{t-5}$)
  - (57.5 bu × Corn Price$_{t-2}$)

Calf Finishing Operation

- EGM_t = (11.50 cwt × Live Cattle Price$_t$)
  - (5.50 cwt × Feeder Cattle Price$_{t-8}$)
  - (54.5 bu × Corn Price$_{t-4}$)

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Expected Gross Margin (EGM)

Farrow to Finish Operation

- EGM_t = (0.74 × 2.50 cwt × Lean Hog $Price_t$)
  - (13.86 bu × Corn $Price_{t-3}$)
  - (196.16/2000 × Soybean Meal $Price_{t-3}$)

Feeder Pig Finishing Operation

- EGM_t = (0.74 × 2.50 cwt × Lean Hog $Price_t$)
  - (9.6 bu × Corn $Price_{t-2}$)
  - (132/2000 × Soybean Meal $Price_{t-2}$)

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Expected Gross Margin (EGM)

SEW Operation

- EGM_t = (0.74 × 2.50 cwt × Lean Hog $Price_t$)
  - (9.7 bu × Corn $Price_{t-2}$)
  - (142/2000 × Soybean Meal $Price_{t-2}$)
- Actual Gross Margin (AGM) is calculate using the same equations
  - ✓Prices are determined at different times

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LGM Example

- January 31, 2006 sales closing date
- Yearling finishing operation in Nebraska
- August 2006 target marketing month
- Determine the indemnity that would be due to producers for that month
  - ✓Total indemnity determined based GMG and AGM for entire insurance period

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Table 1. Cycles within the insurance periods for LGM for Cattle Insurance

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
			Yearling Finishing			
Sales Closing Date	Insurance Period	Insurance Month	Live Cattle Price	Feeder Cattle Price	Corn Price	Live Cattle Price
January 31	February-December	March	March	**October**	January	March
		April	**April**	**November**	February	**April**
		May	May	December	**March**	May
		June	**June**	**January**	April	**June**
		July	July	February	**May**	July
		August	**August**	**March**	June	**August**
		September	September	**April**	**July**	September
		October	**October**	**May**	August	**October**
		November	November	June	**September**	November
		December	**December**	July	October	**December**
February 28	March-January	April	**April**	**November**	February	**April**
		May	May	December	**March**	May
		June	**June**	**January**	April	**June**
		July	July	February	**May**	July
		August	**August**	**March**	June	**August**
		September	September	**April**	**July**	September
		October	**October**	**May**	August	**October**
		November	November	June	**September**	November
		December	**December**	July	October	**December**
		January	January	**August**	November	January

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Expected Live Cattle Price

- Expected August Live Cattle Price as of Jan
  - August 2006 CME LC Futures Price:
    - 1-27-06 $84.475
    - 1-30-06 $84.10
    - 1-31-06 $84.375
    - 3-day Ave $84.32
  - Nebraska August LC Basis (LGM) = ??

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Table 2. Fed Cattle Basis ($/cwt)

State	January	February	March	April	May	June	July	August	September	October	November	December
Colorado	2.49	0.25	2.42	2.77	4.24	4.99	4.47	4.91	3.46	3.16	4.89	4.47
Illinois	-1.48	-2.54	-0.48	0.36	1.12	1.21	-1.40	-1.43	-2.99	-3.53	-1.42	-1.25
Indiana	-2.36	-3.42	-1.36	-0.52	0.24	0.33	-2.28	-2.31	-3.87	-4.41	-2.30	-2.13
Iowa	0.24	-1.23	-0.78	0.08	0.21	0.69	-1.50	-0.49	-2.68	-3.30	-0.30	-0.01
Kansas	0.12	-0.90	0.89	1.07	1.26	1.28	0.02	0.24	-0.81	-0.77	0.80	0.20
Michigan	-9.52	-9.34	-8.05	-7.85	-6.59	-4.73	-6.29	-6.48	-9.15	-11.91	-11.01	-10.15
Minnesota	-4.70	-5.47	-3.63	-2.40	-1.61	-1.15	-2.63	-3.15	-4.84	-5.82	-4.35	-3.69
Missouri	5.17	4.93	6.35	7.78	9.64	11.52	11.98	11.43	8.03	4.55	4.62	5.62
Montana	8.41	6.49	6.66	6.91	7.88	9.66	9.41	9.19	7.44	9.74	10.20	10.44
Nebraska	-0.19	-1.36	1.16	1.72	1.90	2.28	0.62	1.20	-0.73	-0.59	1.38	2.30
Nevada	5.43	4.60	5.99	5.87	6.79	8.16	6.86	6.82	4.87	3.83	5.57	6.58
North Dakota	5.65	3.22	3.57	3.84	4.54	3.98	2.67	6.91	6.43	6.59	6.93	7.93
Ohio	-4.36	-4.93	-3.28	-1.85	-0.40	0.09	-1.67	-1.72	-3.82	-5.74	-4.52	-4.74
Oklahoma	5.98	4.24	4.23	4.10	5.41	9.88	11.46	11.48	8.77	6.50	7.73	9.50
South Dakota	7.00	4.28	4.00	3.90	4.11	5.49	3.11	4.80	4.88	8.59	8.60	7.52
Texas	0.56	-0.16	1.41	1.76	2.18	2.77	1.71	1.64	-0.29	-1.98	0.19	1.14
Utah	-0.43	-0.80	1.04	1.59	2.06	3.17	2.50	2.86	1.45	0.10	0.83	0.82
West Virginia	-5.25	-5.54	-4.65	-2.33	0.16	1.86	2.16	1.43	-1.96	-5.53	-6.12	-5.47
Wisconsin	-5.68	-6.39	-4.47	-3.61	-2.61	-1.15	-3.08	-3.24	-5.02	-7.01	-4.84	-5.02
Wyoming	7.59	5.27	5.62	5.67	7.59	11.85	12.84	12.21	10.65	10.71	11.37	11.60

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Expected Live Cattle Price

- Expected August Live Cattle Price as of Jan
  - August 2007 CME LC Futures Price:
    - 1-27-06 $84.475
    - 1-30-06 $84.10
    - 1-31-06 $84.375
    - 3-day Ave $84.32
  - Nebraska August LC Basis (LGM) = $1.20
- Expected August LC Price = $84.32 + $1.20
- Expected August LC Price = $85.52/cwt

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Expected Feeder Cattle Price

- Expected March Feeder Cattle Price as of Jan
  - March 2006 CME FC Futures Price:
    - 1-27-06 $110.625
    - 1-30-06 $109.75
    - 1-31-06 $109.825
    - 3-day Ave $110.07
  - Nebraska March FC Basis (LGM) = ??

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Table 3. Yearling Basis ($/cwt)

State	January	February	March	April	May	June	July	August	September	October	November	December
Colorado	1.64	2.11	5.06	4.58	2.89	0.71	-0.99	-2.12	-2.48	-1.92	-0.19	1.02
Illinois	1.74	3.62	6.67	6.95	5.05	2.02	-1.36	-2.65	-2.78	-2.16	-0.71	-0.76
Indiana	-6.71	-4.83	-1.78	-1.50	-3.40	-6.43	-9.81	-11.10	-11.23	-10.61	-9.16	-9.21
Iowa	-2.01	-1.21	0.40	0.76	-1.76	-3.65	-7.65	-8.01	-7.75	-7.87	-5.60	-4.68
Kansas	0.49	2.15	4.45	3.89	1.42	-0.84	-2.33	-4.36	-4.60	-3.29	-1.48	-1.32
Michigan	-12.03	-8.11	-6.30	-5.79	-6.91	-8.08	-11.63	-13.37	-14.20	-15.57	-14.99	-14.18
Minnesota	-6.90	-5.36	-2.46	-1.31	-3.55	-5.99	-9.97	-11.22	-11.14	-11.28	-11.04	-9.15
Missouri	1.80	4.07	6.38	6.89	5.36	4.09	3.28	0.99	-0.71	-2.52	-1.78	-0.01
Montana	5.39	6.01	7.02	6.07	4.10	2.53	0.92	0.60	0.06	2.48	3.17	4.42
Nebraska	0.70	1.51	4.63	4.35	1.73	-0.24	-3.10	-3.59	-4.51	-3.13	-1.50	1.14
Nevada	3.82	5.20	7.40	6.21	3.63	1.71	-0.54	-2.06	-2.18	-1.45	0.98	2.84
North Dakota	1.98	1.92	3.49	2.84	0.33	-1.68	-3.50	-2.32	-2.05	-0.68	0.08	1.41
Ohio	-7.87	-5.61	-3.02	-2.82	-4.51	-6.58	-10.47	-11.31	-12.35	-13.36	-11.70	-11.64
Oklahoma	2.80	4.30	5.61	4.79	2.41	3.03	2.65	1.02	-0.19	-0.50	1.61	3.75
South Dakota	5.08	4.41	5.42	4.73	2.29	2.17	-1.53	-1.26	-0.30	3.17	3.64	3.54
Texas	-0.50	2.00	4.51	3.97	1.06	-1.10	-3.04	-4.27	-4.76	-5.37	-3.28	-1.90
Utah	-1.48	0.86	3.81	3.05	-0.47	-2.12	-3.40	-3.95	-3.82	-4.45	-3.33	-3.09
West Virginia	-10.66	-8.15	-5.70	-4.33	-5.40	-7.22	-8.98	-10.85	-12.15	-13.72	-13.90	-13.32
Wisconsin	3.37	5.46	8.00	8.18	6.88	4.48	-3.30	-3.57	-3.34	-3.83	-2.38	-2.34
Wyoming	5.65	6.64	7.33	6.27	4.96	5.74	5.69	4.03	4.28	4.97	5.54	6.98

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Expected Feeder Cattle Price

- Expected March Feeder Cattle Price as of Jan
  - March 2006 CME FC Futures Price:
    - 1-27-06 $110.625
    - 1-30-06 $109.75
    - 1-31-06 $109.825
    - 3-day Ave $110.07
  - Nebraska March FC Basis (LGM) = $4.63
- Expected March FC Price = $110.07 + $4.63
- Expected March FC Price = $114.70/cwt

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Expected Corn Price

- Expected June Corn Price as of Jan
  - May 2006 CBOT Corn Futures Price:
    - 1-27-06 $2.285
    - 1-30-06 $2.2775
    - 1-31-06 $2.29
    - 3-day Ave $2.28

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Expected Corn Price

- Expected June Corn Price as of Jan
  - July 2006 CBOT Corn Futures Price:
    - 1-27-06 $2.375
    - 1-30-06 $2.365
    - 1-31-06 $2.38
    - 3-day Ave $2.37

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Expected Corn Price

- **Expected June Corn Price (a weighted average)**
  - = (1/2 × Expected May Corn Futures Price)
  - + (1/2 × Expected July Corn Futures Price)
  - = (1/2 × $2.28/bu) + (1/2 × $2.37/bu)
  - = $2.33/bu
- **Nebraska June Corn Basis (LGM) = ??**

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Table 5. Corn Basis ($/bushel)

State	January	February	March	April	May	June	July	August	September	October	November	December
Colorado	-0.08	-0.10	-0.12	-0.13	-0.12	0.01	0.14	0.05	0.09	-0.05	-0.05	-0.03
Illinois	-0.10	-0.10	-0.10	-0.12	-0.14	-0.11	-0.10	-0.08	-0.13	-0.16	-0.13	-0.01
Indiana	-0.06	-0.08	-0.07	-0.06	-0.10	-0.08	-0.07	-0.03	-0.13	-0.22	-0.16	-0.02
Iowa	-0.25	-0.25	-0.26	-0.28	-0.31	-0.28	-0.26	-0.23	-0.21	-0.28	-0.25	-0.18
Kansas	-0.10	-0.10	-0.10	-0.12	-0.14	-0.08	-0.02	-0.06	-0.07	-0.06	-0.04	-0.04
Michigan	-0.18	-0.21	-0.18	-0.19	-0.20	-0.15	-0.10	-0.09	-0.06	-0.23	-0.25	-0.19
Minnesota	-0.35	-0.37	-0.38	-0.37	-0.42	-0.36	-0.34	-0.34	-0.33	-0.38	-0.35	-0.30
Missouri	-0.09	-0.09	-0.08	-0.10	-0.12	-0.04	-0.06	-0.08	-0.18	-0.24	-0.16	-0.09
Montana	-0.25	-0.24	-0.22	-0.22	-0.32	-0.14	-0.12	-0.11	-0.10	-0.19	-0.21	-0.18
Nebraska	-0.19	-0.21	-0.22	-0.23	-0.25	-0.18	-0.16	-0.15	-0.18	-0.20	-0.19	-0.16
Nevada	-0.08	-0.10	-0.12	-0.13	-0.12	0.01	0.14	0.05	0.09	-0.05	-0.05	-0.03
North Dakota	-0.41	-0.40	-0.38	-0.38	-0.48	-0.30	-0.28	-0.28	-0.26	-0.36	-0.37	-0.34
Ohio	-0.08	-0.08	-0.09	-0.10	-0.11	-0.04	-0.02	0.01	-0.08	-0.22	-0.17	-0.06
Oklahoma	0.06	0.06	0.06	0.04	0.02	0.08	0.14	0.09	0.09	0.10	0.12	0.12
South Dakota	-0.40	-0.39	-0.39	-0.37	-0.42	-0.30	-0.33	-0.32	-0.37	-0.46	-0.46	-0.36
Texas	0.12	0.11	0.17	-0.17	0.03	0.17	0.02	0.03	0.14	0.18	0.15	0.17
Utah	0.51	0.50	0.48	0.47	0.48	0.60	0.74	0.64	0.69	0.55	0.55	0.57
West Virginia	0.30	0.28	0.26	0.26	0.32	0.36	0.42	0.43	0.33	0.12	0.14	0.26
Wisconsin	-0.26	-0.26	-0.26	-0.25	-0.31	-0.19	-0.19	-0.18	-0.14	-0.24	-0.24	-0.19
Wyoming	0.04	0.02	0.00	-0.01	0.00	0.13	0.26	0.17	0.21	0.08	0.08	0.09

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Expected Corn Price

- **Expected June corn price (a weighted average)**
  - = (1/2 × Expected May Corn Futures Price)
  - + (1/2 × Expected July Corn Futures Price)
  - = (1/2 × $2.28/bu) + (1/2 × $2.37/bu)
  - = $2.33/bu
- **Nebraska June Corn Basis (LGM) = -$0.18**
- **Expected June Corn Price = $2.33 + (-$0.18)**
- **Expected June Corn Price = $2.15/bu**

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Expected Gross Margin (EGM)

- **Yearling Finishing Operation**
  - EGM_{Aug} = (12.50 cwt × Exp Live Cattle $Price_{Aug}$)
    - (7.50 cwt × Exp Feeder Cattle $Price_{Mar}$)
    - (57.5 bu × Exp Corn $Price_{Jun}$)
  - EGM_{Aug} = (12.50 cwt × $85.52/cwt)
    - (7.50 cwt × $114.70/cwt)
    - (57.5 bu × $2.15/bu)
  - EGM_{Aug} = $1,069.00 - $860.25 - $123.625
  - EGM_{Aug} = $85.13/hd

Gross Margin Guarantee (GMG) for August

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- GMG = EGM – Deductible
- Deductible
  - $0 to $150 per head at the insured's option
  - Must be the same for each month in insurance period
  - Let's use a $0/head deductible
- GMG = $85.13 – $0
- GMG = $85.13/hd

Gross Margin Guarantee (GMG)

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- If you have 500 head of target marketings in August and 0 head of target marketings for the rest of the insurance period:
  - ✓GMG = $42,565 ($0 deductible)

Gross Margin Guarantee (GMG) and Actual Gross Margin (AGM)

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- If total AGM falls below $42,565, an indemnity makes up the difference
  - ✓AGM is based on LGM's actual prices (not the actual prices producer receives or pays)

Actual Gross Margin (AGM)

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- Yearling Finishing Operation
  - AGM_{Aug} = (12.50 cwt × Act Live Cattle $Price_{Aug}$)
    - (7.50 cwt × Act Feeder Cattle $Price_{Mar}$)
    - (57.5 bu × Act Corn $Price_{Jun}$)

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Actual Live Cattle Price

- Actual August Live Cattle Price
  - August 2006 CME LC Futures Price:
    - 8-28-06 $89.3225
    - 8-29-06 $89.40
    - 8-30-06 $89.8775
    - 3-day Ave $89.53

Expected LC Futures = $84.32

Same

  - Nebraska August LC Basis (LGM) = $1.20
- Actual August LC Price = $89.53 + $1.20
- Actual August LC Price = $90.73/cwt

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Actual Feeder Cattle Price

- Actual March Feeder Cattle Price
  - March 2006 CME FC Futures Price:
    - 3-27-06 $103.425
    - 3-28-06 $103.725
    - 3-29-06 $103.50
    - 3-day Ave $103.55

Expected FC Futures = $110.70

Same

  - Nebraska March FC Basis (LGM) = $4.63
- Actual March FC Price = $103.55 + $4.63
- Actual March FC Price = $108.18/cwt

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Actual Corn Price

- Actual June Corn Price
  - May 2006 CBOT Corn Futures Price:
    - 5-9-06 $2.285
    - 5-10-06 $2.30
    - 5-11-06 $2.3775
    - 3-day Ave $2.32

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Actual Corn Price

- Actual June Corn Price
  - July 2006 CBOT Corn Futures Price:
    - 7-11-06 $2.5375
    - 7-12-06 $2.5925
    - 7-13-06 $2.525
    - 3-day Ave $2.55

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Actual Corn Price

- Actual June Corn Price (a weighted average)
  - = (1/2 × Actual May Corn Futures Price)
    + (1/2 × Actual July Corn Futures Price)
  - = (1/2 × $2.32/bu) + (1/2 × $2.55/bu)
  - = $2.44/bu

Expected Corn Futures = $2.15

Same

- Nebraska June Corn Basis (LGM) = -$0.18
- Actual June Corn Price = $2.44 + (-$0.18)
- Actual June Corn Price = $2.26/bu

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Actual Gross Margin (AGM)

- Yearling Finishing Operation
  - AGM_{Aug} = (12.50 cwt × Act Live Cattle $Price_{Aug}$)
    - (7.50 cwt × Act Feeder Cattle $Price_{Mar}$)
    - (57.5 bu × Act Corn $Price_{Jun}$)
  - AGM_{Aug} = (12.50 cwt × $90.73/cwt)
    - (7.50 cwt × $108.18/cwt)
    - (57.5 bu × $2.26/bu)
  - AGM_{Aug} = $1,134.125 - $811.35 - $129.95
  - AGM_{Aug} = $192.83/hd

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Indemnity In August…

- Indemnity = GMG_{Aug} – AGM_{Aug} (if positive)
- Indemnity = $85.13 - $192.83 < 0
- Indemnity = $0 per head

Important Note…

- Indemnity is actually figured for whole 11-month (cattle) or 6-month (swine) insurance period
  - Indemnity = GMG – total AGM
  - This averages margins out over entire year

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Indemnity?

- Again, this example assumes 500 head of target marketings in August and 0 head of target marketings for the rest of the insurance period

- GMG = $42,565.00
- AGM = $96,415.00
- Indemnity = $0 (total, <u>not</u> per head)

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LGM Premium

- Determined by simulation of losses
- Premiums decrease as deductible increases
- Calculated using RMA's online calculator
  - ✓http://www3.rma.usda.gov/apps/premcalc/
  - ✓Need a user ID and password

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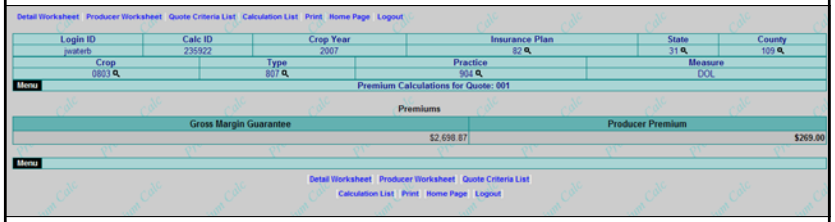
USDA's GMG and Premium Pricing Web Page



Premium is due when application is due

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Collecting an Indemnity

- Indemnity paid if GMG > AGM
- Indemnity paid at the end of insurance period
- Losses in one month may be offset by gains in another month
- Insurance company issues "notice of probable loss" 10 days after AGM is determined
- Producer submits "marketings report" and "sales receipt" within 15 days after receiving notice of probable loss

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Summary

- Expected and Actual Gross Margins are determined by an adjusted futures price
- Gross Margin Guarantee = EGM - Deductible
- An indemnity will be paid if the GMG is greater than the total AGM
- Premiums can be found at RMA's website

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What's Next?

- **Chapter 3: Additional LGM Policy Provisions**
  - ✓**Perils covered by LGM**
  - ✓**Ownership and record keeping for covered livestock**
  - ✓**Guaranteed pricing**
  - ✓**Transferring coverage and assigning an indemnity**

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