

# **Moove Over: Will New Government-Sponsored Dairy Margin Insurance Crowd Out Private Market Risk Management Tools?**

**Christopher A. Wolf, Marin Bozic,  
John Newton, and Cameron S. Thraen**

**AAEA Crop Insurance Symposium**

**October 8-9 2013**

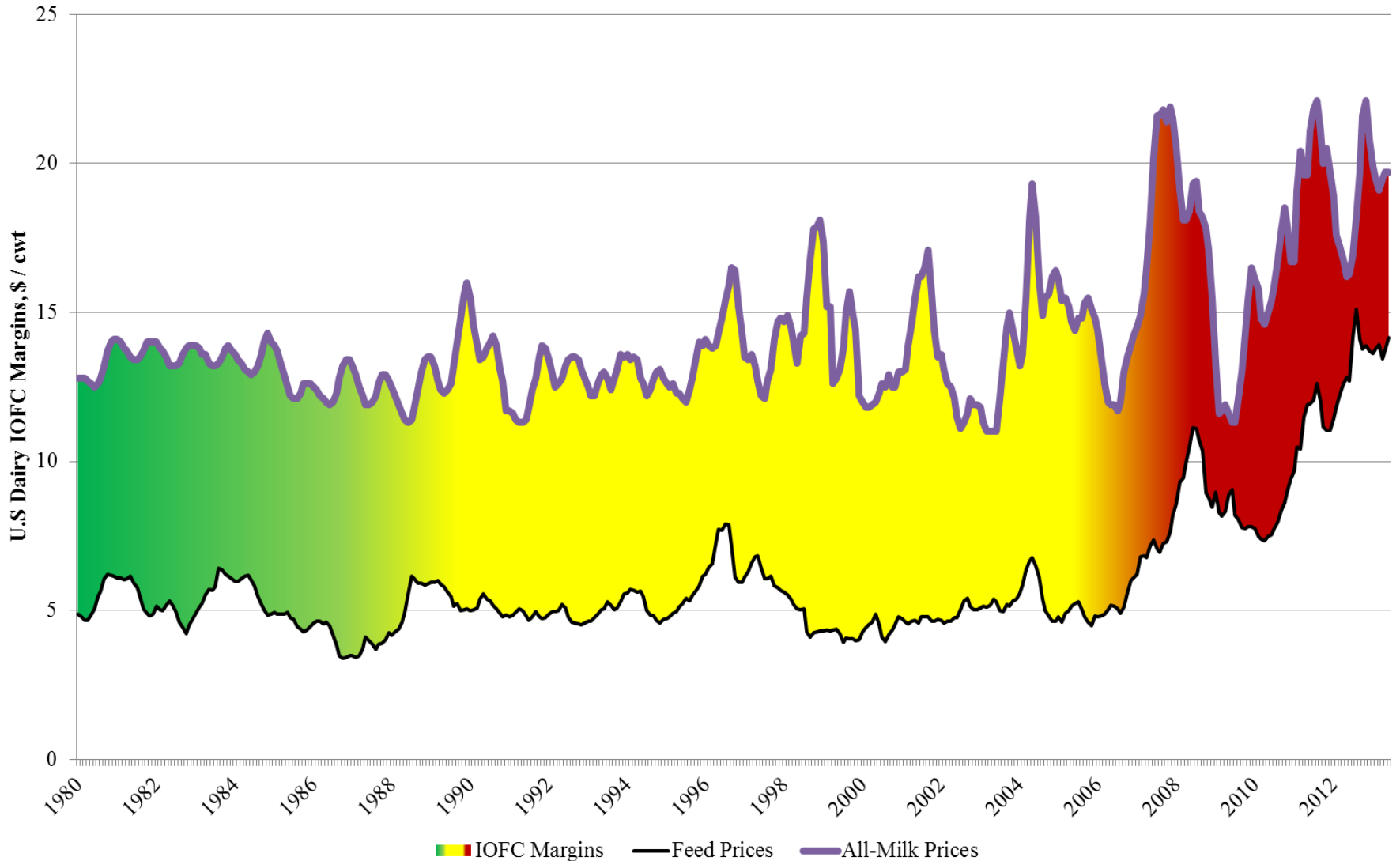
# Motivation

- Increasing volatility in farm milk and feed prices
- Existing policies largely focus on price support
- Increasing use of private milk price risk management tools in recent years
- Draft Farm Bill dairy subtitle contains subsidized margin protection

# Objectives

- Review the risk environment that dairy farms faced in recent years
- Review trends in the use of risk management programs and tools
- Present key provisions of draft dairy subtitle
- Examine how proposed margin insurance programs may change the utilization of private sector risk management instruments

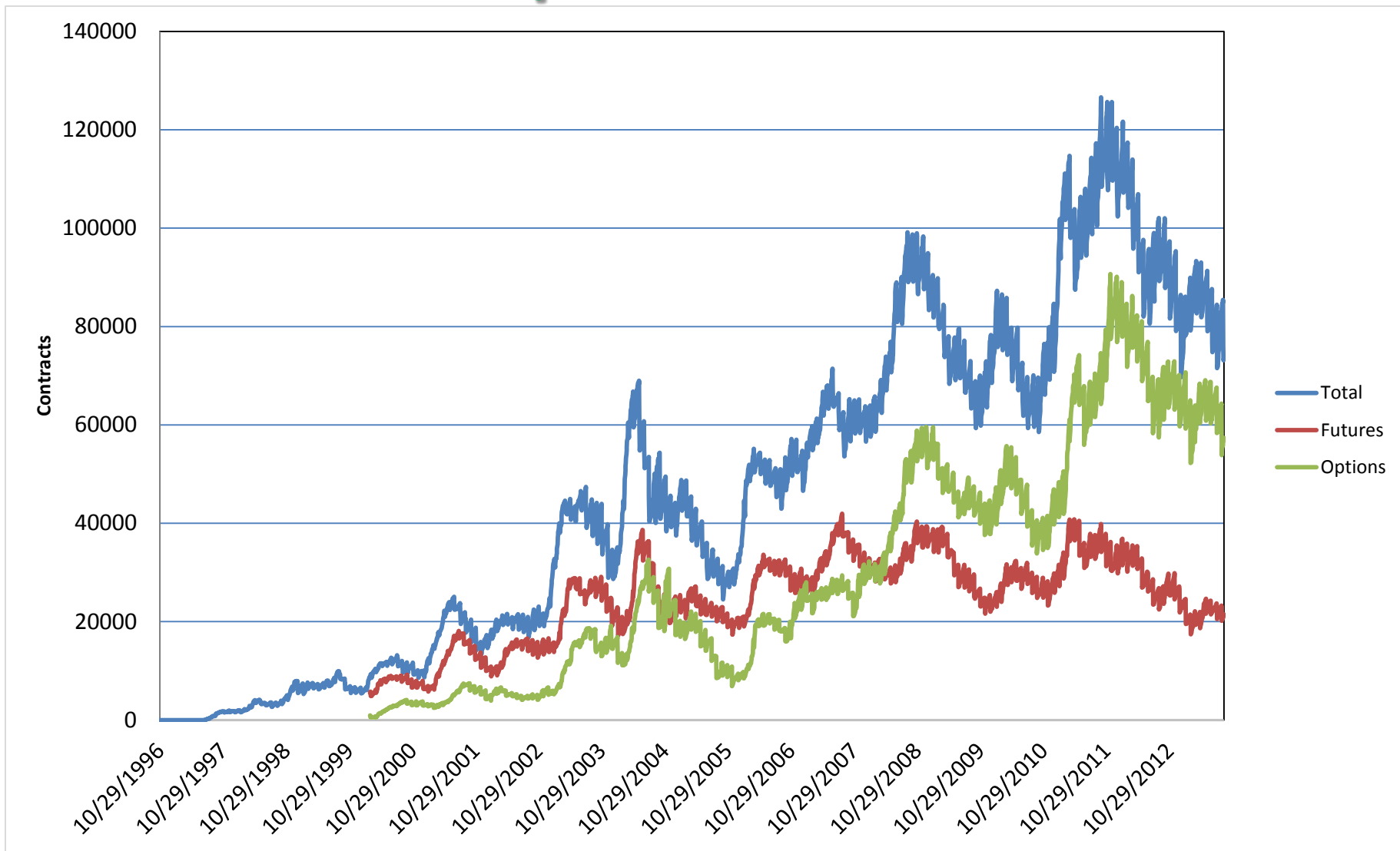
# US Milk Income Over Feed Cost 1980-2013



# Private and Public Responses to Dairy Price Risk

- Increased use of milk and feed futures, options and forward contracts
  - Class III on CME (milk for cheese and dry whey)
  - Corn and Soybean (or Meal)
- Dairy Options Pilot Program
  - Education and subsidized milk put options

# CME Class III Milk Future & Options Open Interest



# All Dairy Futures & Options Open Interest



# Dairy Livestock Gross Margin Insurance

- Dairy Livestock Gross Margin Insurance
  - Subsidized margin between Class III milk and feed costs (corn and SBM equivalents)
  - Sold through insurance agents once a month
  - Protect up to 10 months
  - Feed quantities are flexible and customizable

# Dairy Livestock Gross Margin Statistics, 2009-2012

Insurance Year	Policies Sold	Milk Insured	Gross Margin Guarantee	Premium	Indemnities Paid	Subsidy	Loss Ratio
	(No.)	(cwt)	(\$)	(\$)	(\$)		
2009	40	401,680	4,715,858	287,201	718,035	0	2.5
2010	134	1,872,499	24,914,997	781,589	280,566	0	0.36
2011	1,224	46,172,815	769,644,504	25,012,757	64,738	10,735,652	<0.01
2012	900	40,524,158	704,863,515	19,162,929	1,195,704	8,870,732	0.06

# Major Provisions of Current Draft Dairy Subtitle

- Margin protection
- Market stabilization program
- End MILC, DPPSP

# Margin Protection Program

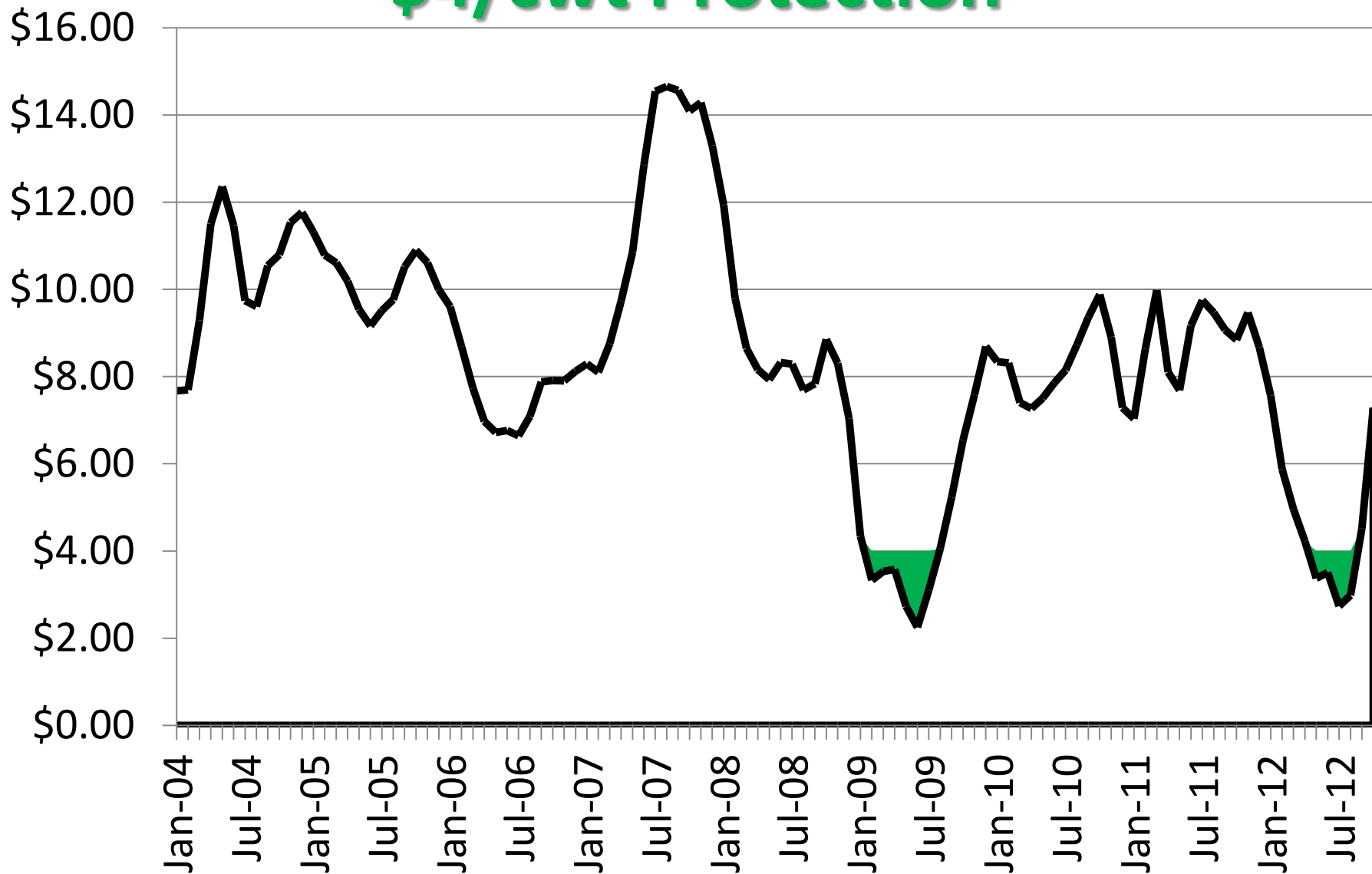
- Subsidized margin insurance
- Margin defined as difference between All Milk Price and Feed Cost (Corn, SBM, Hay)
- Base level of production is lesser of (80% Base Production History OR Actual Milk Production) for each two month period
- Supplemental production is lesser of (coverage level) times lesser of (APH/6 OR Actual 2 month production)

# IOFC Margin

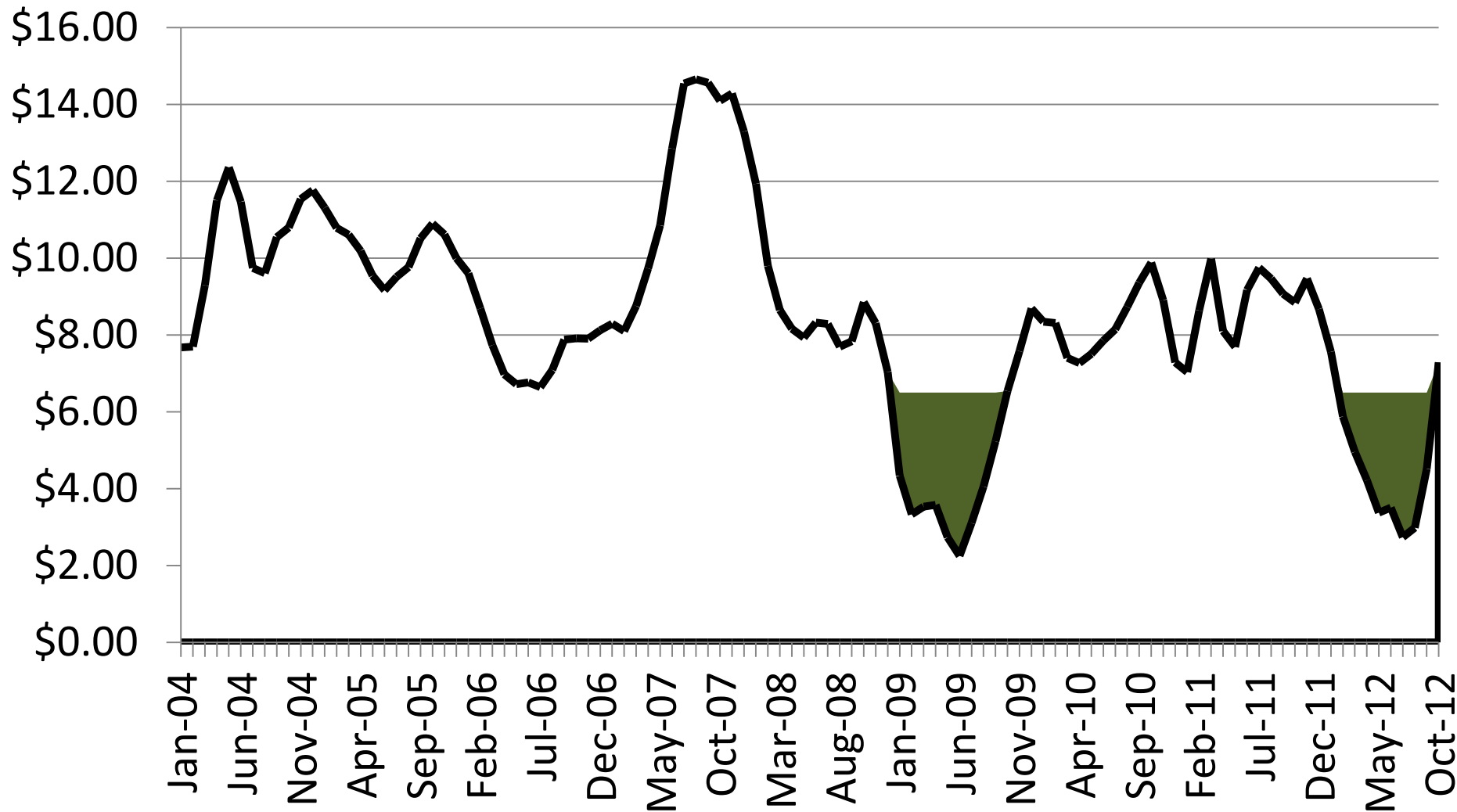
$$\text{IOFC} = \text{AMP} - (1.10728 \times \text{CP} + 0.0735 \times \text{SBM} + 0.0137 \times \text{Hay})$$

- U.S. All-Milk is the average price received by dairy producers for all milk sold to plants and dealers
- Corn and alfalfa hay prices are taken from monthly U.S. Department of Agriculture [Agricultural Prices](#) reports
- Soybean meal price is the central Illinois price for soybean meal as reported in the United States Department of Agriculture Market News-[Monthly Soybean Meal Price Report](#) (rail price)

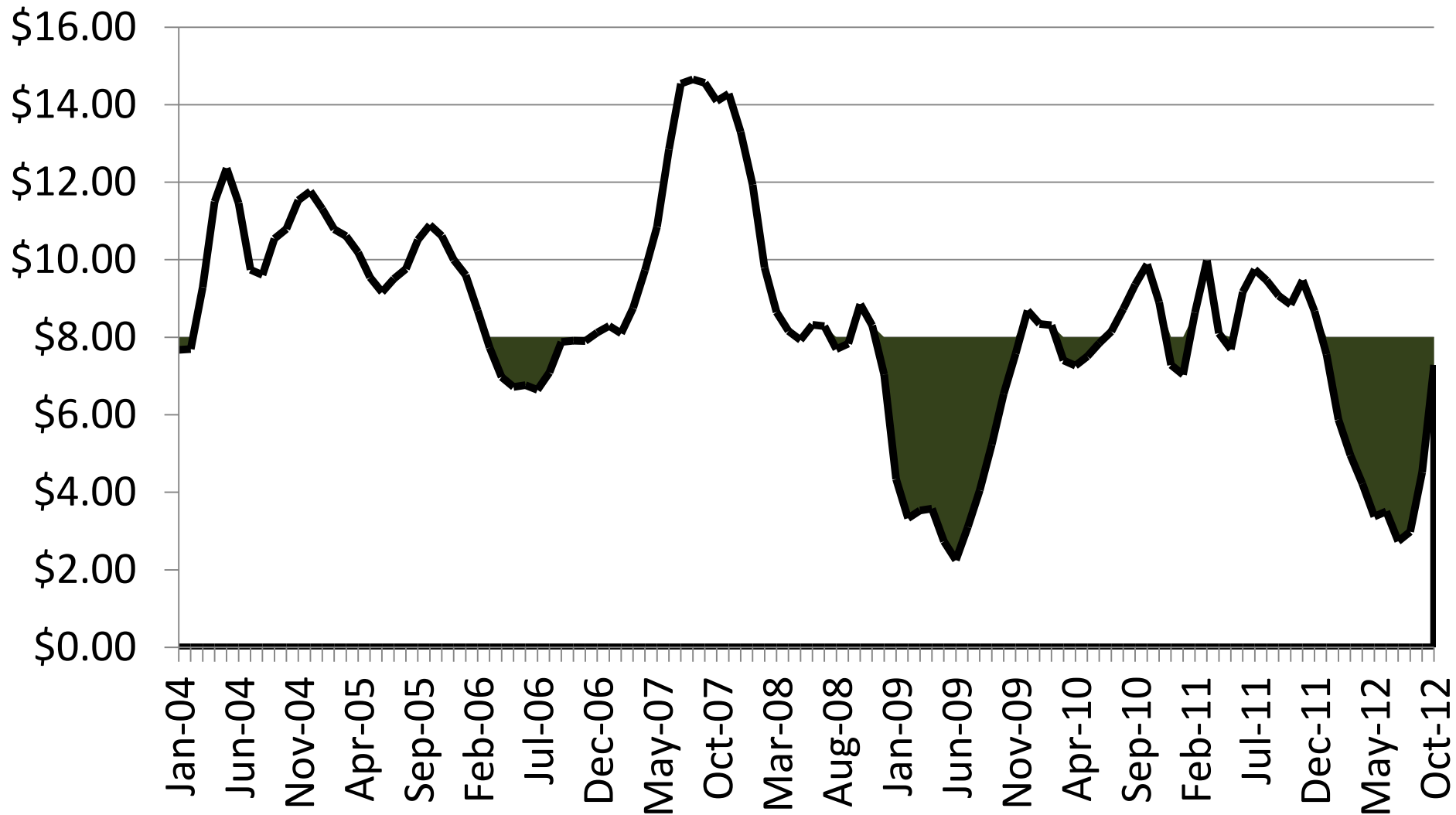
# IOFC Margin with Base \$4/cwt Protection



# Supplemental Margin Protection: \$6.50 Coverage Level



# Supplemental Margin Protection: \$8.00 Coverage Level



# Premium Rates for Supplemental Margin Protection

Coverage Level	Premium Per Cwt (under 4 mil lbs)	Premium Per Cwt (over 4 mil lbs)
\$4.00	\$0.000	\$0.000
\$4.50	\$0.010	\$0.015
\$5.00	\$0.025	\$0.036
\$5.50	\$0.040	\$0.081
\$6.00	\$0.065	\$0.155
\$6.50	\$0.090	\$0.230
\$7.00	\$0.434	\$0.434
\$7.50	\$0.590	\$0.590
\$8.00	\$0.922	\$0.922

# Market Stabilization Program

- Paid on a declining percentage of base milk production when margins are below trigger levels
- Payment reduction factors

Range =>	\$5 < Margin ≤ \$6 for 2 consecutive months	\$4 < Margin ≤ \$5 for 2 consecutive months	Margin ≤ \$4 for 1 month
Payments on the greater of	98% x (Base) or 94% x (Actual)	97% x (Base) or 93% x (Actual)	96% x (Base) or 92% x (Actual)
No reduction is made if	Actual < (98% x Base)	Actual < (97% x Base)	Actual < (96% x Base)

# Market Stabilization Program

- Stabilization Base is chosen as either (1) average milk marketed in 3 months prior to program or (2) milk marketed from the previous year by month
- Dairy product prices can “untrigger” penalties if US prices far enough above world prices
- Penalty stays at highest level until it comes off
- Funds diverted to USDA used to purchase dairy products for donation to food banks or promotion programs to expand demand

## Consider the example of Three Rivers Dairy

2013 Expected production: 91,618 cwt

Happy IOFC margin: \$8.00/cwt

Happy IOFC revenue: \$732,944

Basic Margin Coverage: 89,821 cwt

Supplemental Coverage: 89,821 cwt

Bad memories:

2009 IOFC margin: \$4.52

2012 IOFC margin: \$5.31

# What would \$6.50 coverage level mean under different margin scenarios if we get DSA?

Average Annual Simulated Margin	Probability	DMSP Price Boost	Shortfall for NON-PARTICIPATING farm*
Less than \$5.00	1.46%	88,620	-311,509
\$5.00-\$6.00	10.66%	71,405	-214,702
\$6.00-\$7.00	38.88%	41,191	-134,956
\$7.00-\$8.00	30.06%	17,377	-50,761
Over \$8.00	18.94%	5,458	69,932

# What would \$6.50 coverage level mean under different margin scenarios if we get DSA?

Average Annual Simulated Margin	Shortfall for NON-PARTICIPATING farm	Premium for \$6.50 coverage	Average Realized Indemnity	DMSP Penalty	Shortfall for PARTICIPATING farm
Less than \$5.00	-311,509	-13,803	153,669	-23,881	-195,524
\$5.00-\$6.00	-214,702	-13,803	81,760	-14,348	-161,092
\$6.00-\$7.00	-134,956	-13,803	39,107	-7,807	-117,460
\$7.00-\$8.00	-50,761	-13,803	17,565	-4,267	-51,266
Over \$8.00	69,932	-13,803	7,141	-2,195	61,074

# What would \$6.50 coverage level mean under different margin scenarios if we get G-S?

Average Annual Simulated Margin	Probability	Shortfall for NON-PARTICIPATING	Premium for \$6.50	Indemnity	Shortfall for PARTICIPATING farm
Less than \$5.00	8.86%	-329,350	-14,439	151,244	-192,544
\$5.00-\$6.00	19.96%	-222,392	-14,439	75,181	-161,650
\$6.00-\$7.00	29.68%	-136,595	-14,439	33,145	-117,889
\$7.00-\$8.00	23.98%	-49,389	-14,439	13,083	-50,744
Over \$8.00	17.52%	71,576	-14,439	5,342	62,480

# Expected impacts of G-S on a 360 cow farm in 2013 (based on information on Jan 15)

Coverage Level	Fees & Premium	Expected Indemnity	DMSP Penalty*	DMSP Price Boost*	Net Revenue
\$4.00	1,196	3,181	-	-	1,985
\$4.50	2,114	5,641	-	-	3,527
\$5.00	3,271	9,708	-	-	6,438
\$5.50	5,504	16,224	-	-	10,720
\$6.00	8,814	26,604	-	-	17,790
\$6.50	14,439	42,317	-	-	27,878
<b>\$7.00</b>	<b>20,906</b>	<b>62,853</b>	-	-	<b>41,947</b>
\$7.50	52,281	86,805	-	-	34,524
\$8.00	72,649	113,359	-	-	40,710

# Expected impacts of DSA on a 360 cow farm in 2013 (based on information on Jan 15)

Coverage Level	Fees & Premium	Expected Indemnity	DMSP Penalty*	DMSP Price Boost*	Net Revenue
\$4.00	250	959	-6,612	31,178	-5,903
\$4.50	1,283	2,260	-6,612	31,178	-5,634
\$5.00	2,764	4,785	-6,612	31,178	-4,591
\$5.50	5,322	9,552	-6,612	31,178	-2,382
\$6.00	9,540	18,260	-6,612	31,178	2,108
<b>\$6.50</b>	<b>13,803</b>	<b>32,797</b>	<b>-6,612</b>	<b>31,178</b>	<b>12,382</b>
\$7.00	35,334	52,873	-6,612	31,178	10,927
\$7.50	47,945	77,081	-6,612	31,178	22,524
\$8.00	74,784	104,676	-6,612	31,178	23,280

# Hedge with Milk Futures

$$\pi_t = p_t y_{t-1} - c(y_{t-1}) - h_{t-1}(f_t - f_{t-1})$$

- Where  $p$  is cash milk price,  $y$  is cash milk position,  $c$  is cost function,  $h$  is futures position and  $f$  is futures price
- Minimum variance hedge ratio:

$$\frac{h_{t-1}}{y_{t-1}} = \frac{\sigma_{pf}}{\sigma_f^2}$$

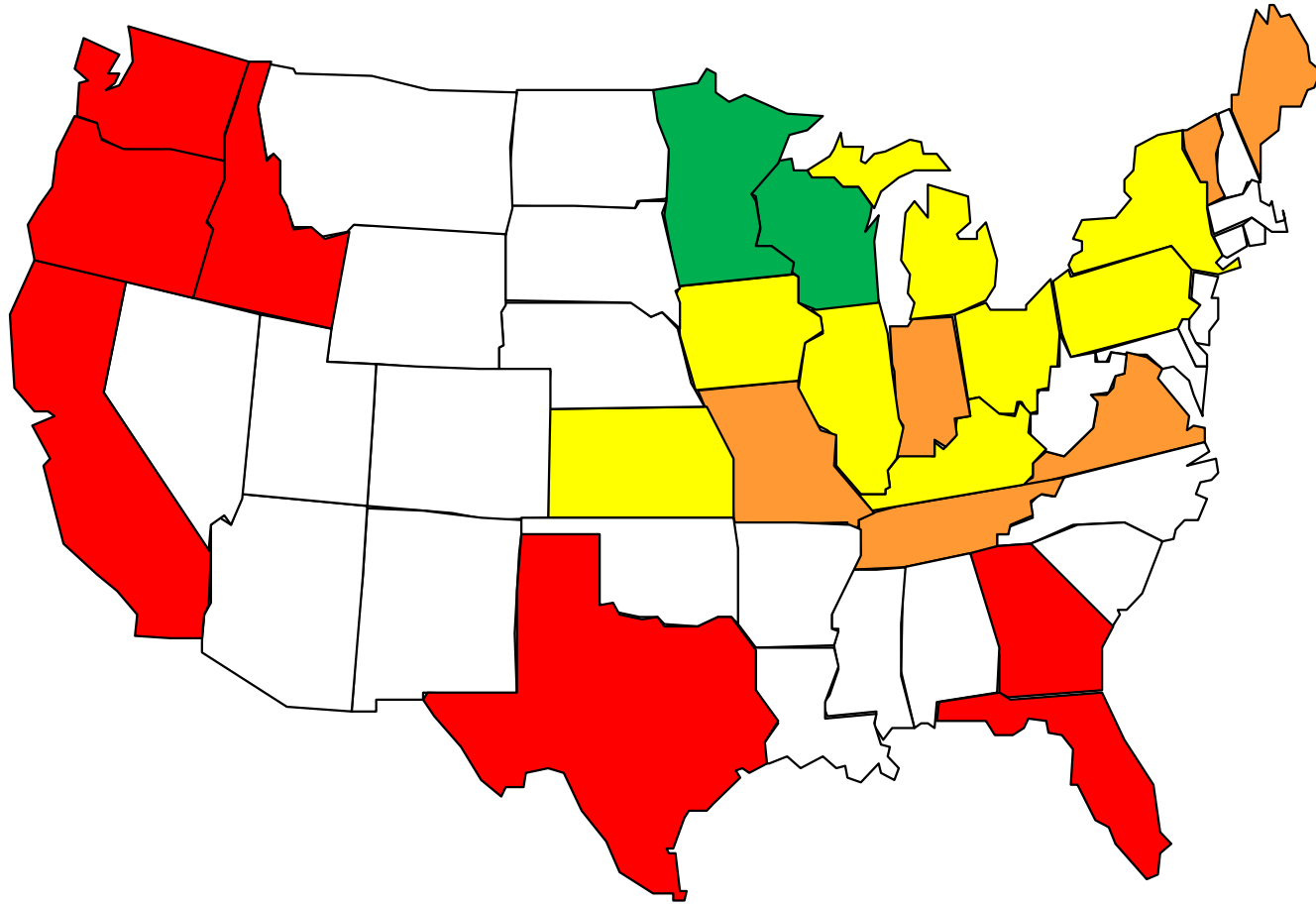
# Effect of Margin Program

$$\pi_t = p_t y_{t-1} - c(y_{t-1}) - h_{t-1}(f_t - f_{t-1}) + a_{t-1}(I_t - g_{t-1})$$

- where  $a$  is margin program position,  $I$  is insurance indemnity, and  $g$  is premium cost
- Minimum variance hedge ratio:

$$\frac{h_{t-1}}{y_{t-1}} = \frac{\sigma_{pf}}{\sigma_f^2} + \frac{\sigma_{If}}{\sigma_f^2} \frac{a_{t-1}}{y_{t-1}}$$

# Purchased Feed as a % of Total Feed Costs



Green <40%   Yellow 40-60%   Orange 60-70%   Red >70%

# Potential IOFC Margin Futures Contract Specifications

<b>Contract Size</b>	2,000 cwt of Grade A Milk (~ 90 metric tons)
<b>Price Quotation</b>	Dairy IOFC Margin
<b>Pricing Unit</b>	Cents per hundredweight (cwt.)
<b>Tick Size (minimum fluctuation)</b>	\$0.01 per cwt (= \$20.00 per contract)
<b>Daily Price Limits</b>	\$0.75 per cwt above or below the previous day's settlement price.
<b>Last Trade Date/Time</b>	Trading shall terminate on the business day immediately preceding the day on which the USDA announces the Actual Dairy Producer Margin.
<b>Contract Months</b>	February, April, June, August, October, December
<b>Settlement Procedure</b>	There shall be no delivery of milk in settlement of this contract. All contracts open as of the termination of trading shall be cash settled based on the average USDA Actual Dairy Producer Margin for the particular Consecutive 2-month Period (e.g. Jan-Feb average Actual Dairy Producer Margin is the settlement margin for the February contract, etc), as first released.

# Potential IOFC Margin Options

## Contract Specifications

<b>Contract Size</b>	One Dairy IOFC Margin Futures contract
<b>Pricing Unit</b>	Cents per hundredweight (cwt.)
<b>Tick Size (minimum fluctuation)</b>	\$0.01 per cwt (= \$20.00 per contract)
<b>Daily Price Limits</b>	None
<b>Last Trade Date/Time</b>	Trading shall terminate on the business day immediately preceding the day on which the USDA announces the Actual Dairy Producer Margin.
<b>Contract Months</b>	February, April, June, August, October, December
<b>Strike Price Intervals</b>	All Contract Months: \$4.00 to \$8.00 per cwt in \$.50 intervals.
<b>Exercise Procedure</b>	American Style

# Effect of Margin Option Contract

$$\pi_t = p_t y_{t-1} - c(y_{t-1}) - h_{t-1}(f_t - f_{t-1}) \\ + \alpha_{t-1}(I_t - g_{t-1}) + d_{t-1}(T_{t-1} - I_t)$$

- where  $d$  is size of options position, and  $T$  is options premium

- Minimum Variance Hedge Ratio:

$$\frac{h_{t-1}}{y_{t-1}} = \frac{\sigma_{pf}}{\sigma_f^2} + \frac{\sigma_{If}}{\sigma_f^2} \left( \frac{\alpha_{t-1}}{y_{t-1}} - \frac{d_{t-1}}{y_{t-1}} \right)$$

# Conclusions

- New dairy programs likely to include subsidized IOFC margin protection
- This government program likely to substitute for private milk hedging
- IOFC margin contract might bring hedgers back