Managing the Newly Created LGM-Dairy Insurance under Seasonal Climate Variability

Evidences from the State of Wisconsin

Victor E. Cabrera & Daniel Solis

LGM-Dairy: What is it?

- Livestock Gross Margin for Dairy Insurance
  - US Federal Crop Insurance Program offered by the Federal Crop Insurance Corporation (FCIC). USDA-RMA
  - Approved July 2007, available July 2008
- Protects Dairy Business Margin
  - Milk Revenue – Feed Costs
- Revenue neutral
  - No subsidies

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LGM-Dairy: Who is eligible?

- Milk producers of 32 states (FCIC and RMA)
  - Arizona, Colorado, Connecticut, Delaware, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Texas, Utah, Vermont, West Virginia, Wisconsin, and Wyoming

http://www.rma.usda.gov/news/2008/05/lgmdairy.html

http://future.aae.wisc.edu/lgm_dairy.html#1

LGM-Dairy: What it covers?

Prices of:

- Any milk volume (up to 240,000 cwt/yr)of producer's target marketings for a 11-month period
- Any amount of corn and soybean meal to be fed during insurance period, restricted to:
  - 0.13 – 1.04 bu corn/cwt milk
  - 0.037 – 0.29 bu SBM/cwt milk

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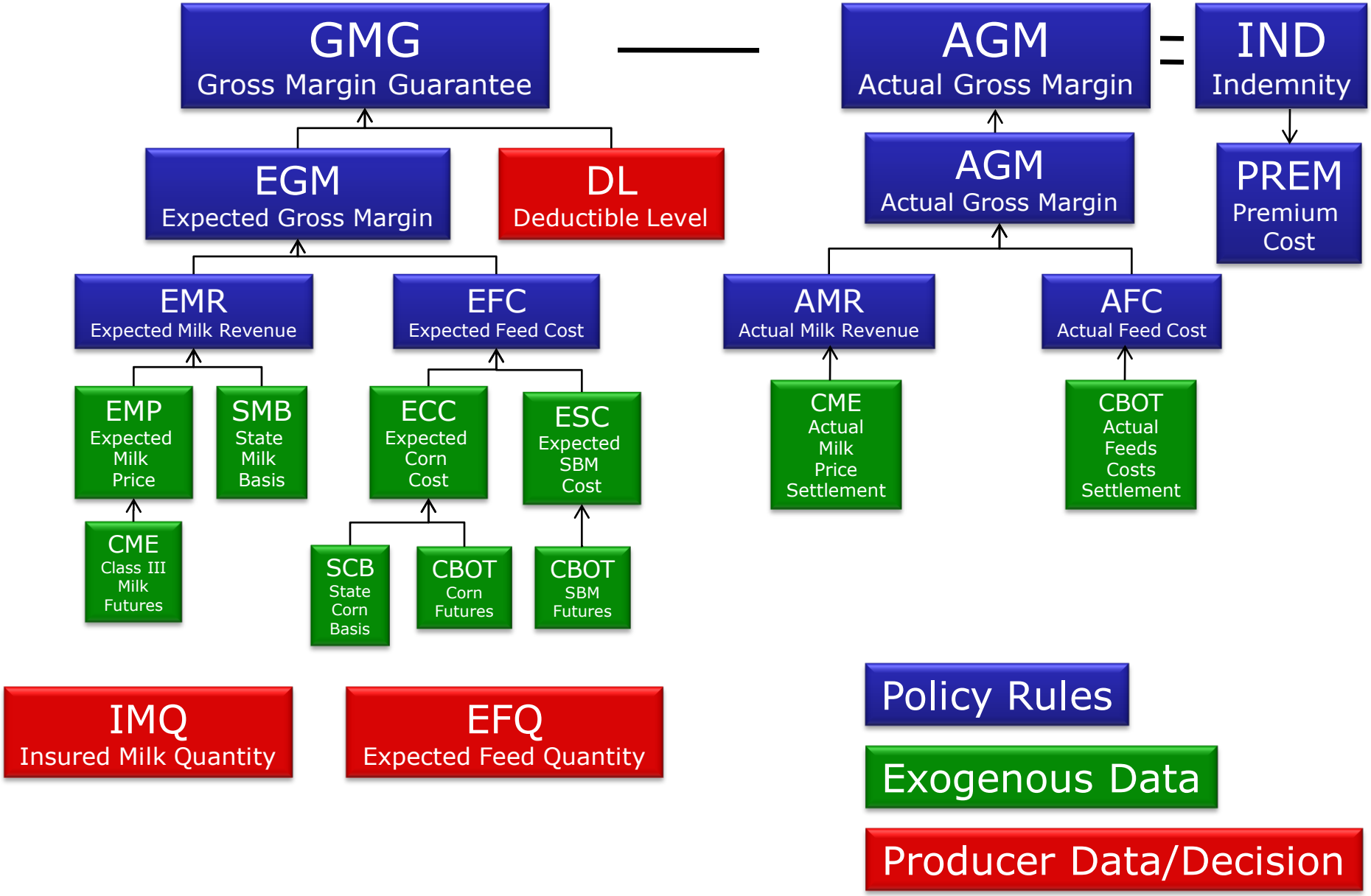
LGM-Dairy: What farmer needs to provide?

- Milk target marketing per month of insured period
- Feed expected to be used every month of insured period (RMA Equivalent Tables):
  - Corn and corn equivalents
  - Soybean meal and soybean meal equivalents

LGM-Dairy: What farmer needs to decide?

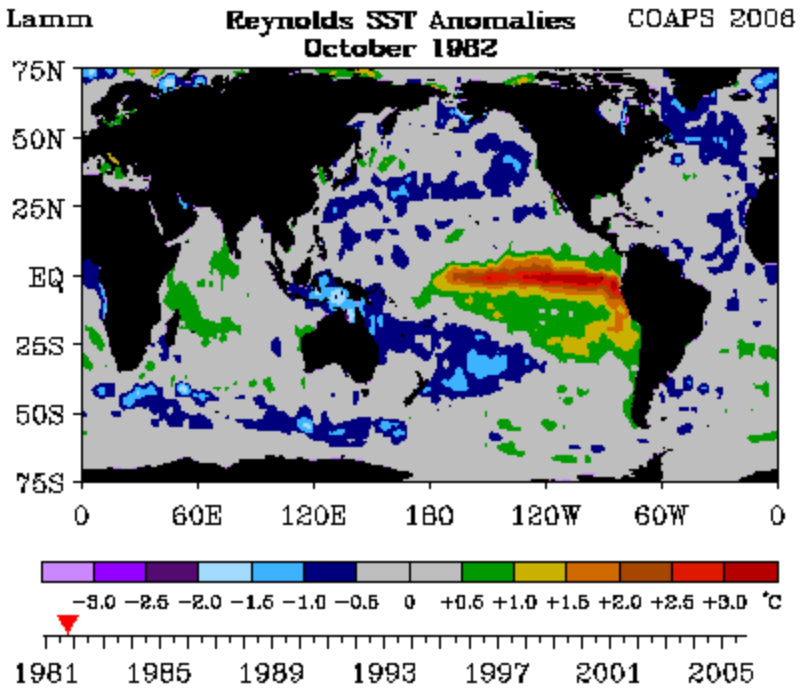
- Percentage (%) of target marketings to be insured (0% to 100%)
- Level of Deductible or risk assumed to be between $0 to $1.50/cwt in $0.1 increments

LGM-Dairy: How it works?

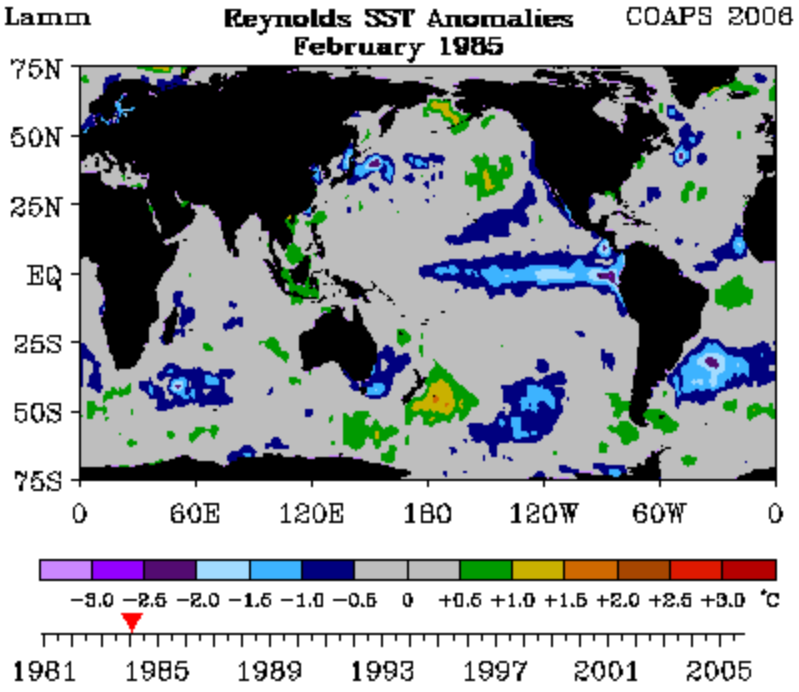


ENSO: What is it?

El Nino



La Nina



AgClimate.org

El Nino: Unusual warming of ocean's temperature along the equator

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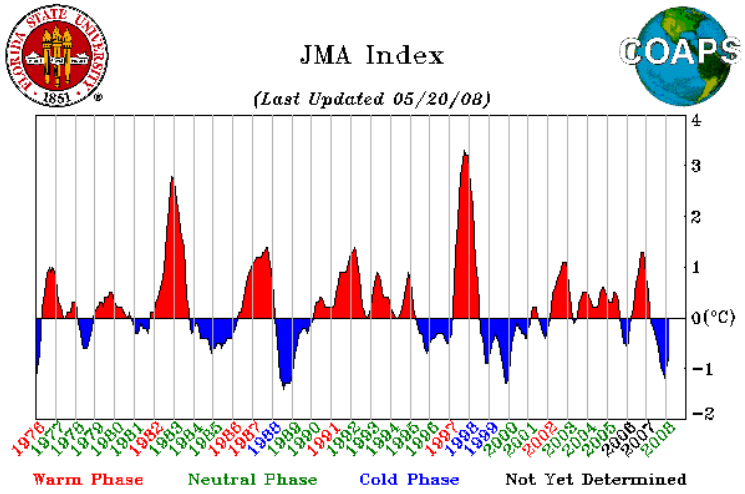
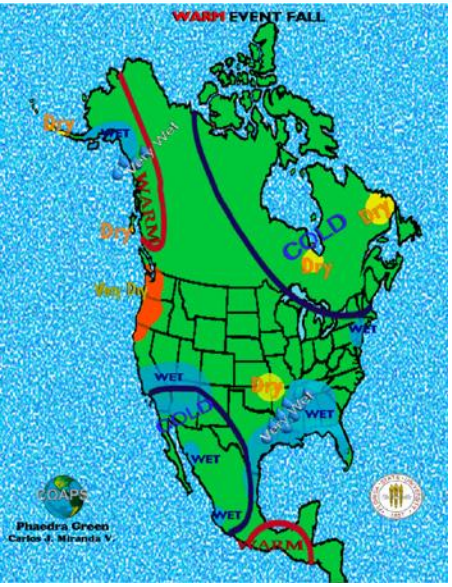
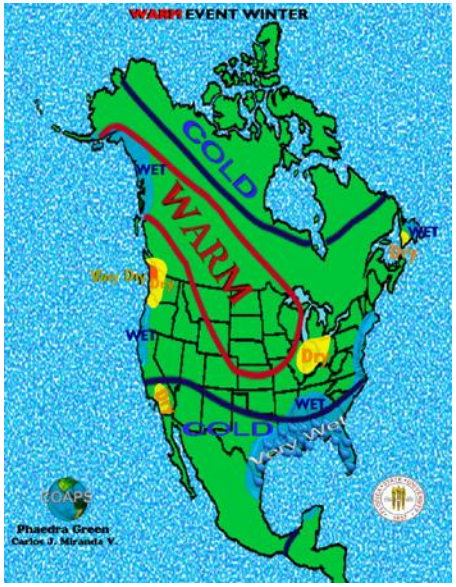
ENSO: When occurs?

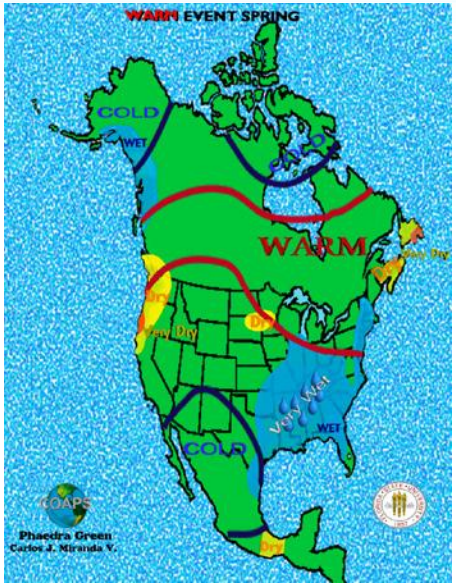
- Every month in a year can be classified as El Nino, La Nina, or neutral
- Usually a ENSO phase last a full calendar year, starting in October (year 1) and ending in September (year 2)
- An El Nino year occurs every 2 to 7 years

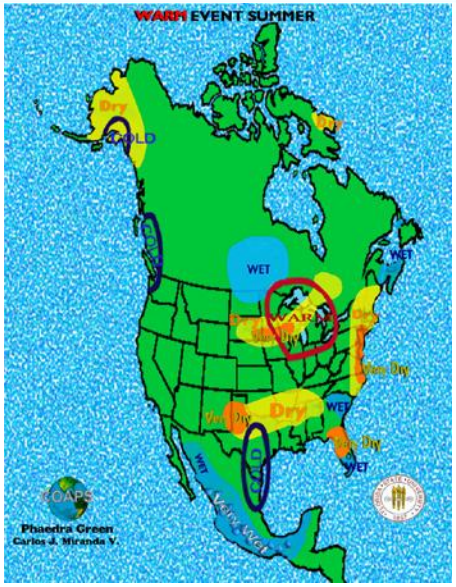


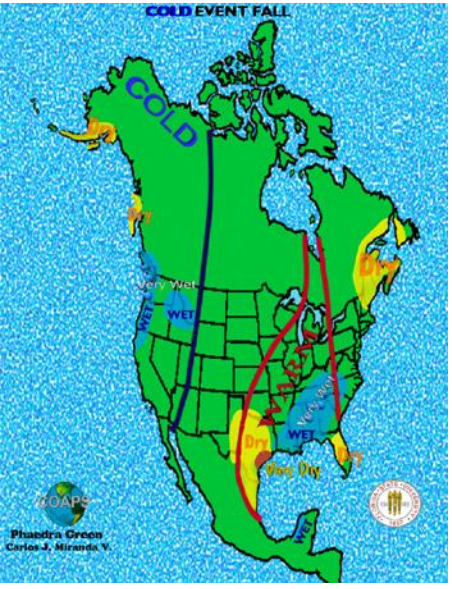
ENSO: How impacts agriculture?

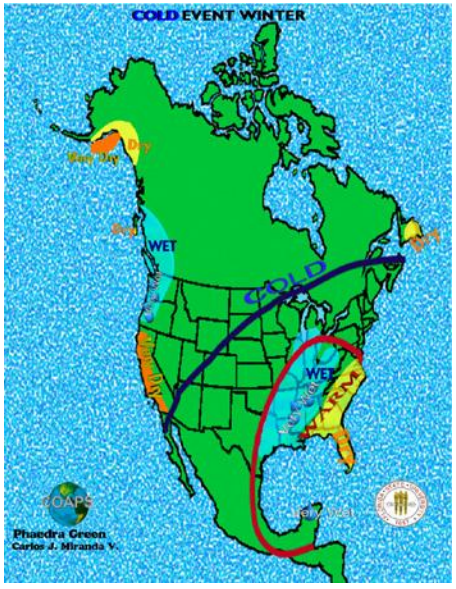


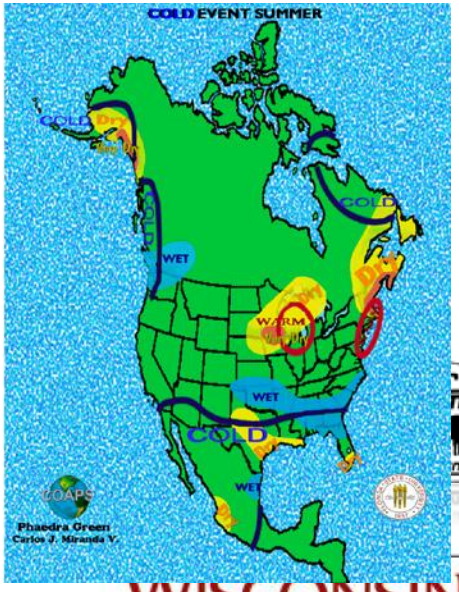












http://www.coaps.fsu.edu/lib/booklet/

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Hypothesis

- A better understanding of the impact of climate variability on milk production and productivity, and on the prices of milk and feed stuffs may give dairy producers an advantage edge in the selection of the best LGM-Dairy risk management alternative for their farms

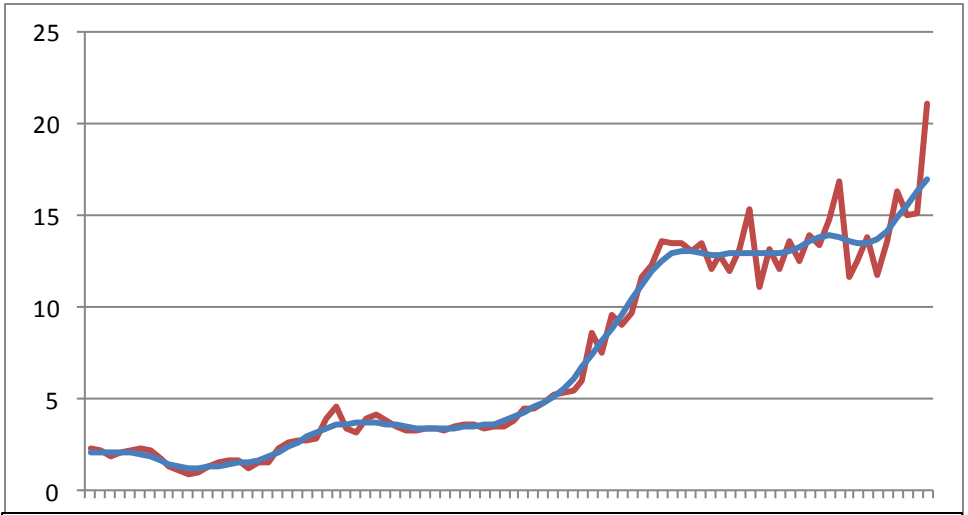
Goals/Objectives

- To offer an empirical analysis of the usefulness of climate forecasts in managing LGM-Dairy among dairy farms in Wisconsin
- To offer a methodological framework to evaluate the LGM-Dairy insurance under the influence of seasonal climate forecast
- To offer an analytical tool

  to evaluate LGM-Dairy

Materials & Methods

- Historical MILK, CORN, and SOYBEAN prices (January 1923 – March 2008)
- Stochastic Price Generator
  1. Plot historical series
  2. De-trend (Gaussian function)



Wisconsin All Milk Price January 1923-2008

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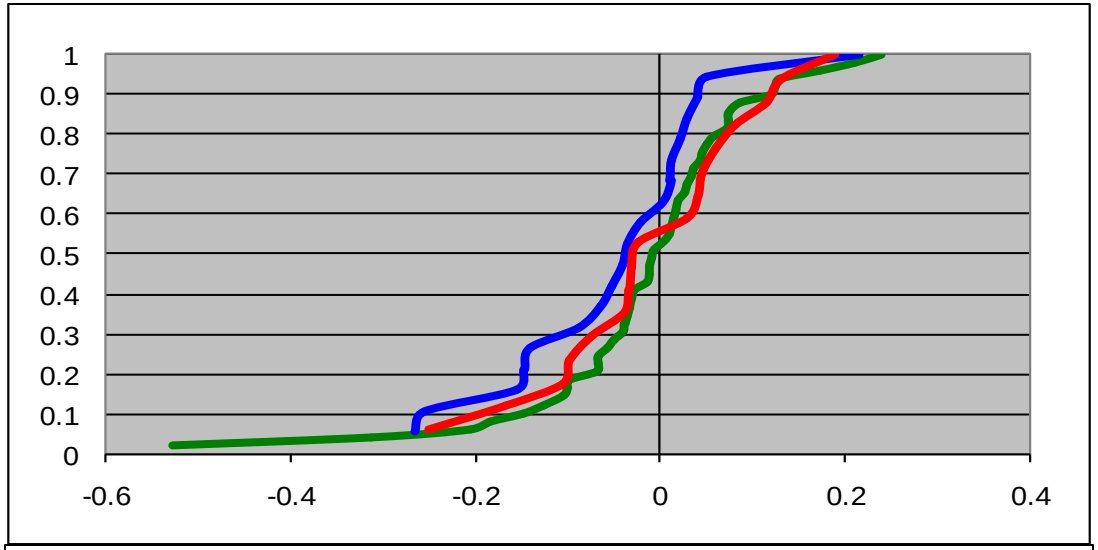
- Stochastic Price Generator
  3. Calculate residuals
  4. Sort by ENSO
  5. 2,000 re-samples (only 17 El Nino, 20 La Nina, and 49 neutral)



June milk price for El Nino, La Nina, and neutral years

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Materials and Methods

$$IND(i) = \max(GMG - SGM(i), 0) \quad (1)$$

IND=indemnity, GMG=gross margin guarantee, SGM=simulated gross margin, *i*=record/year

$$PREM = 1.03 * (1/6000) * \sum_{i=1}^{6000} IND(i) \quad (2)$$

PREM=premium

$$GMG = EGM - DL * \sum_{m=2}^{11} IMQ(m) \quad (3)$$

EGM=expected gross margin, DL=deductible level, IMQ=insured milk quantity, *m*=month of the LGM-Dairy contract

$$SGM(i) = \sum_{i=1}^{6000} \sum_{m=2}^{11} SM(i,m) * IMQ(m) \quad (4)$$

SGM=simulated gross margin, SM=simulated margin

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- Optimization model

$$\max_{x} E\big(U(e)\big) = \Big(\sum_{i=1}^{2000} SGM(i,mg,dl) + IND(i,mg,dl) - PREM(mg,dl)\Big) / 2000 \quad (5)$$

E(U)=expected utility, e=ENSO phase

- Objective function:
  - Optimal milk guarantee (mg) and deductible level (dl) by ENSO phase
  - Solved: Minos5 (GAMS)

Materials & Methods

- Model Parameters
  - Typical dairy farm in Wisconsin:
    - 0.53 bu Corn Equivalents/cwt milk
    - 0.12 bu SBM Equivalents/cwt milk

    cdp.wisc.edu
- Milk Guarantee 0(non insured)-100%
- Deductible $0-1.5/cwt ($0.1 increments)

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Results

- ENSO gross margins

	Neutral	La Niña	El Niño
Mean	11.796	11.277	11.812
SD	0.053	0.036	0.042
Minimum	2.525	6.462	7.234
Maximum	16.903	15.432	15.193

- All years:100% IMQ and 0 DL

Minimum Gross Margin	$10.92/cwt
Premium	$0.81/cwt
Indemnity>Premium (El Nino)	42%
Indemnity>Premium (La Nina)	56%
Indemnity>Premium (neutral)	42%

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Results

- Only a marginal opportunity of using ENSO-based climate forecast to select LGM-Dairy insurance
- LGM-Dairy for neutral years
  - Always better engage in LGM-Dairy, however optimal (Premium = $0.13/cwt) when:
    - » 77% IMQ & $0 DL
    - » 80% IMQ & $0.5 DL
    - » 83% IMQ & $1 DL
    - » 86% IMQ & $1.5 DL
  - Optimal LGM-Dairy/ENSO gain:
    - » $0.0181/cwt (vs. 100% & 0)
    - » $0.0805/cwt (vs. no insurance)

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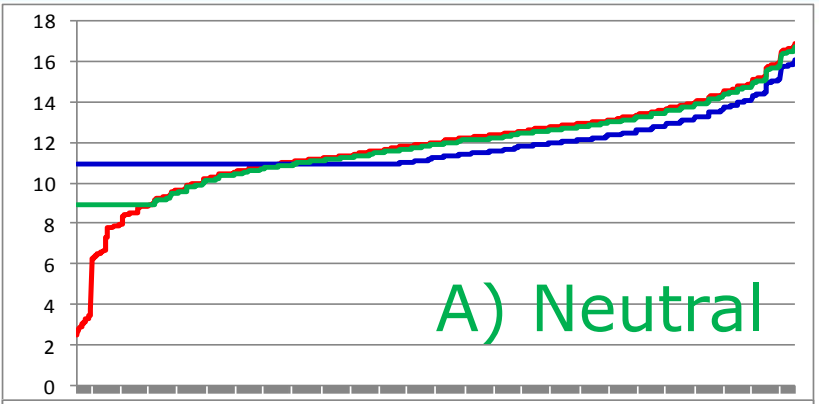
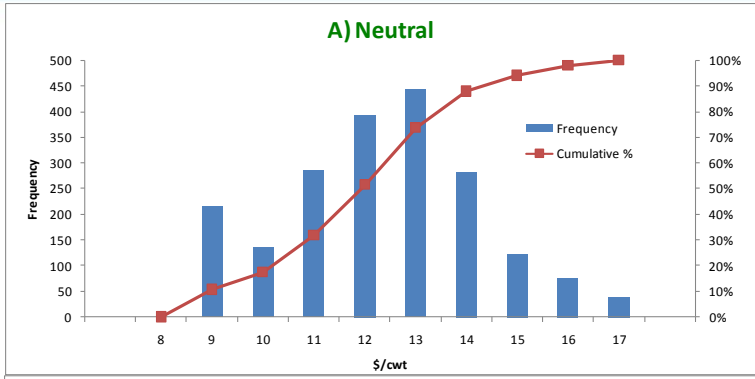
Results

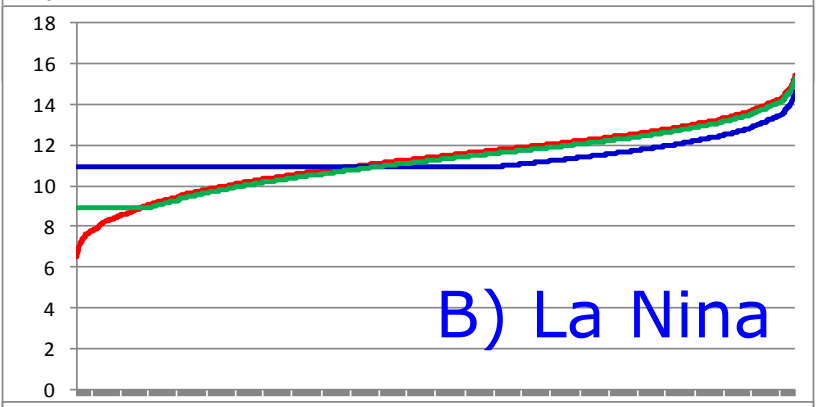
- LGM-Dairy for La Nina years
  - Optimal to fully engage in LGM-Dairy (Premium = $0.81/cwt)
  - Optimal LGM-Dairy/ENSO gain:
    - » $0.0513/cwt (vs. 80% & 0.5)
    - » $0.0782/cwt (vs. no insurance)
- LGM-Dairy for El Nino years
  - Optimal not to engage in LGM-Dairy
  - Optimal LGM-Dairy/ENSO gain:
    - » $0.0963/cwt (vs. 100% & 0)
    - » $0.0293/cwt (vs. 77% & 0)

Results: ENSO sensitive LGM-Dairy contracts

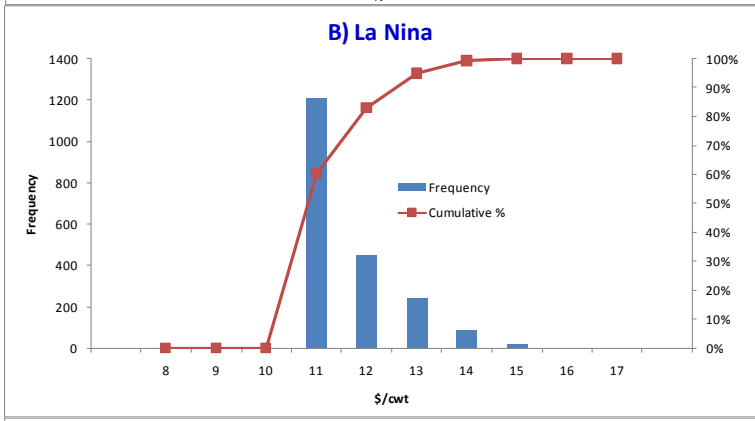


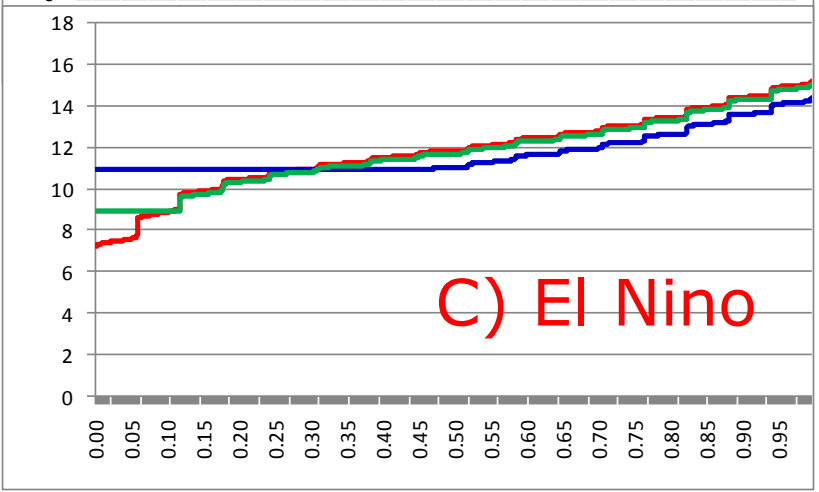
80% IMQ
$0.5 DL
$11.88±1.85,
min $8.91
premium $0.13



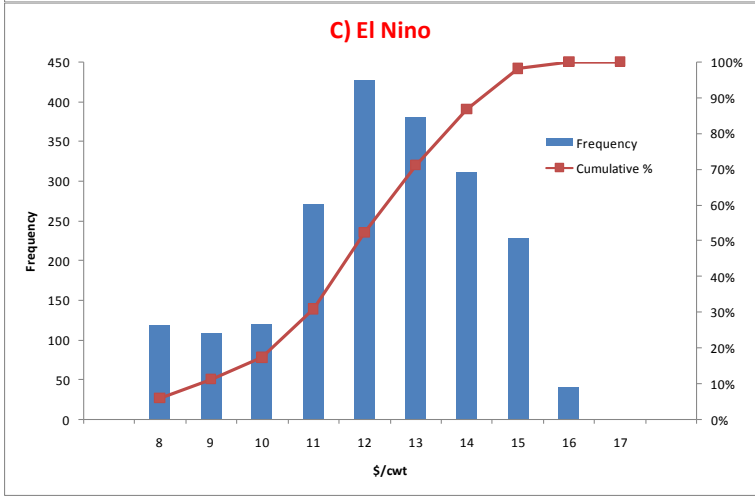


100% IMQ
$0 DL
$11.36±0.72
min $10.92
premium $0.81





0% IMQ
$0 DL
$11.813±0.04
min $7.23
premium $0



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