

Dairy Margin Risk Management: The Black Swan Approach

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April 30, 2015

National Workshop for Dairy Economists and Policy Analysts

UNIVERSITY OF MINNESOTA

Driven to DiscoverSM



Dairy Policy @DairyMAP · 18h

Cheese packaging room as seen from the observation deck at @TillamookCheese.
#NWDEPA15 #andynamedit



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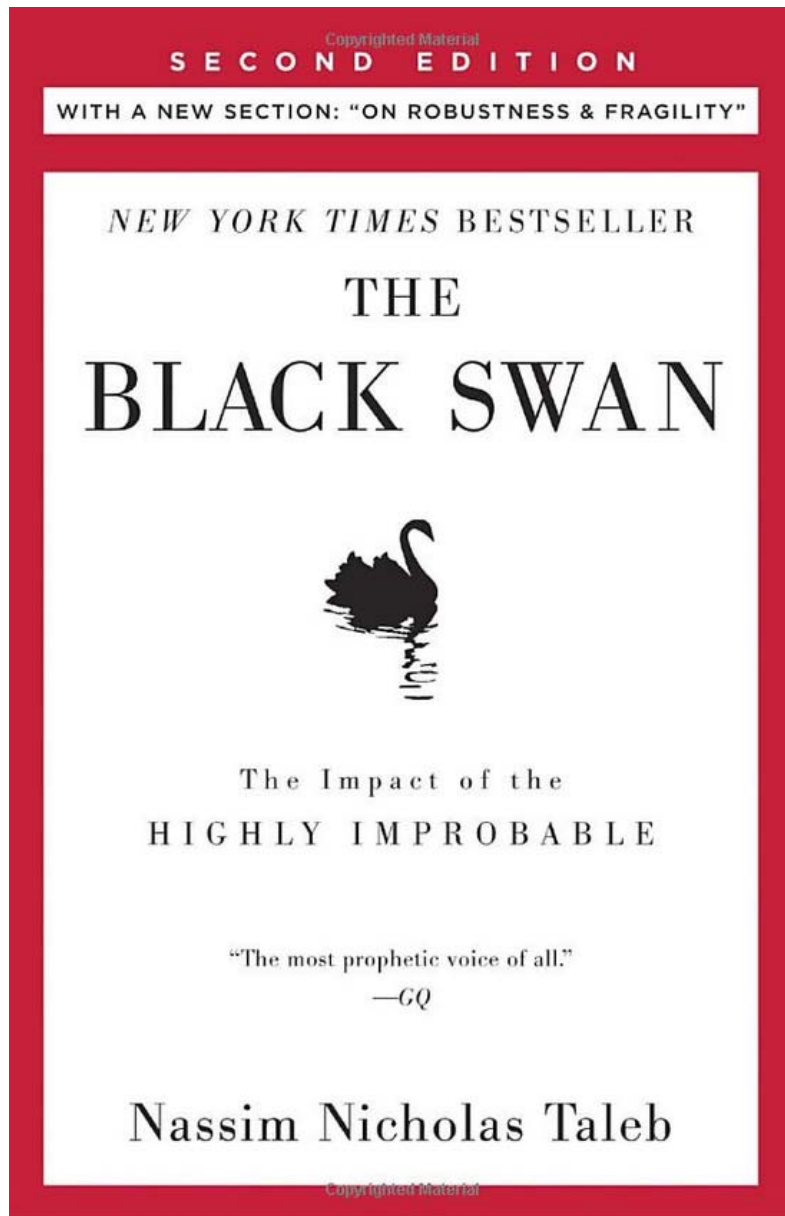
TED

ideas worth spreading

DEAD

dairy economic analysis discussions

The Impact of the Highly Improbable



1. The disproportionate role of high-profile, hard-to-predict, and rare events that are beyond the realm of normal expectations in history, science, finance, and technology.
2. The non-computability of the probability of the consequential rare events using scientific methods (owing to the very nature of small probabilities).
3. The psychological biases that blind people, individually and collectively, to uncertainty and to a rare event's massive role in historical affairs.



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FARM BILL HOME / FARM SAFETY NET / DAIRY PROGRAMS / MARGIN PROTECTION PROGRAM DECISION TOOL

MPP LGM

Margin Protection Program Decision Tool

www.DairyMarkets.org

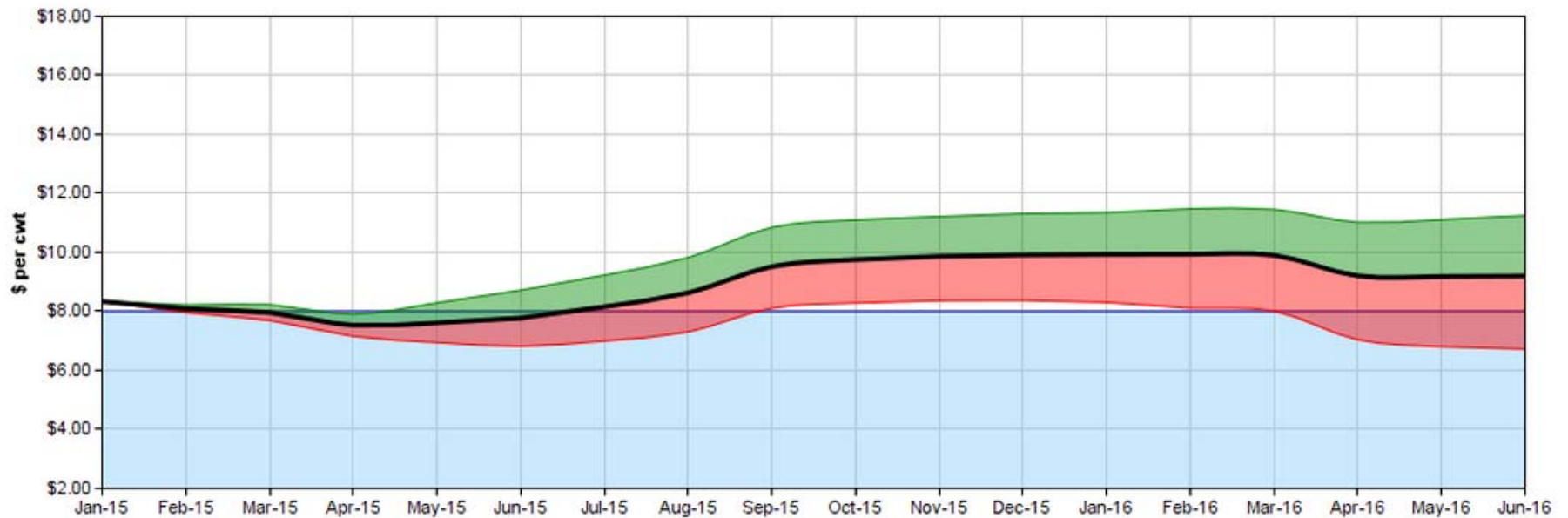
Farm Name: Coverage Year: Actual Production History: lbs

Forecast Margin

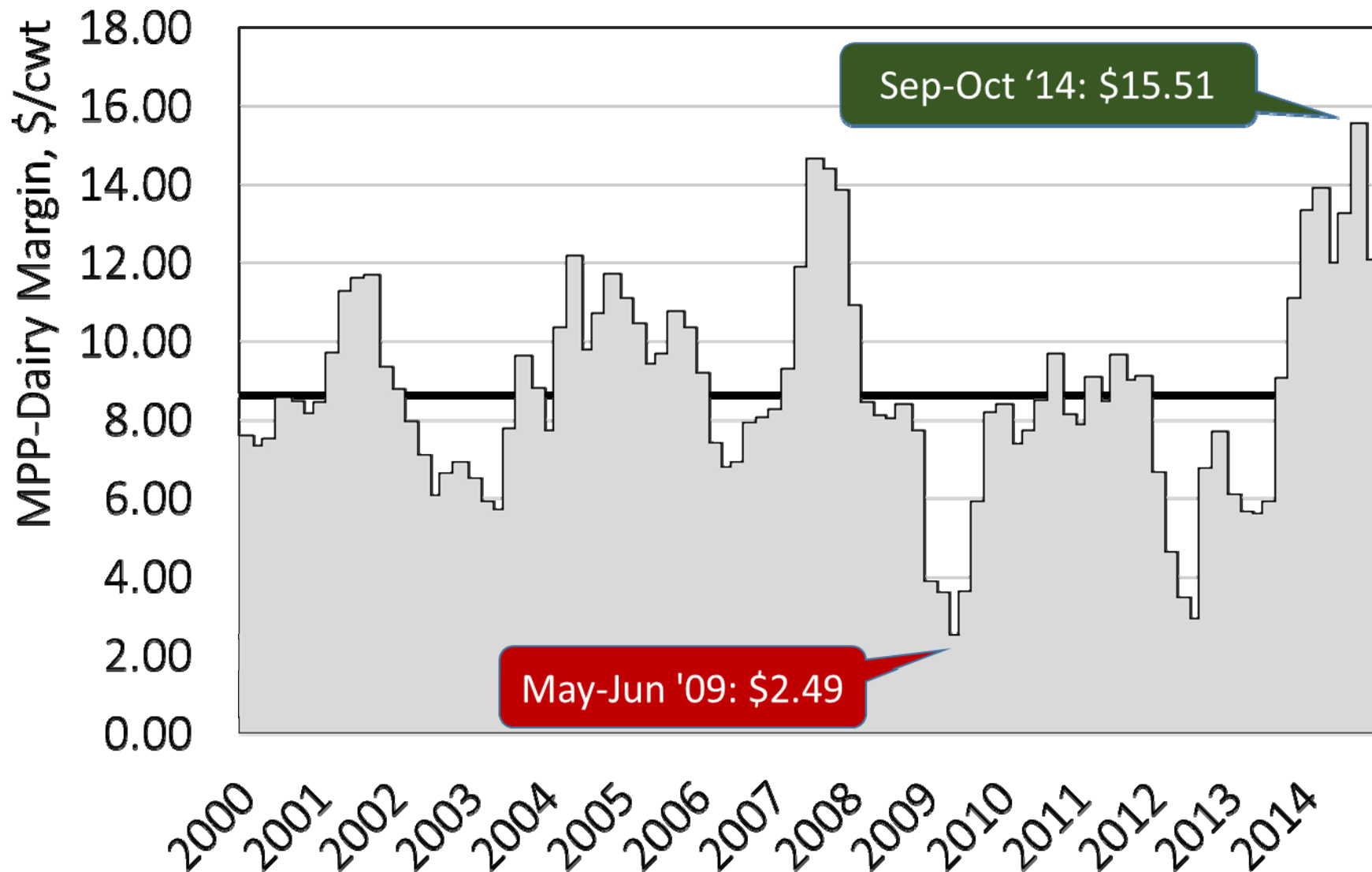
Select Coverage

Probability Table Forecast Graph

Include Actual Margins



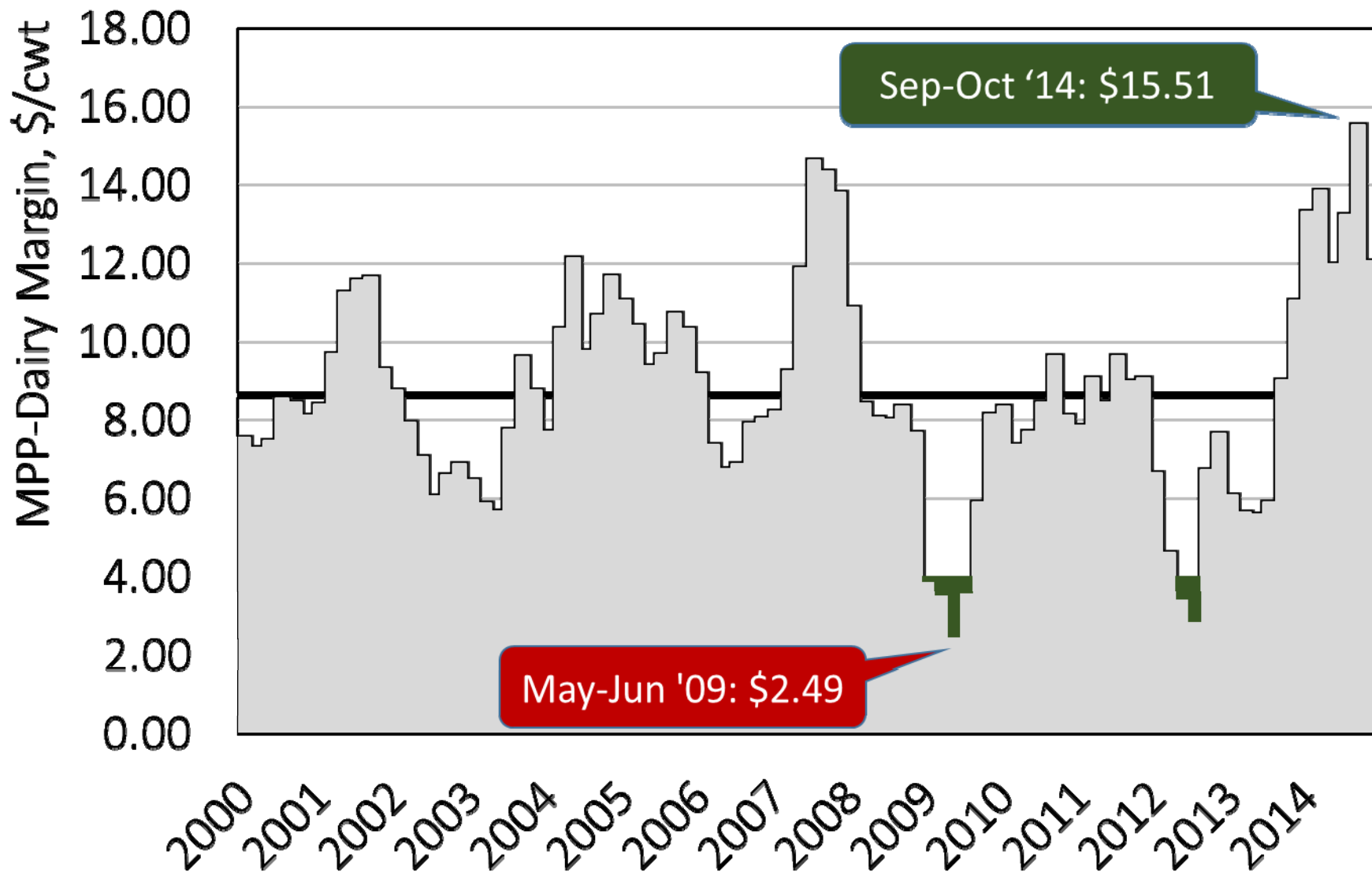
Actual Dairy Production Margin: Historical



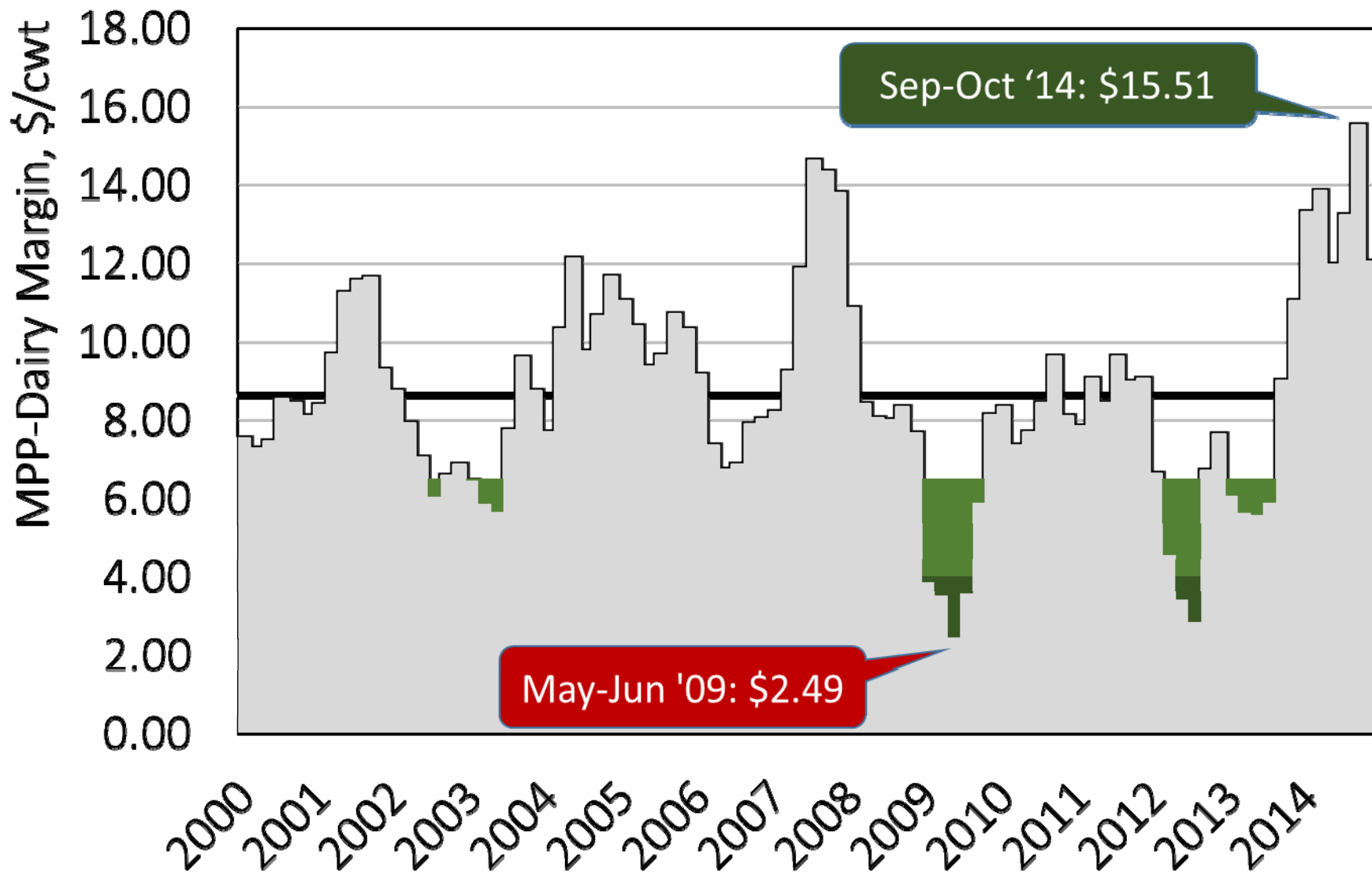
MPP Coverage Levels and Premiums

Coverage Level	First 4mil lbs (\$/cwt)	Above 4 mil lbs (\$/cwt)
\$4.00	\$0.000	\$0.000
\$4.50	\$0.010	\$0.020
\$5.00	\$0.025	\$0.040
\$5.50	\$0.040	\$0.100
\$6.00	\$0.055	\$0.155
\$6.50	\$0.090	\$0.290
\$7.00	\$0.217	\$0.830
\$7.50	\$0.300	\$1.060
\$8.00	\$0.475	\$1.360

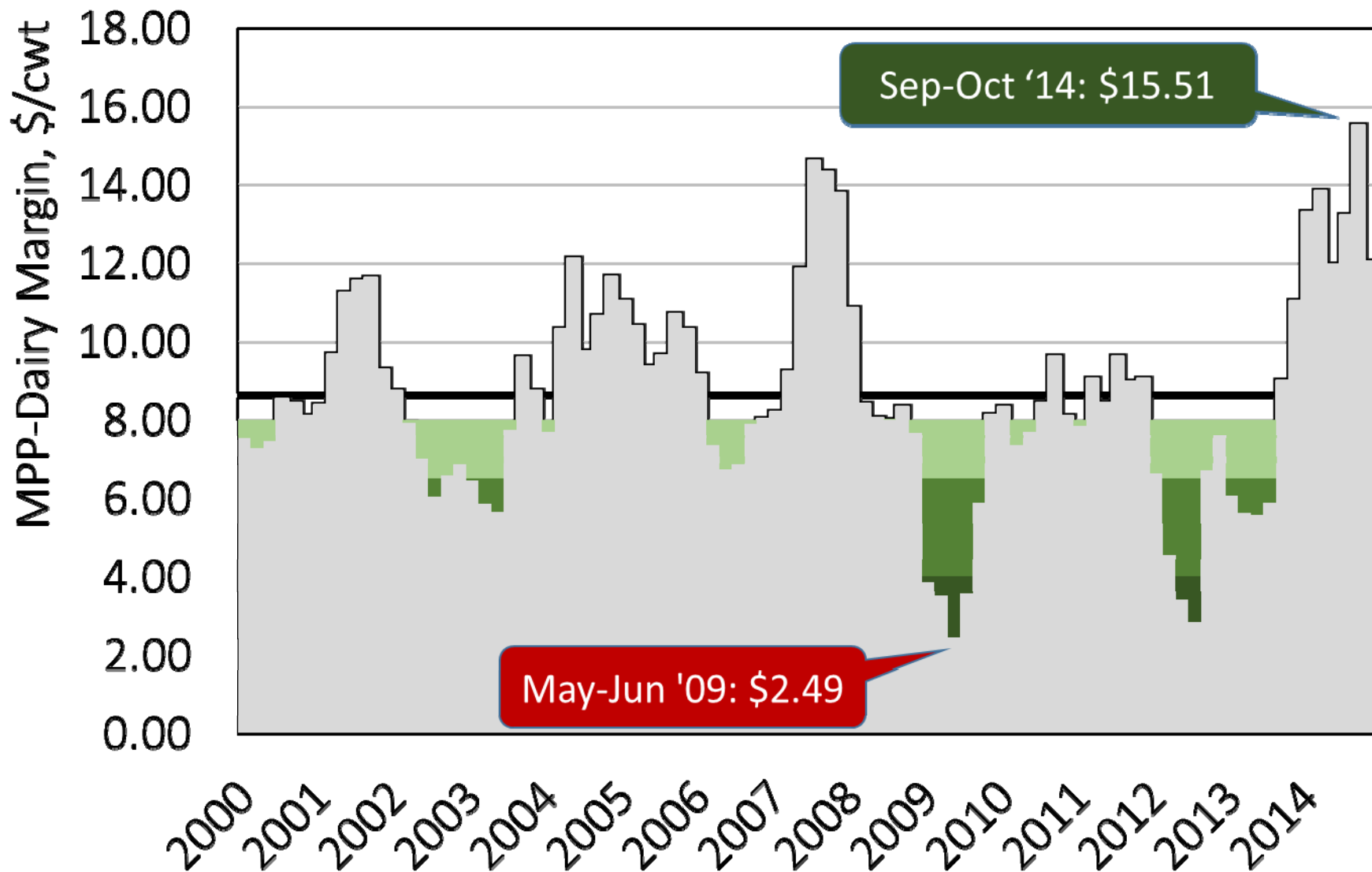
Actual Dairy Production Margin: Historical



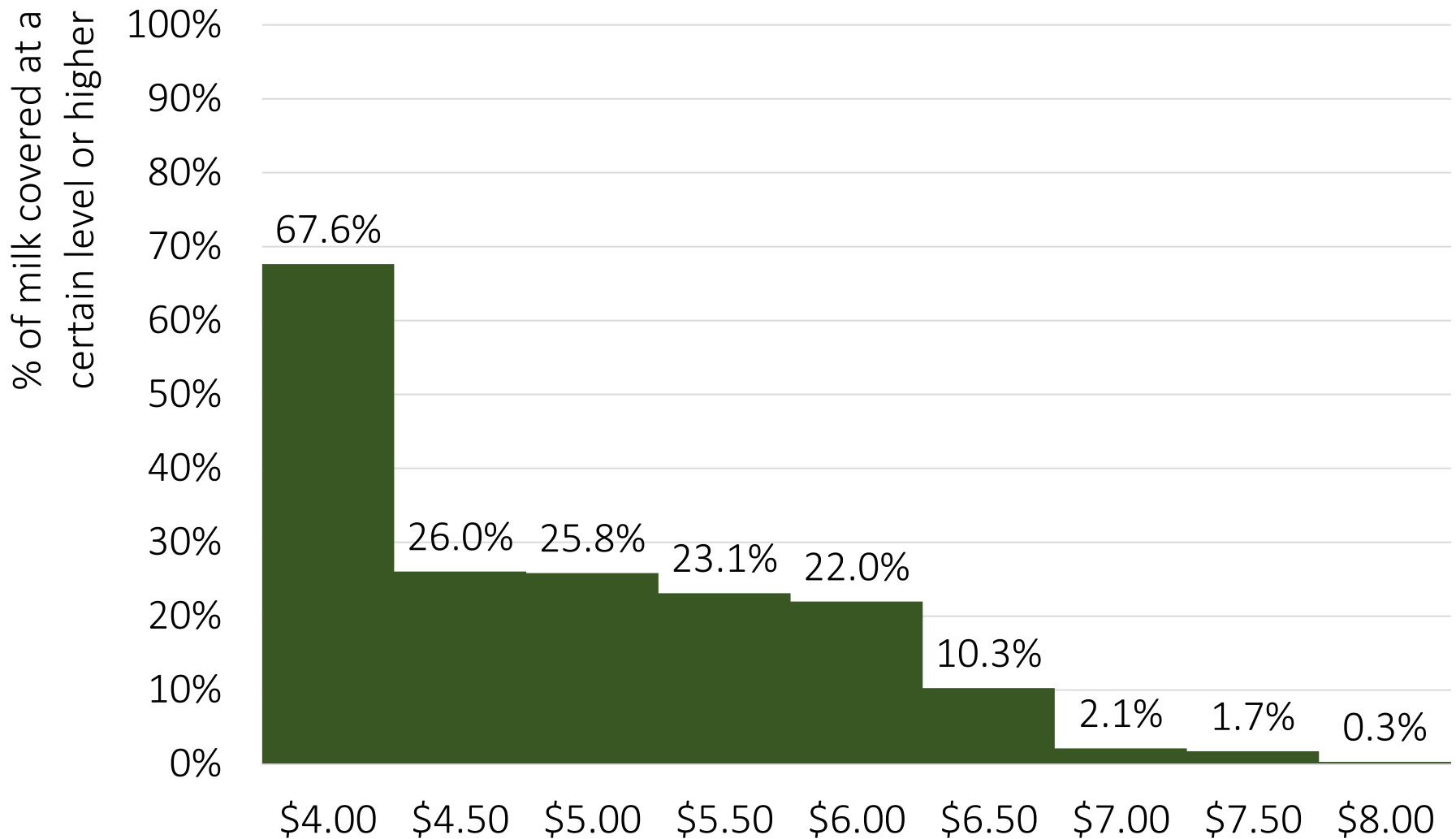
Actual Dairy Production Margin: Historical



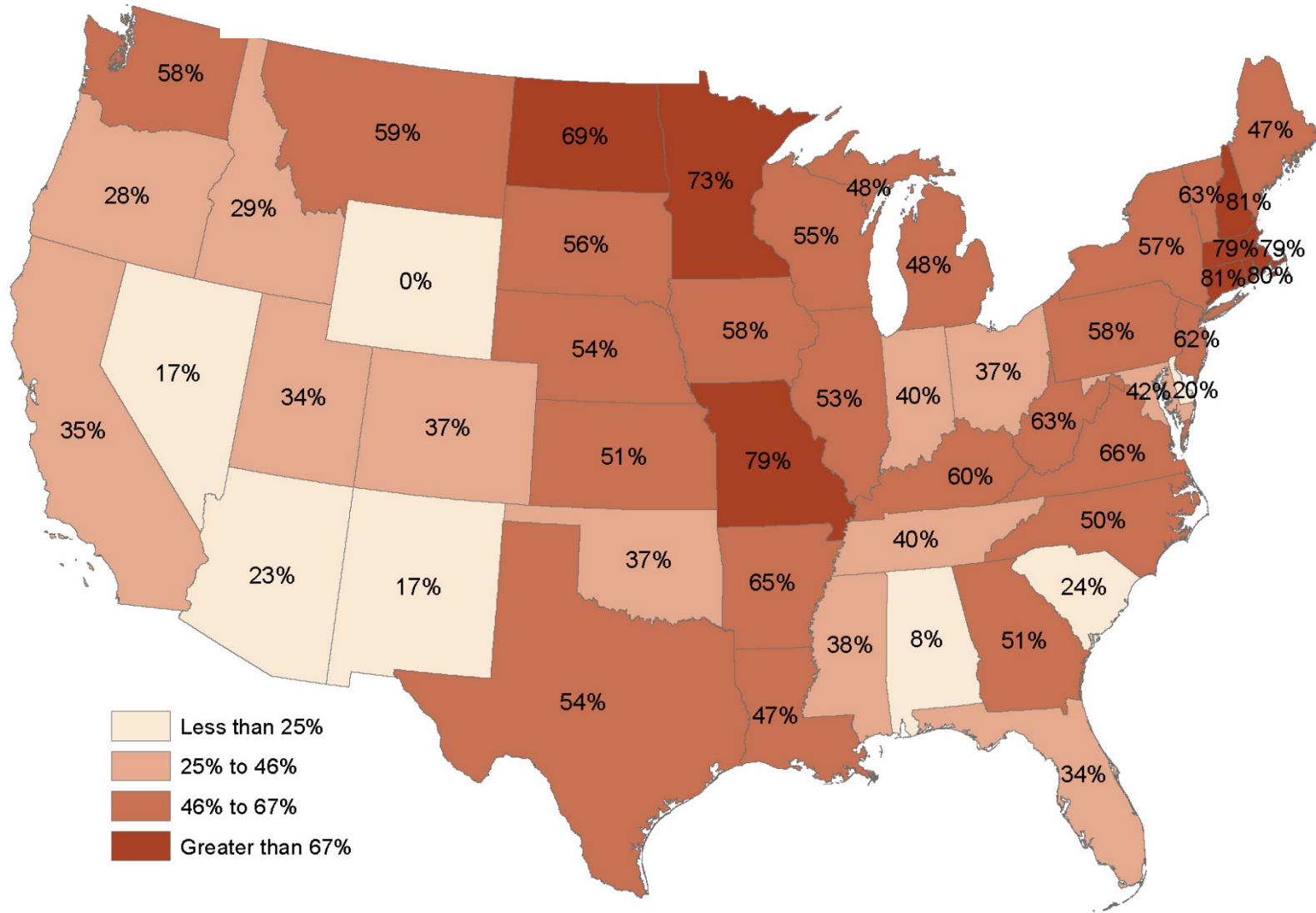
Actual Dairy Production Margin: Historical



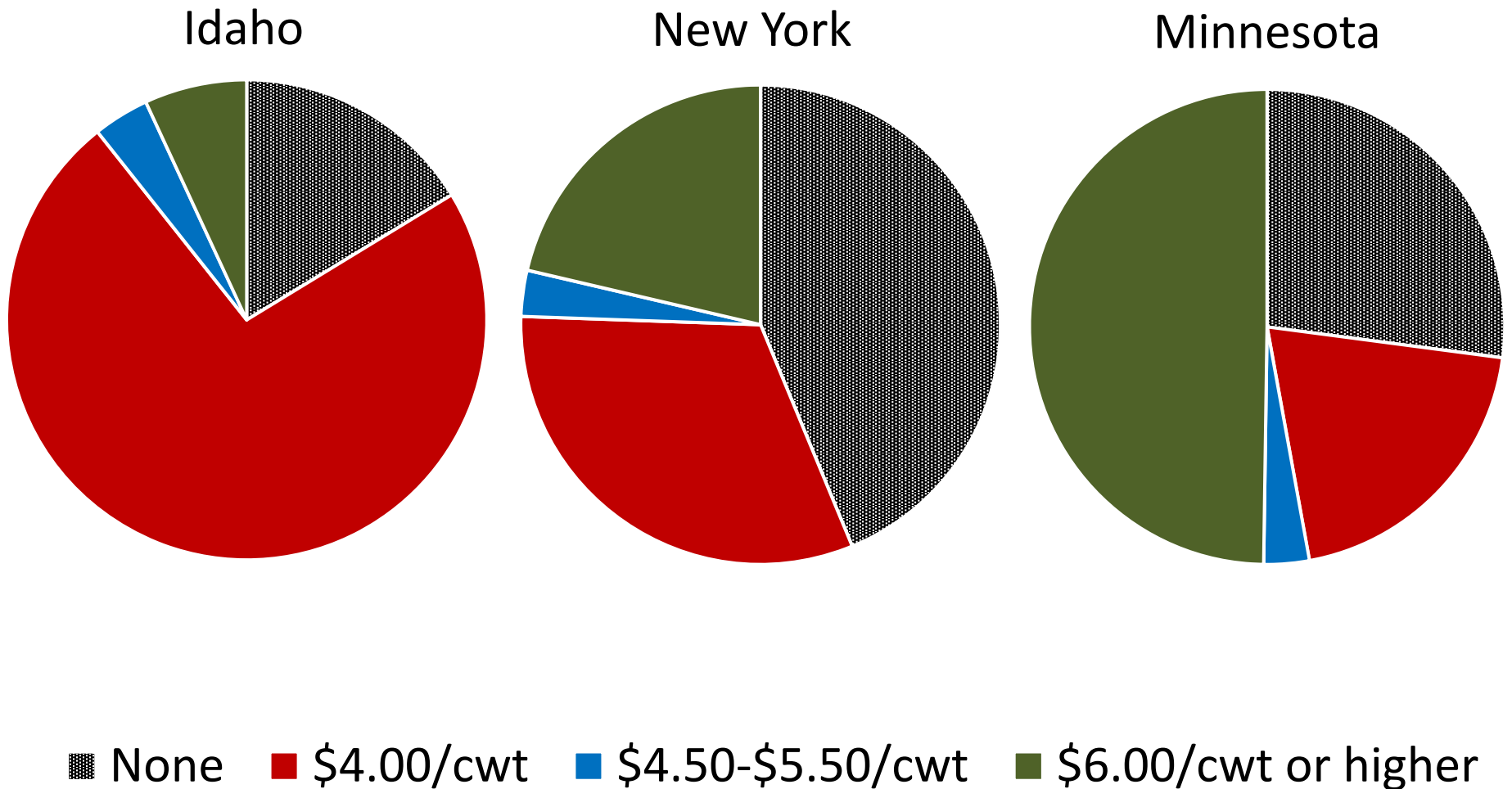
Percent of Expected 2015 Milk Production by MPP-Dairy Coverage Level (Cumulative)



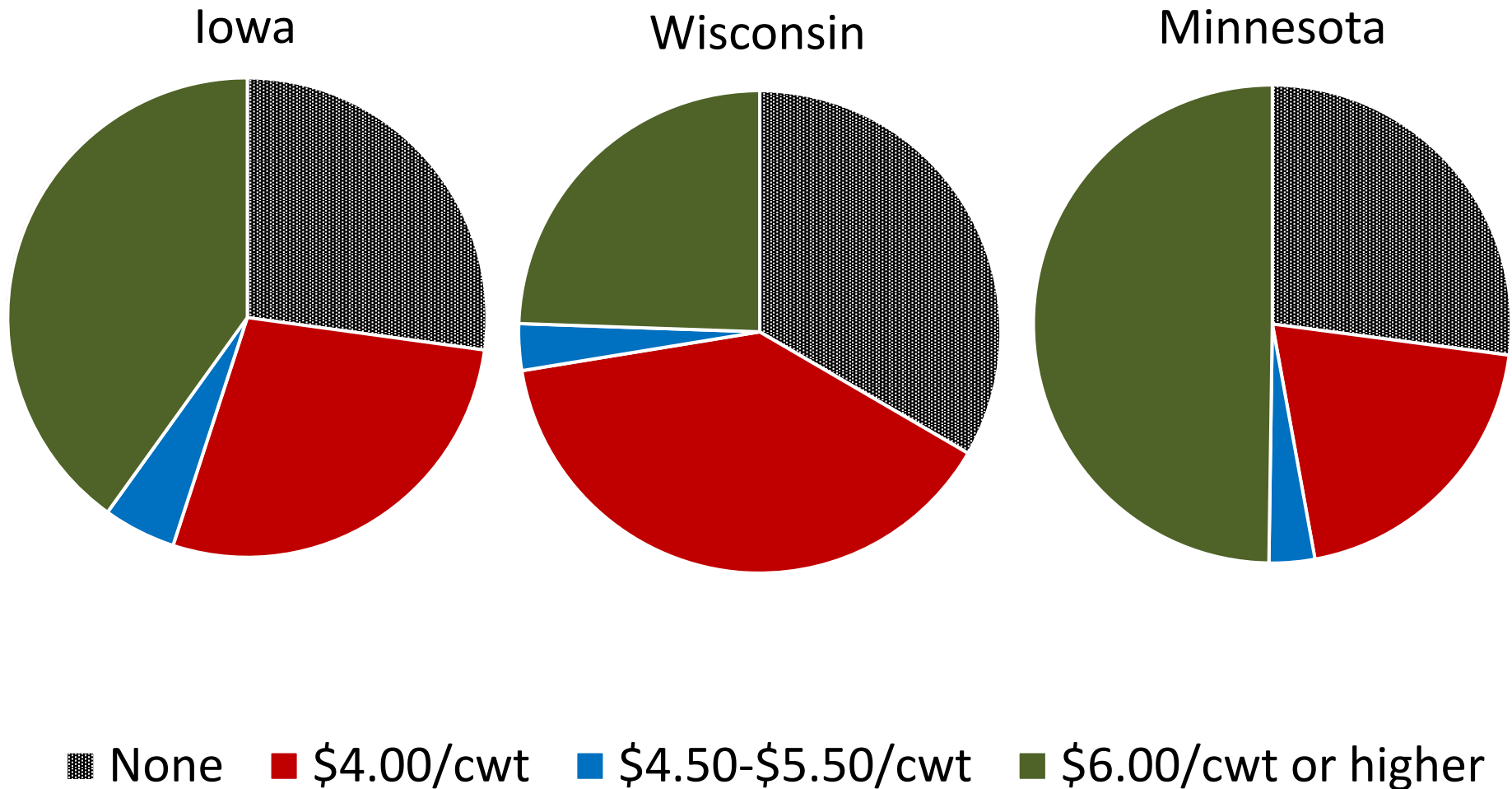
Percent of Enrolled Herds Buying Above \$4.00/cwt



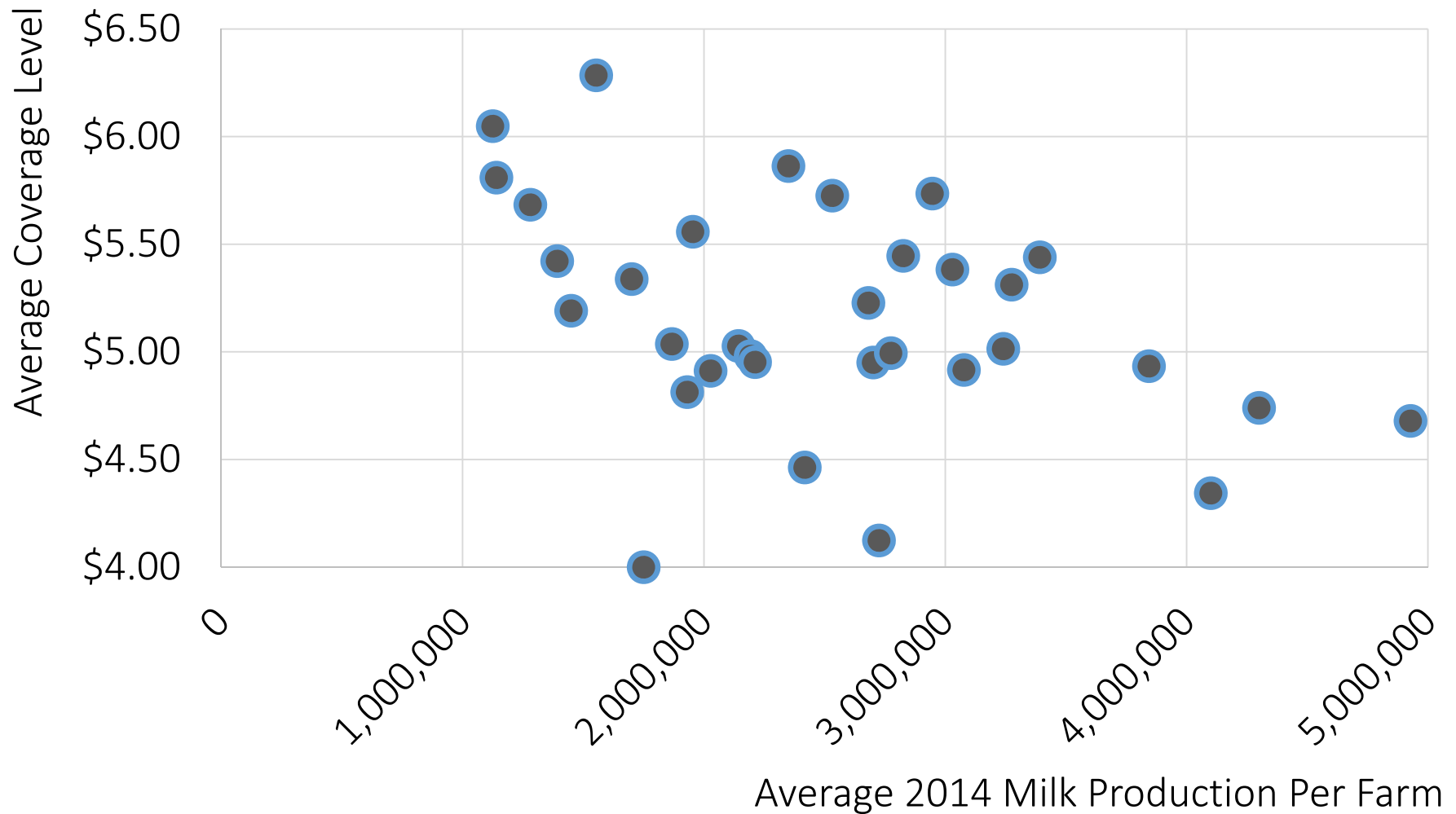
Percent of Expected 2015 Milk Production by MPP-Dairy Coverage Level



Percent of Expected 2015 Milk Production by MPP-Dairy Coverage Level

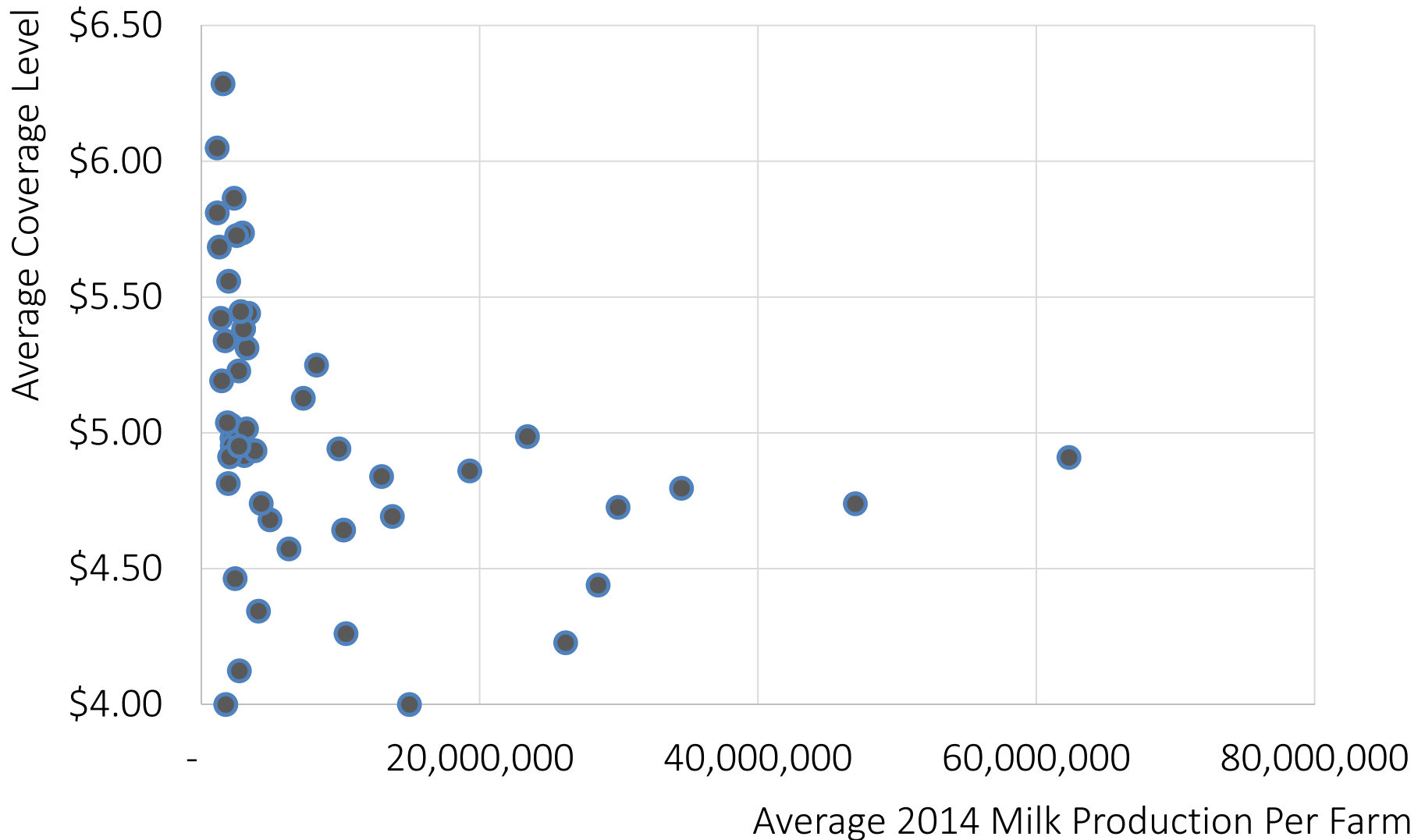


Avg. Farm Size in State vs Avg. Coverage Level Chosen



For 33 states with avg. farm production lower than 5 million lbs.

Avg. Farm Size in State vs Avg. Coverage Level Chosen



Willingness-to-Pay Estimates

Choice Experiment	WTP	% Opt out	Cov. Level	<=4mil	>4mil
High Margin Scenario	-\$0.89/cwt	52.9%	\$4.00	\$0.00	\$0.00
			\$4.50	\$0.01	\$0.02
Moderate Margin Scenario	\$0.06/cwt	42.4%	\$5.00	\$0.02	\$0.04
			\$5.50	\$0.04	\$0.10
Low Margin Scenario	\$0.17/cwt	26.6%	\$6.00	\$0.05	\$0.15
			\$6.50	\$0.09	\$0.29
Very Low Margin Scenario	\$0.31/cwt	22.8%	\$7.00	\$0.22	\$0.83
			\$7.50	\$0.30	\$1.06
			\$8.00	\$0.48	\$1.36

Registration Period For 2016



MPP-Dairy Registration & Annual Coverage Election Period Opens



Last Day to Register or Choose Coverage for 2016

MPP Coverage Levels and Premiums

Coverage Level	First 4mil lbs (\$/cwt)	Above 4 mil lbs (\$/cwt)
\$4.00	\$0.000	\$0.000
\$4.50	\$0.010	\$0.020
\$5.00	\$0.025	\$0.040
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Farm Name: Coverage Year: Actual Production History: lbs

Forecast Margin

Select Coverage

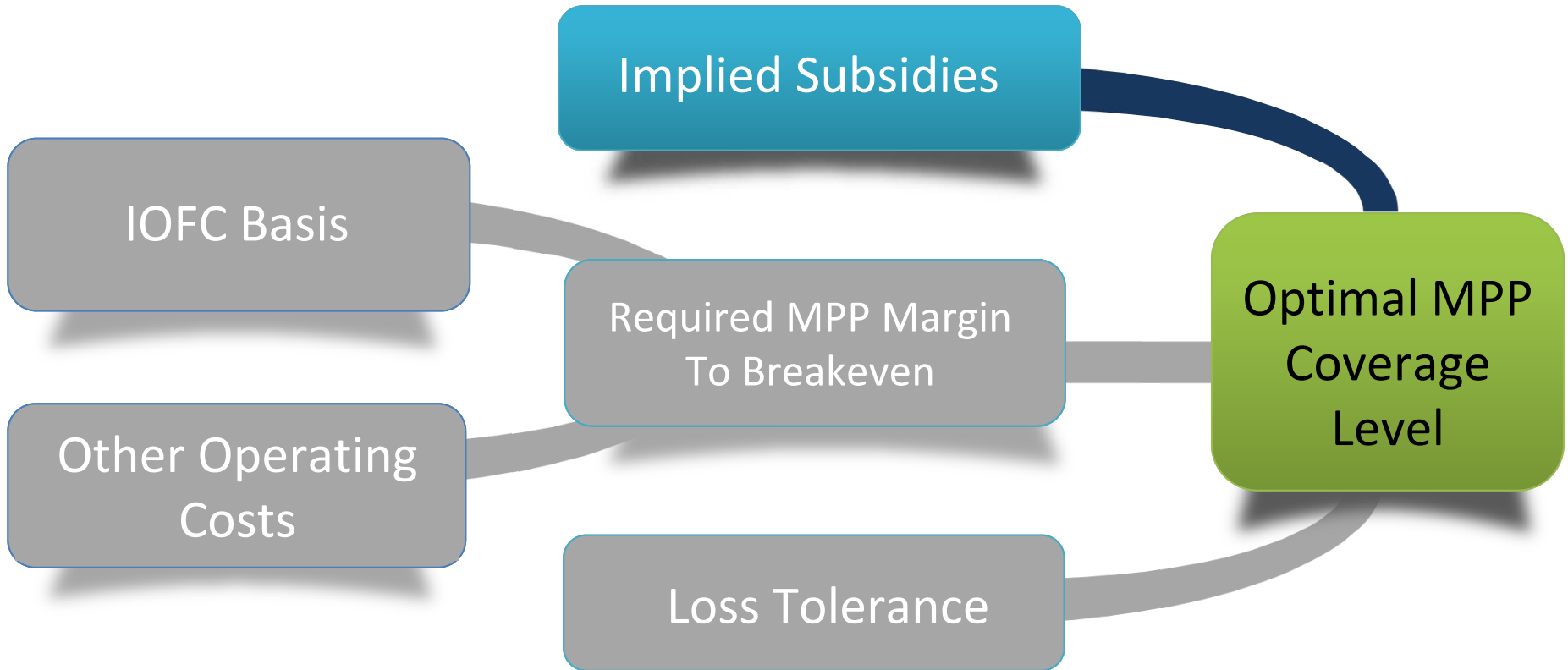
2015 Forecast Not

Include Actual Net Revenue Coverage Percentage =

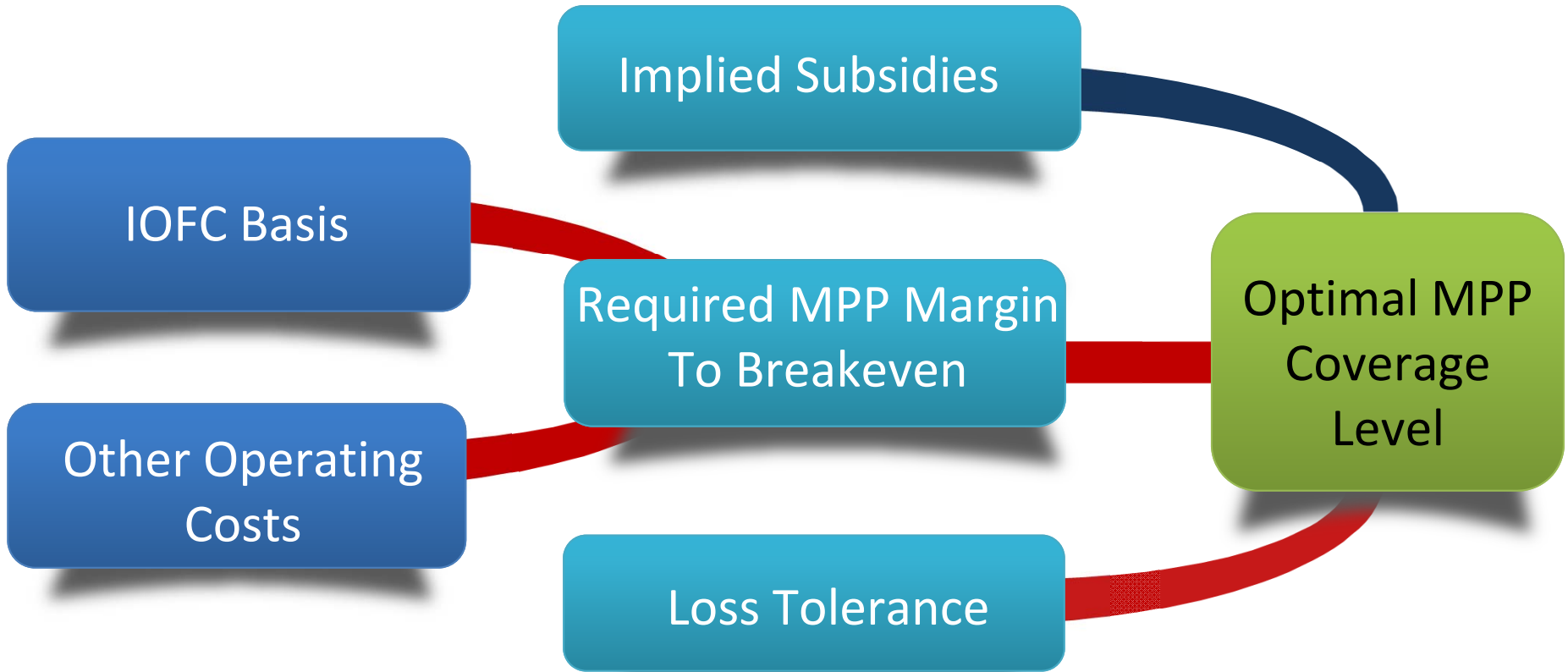
Coverage Level	Administrative Fees & Premiums	Expected Payment	Expected Net Returns
\$8.00	\$705,489	\$161,800	(\$543,689)
\$7.50	\$544,080	\$83,611	(\$460,469)
\$7.00	\$425,519	\$41,531	(\$383,988)
\$6.50	\$149,182	\$19,555	(\$129,628)
\$6.00	\$79,968	\$8,223	(\$71,745)
\$5.50	\$51,770	\$2,930	(\$48,840)
\$5.00	\$21,048	\$883	(\$20,165)
\$4.50	\$10,514	\$204	(\$10,310)
\$4.00	\$100	\$38	(\$62)

The Expected Payments and Net Returns are based on probabilities calculated from futures market data that were available on 03/25/2015. The "2015 Estimate" values are based on the actual margin calculations on 03/25/2015 as well as the forecast payments for remainder of the year.

How to make a well-reasoned risk management decision?



How to make a well-reasoned risk management decision?



Would MPP-Dairy Help Western Dairies?

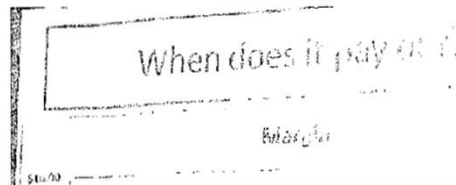
HOARD'S WEST

by Hoard's Dairyman staff

USDA's Margin Protection Program is functionally useless for Western dairies

IT DOESN'T take long looking at the 2014 Farm Bill's Margin Protection Program for Dairy (MPP-Dairy) to see that it won't be warmly received by dairies in the West.

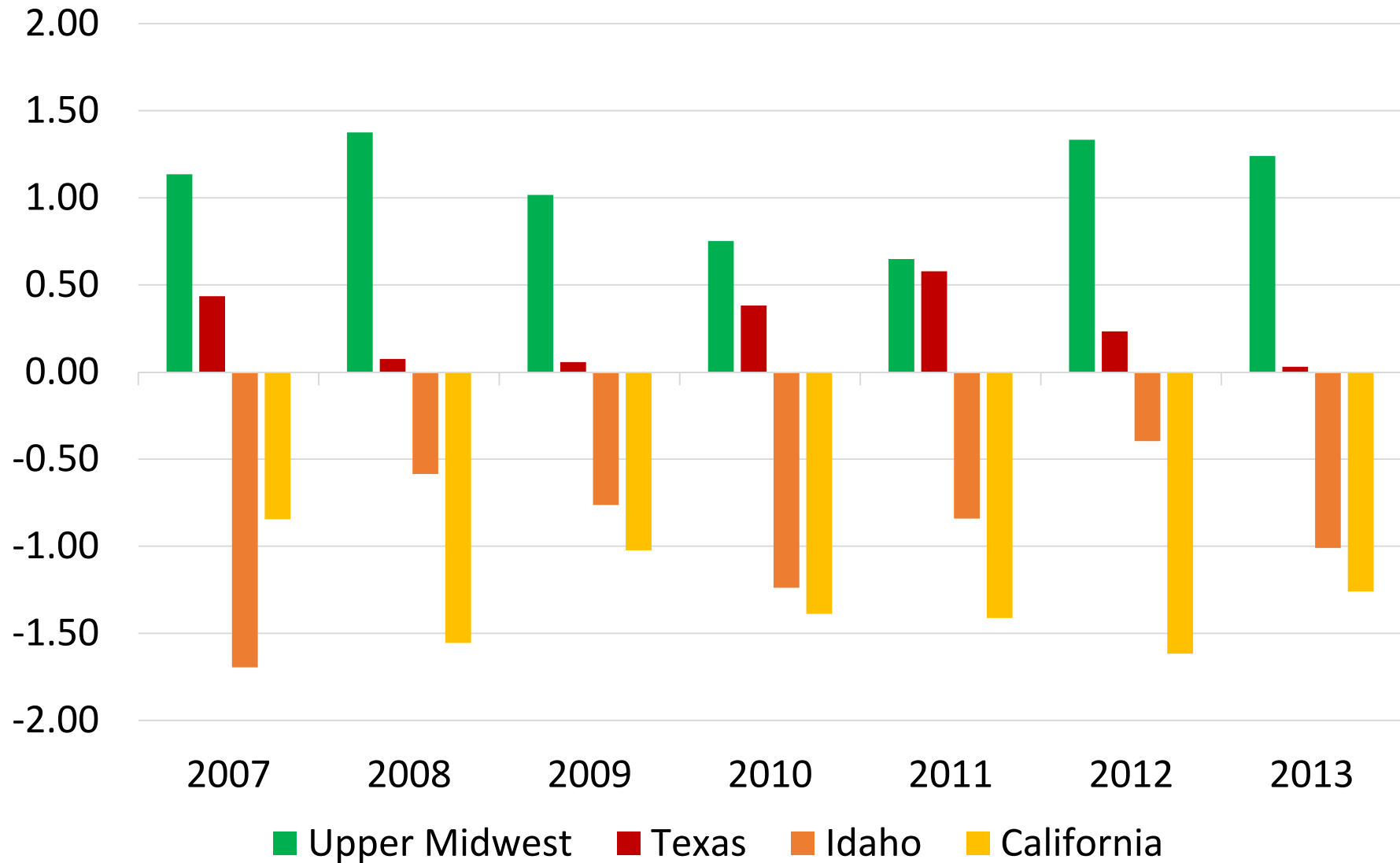
This blunt assessment of a tool that is supposedly meant to provide a degree of financial safety for all U.S. dairies was reinforced at a series of



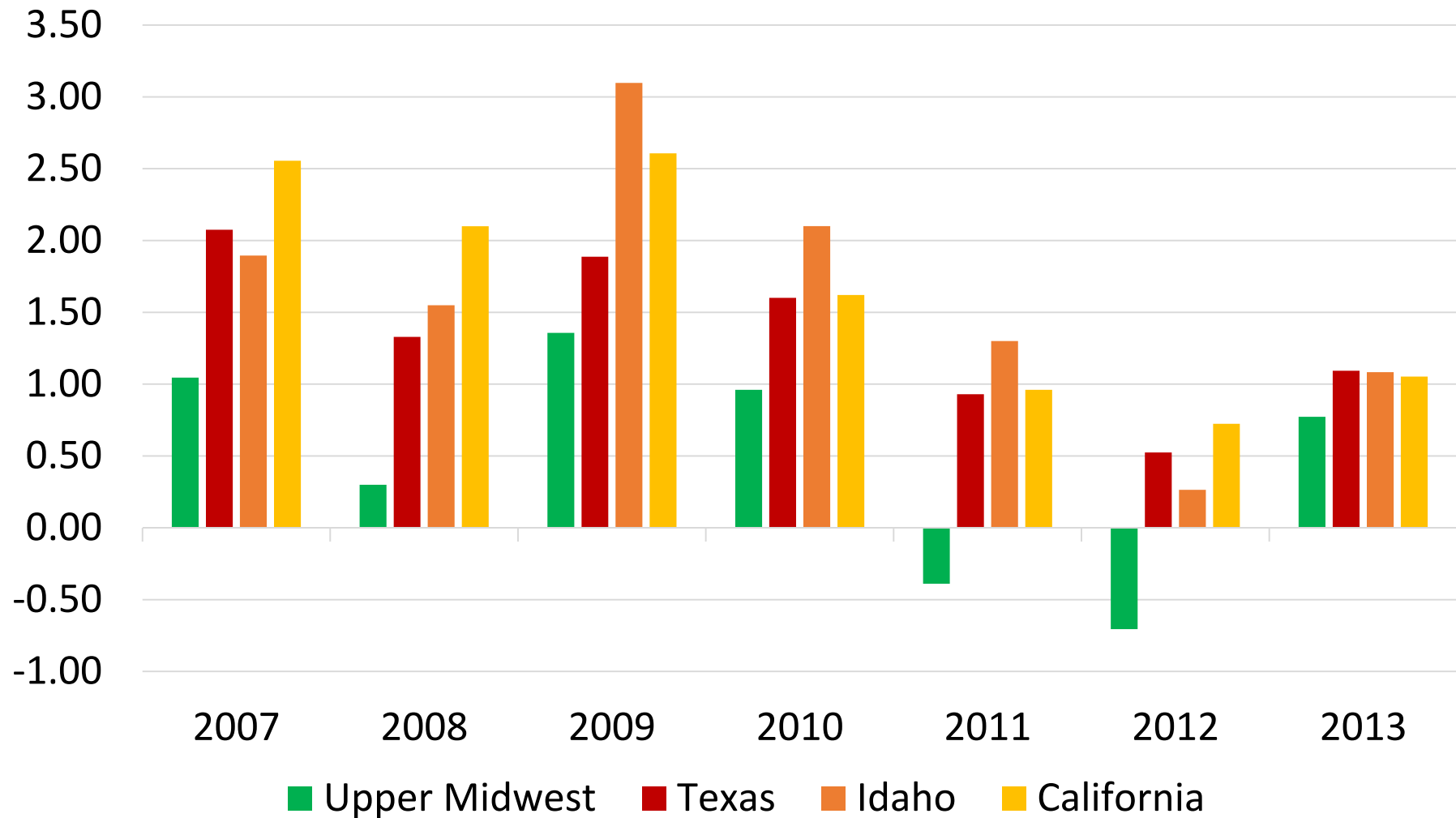
Economist Annie AcMoody showed a graph of income over feed cost margins dating back to 2006 that

- *“The situation in California is the worst of both worlds: Its all-milk price is consistently lower than the national average, and its feed costs are consistently higher. As a result; the state's margin since 2007 has averaged \$2.47 less than the national margin.”*
- *“As national margins erode, Western margins will drop lower because they already are lower. Profits will disappear faster. Losses will happen sooner and they will be bigger.”*

MPP-Dairy: Milk Price Basis (Region Minus US All-Milk)

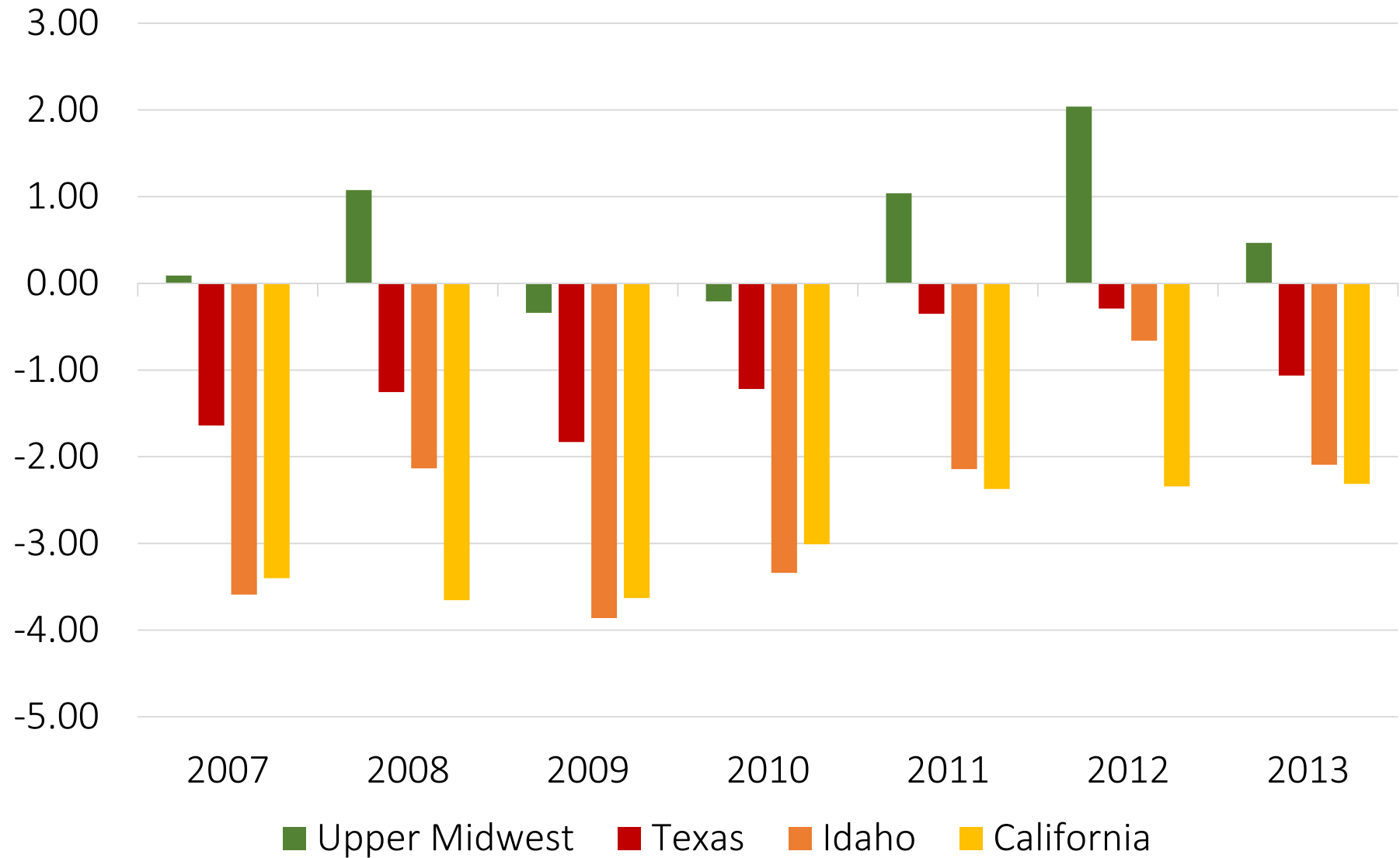


MPP-Dairy: Feed Cost Basis (Region Minus MPP Feed)

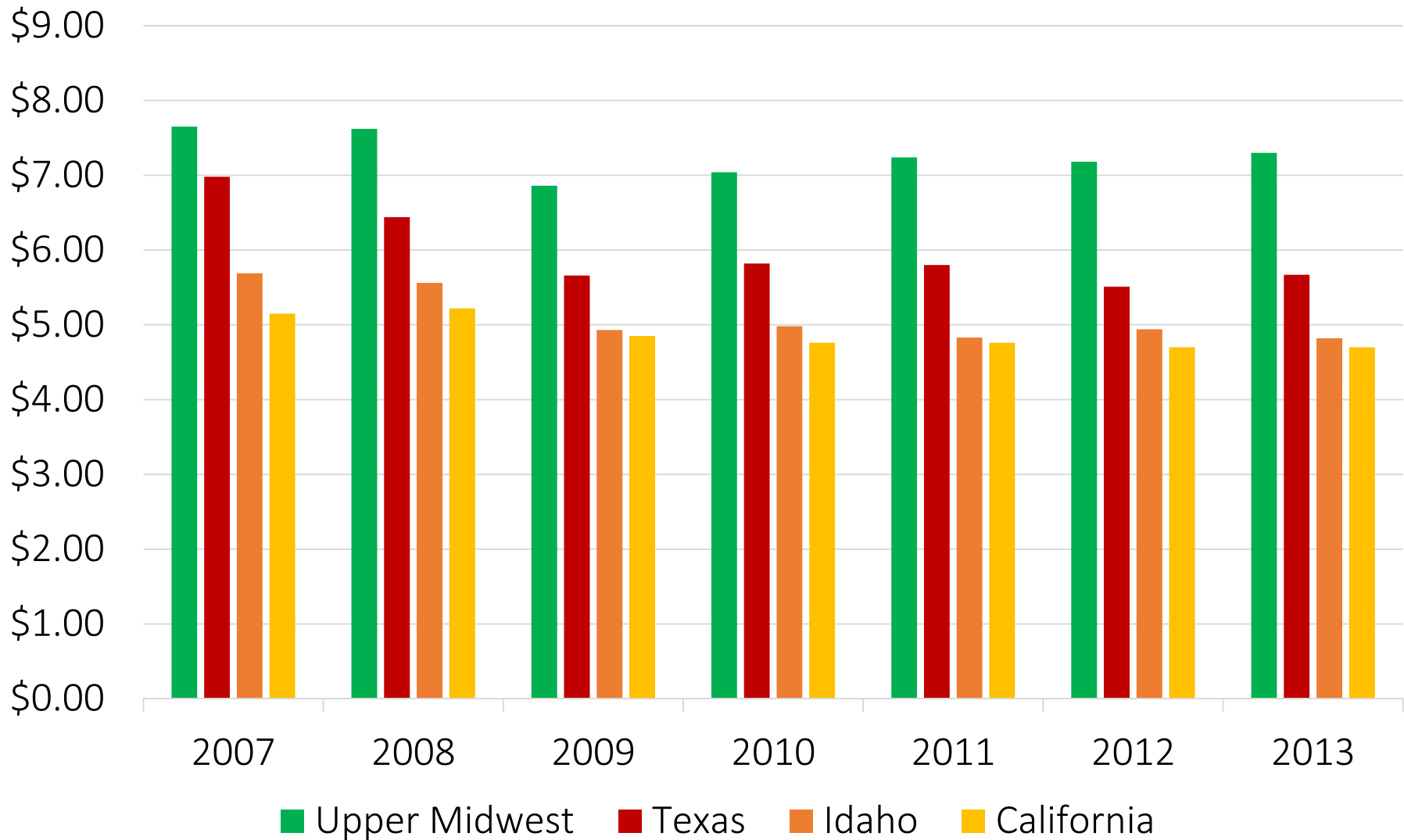


Homegrown feed valued at market prices. Replacement heifers feed costs included.

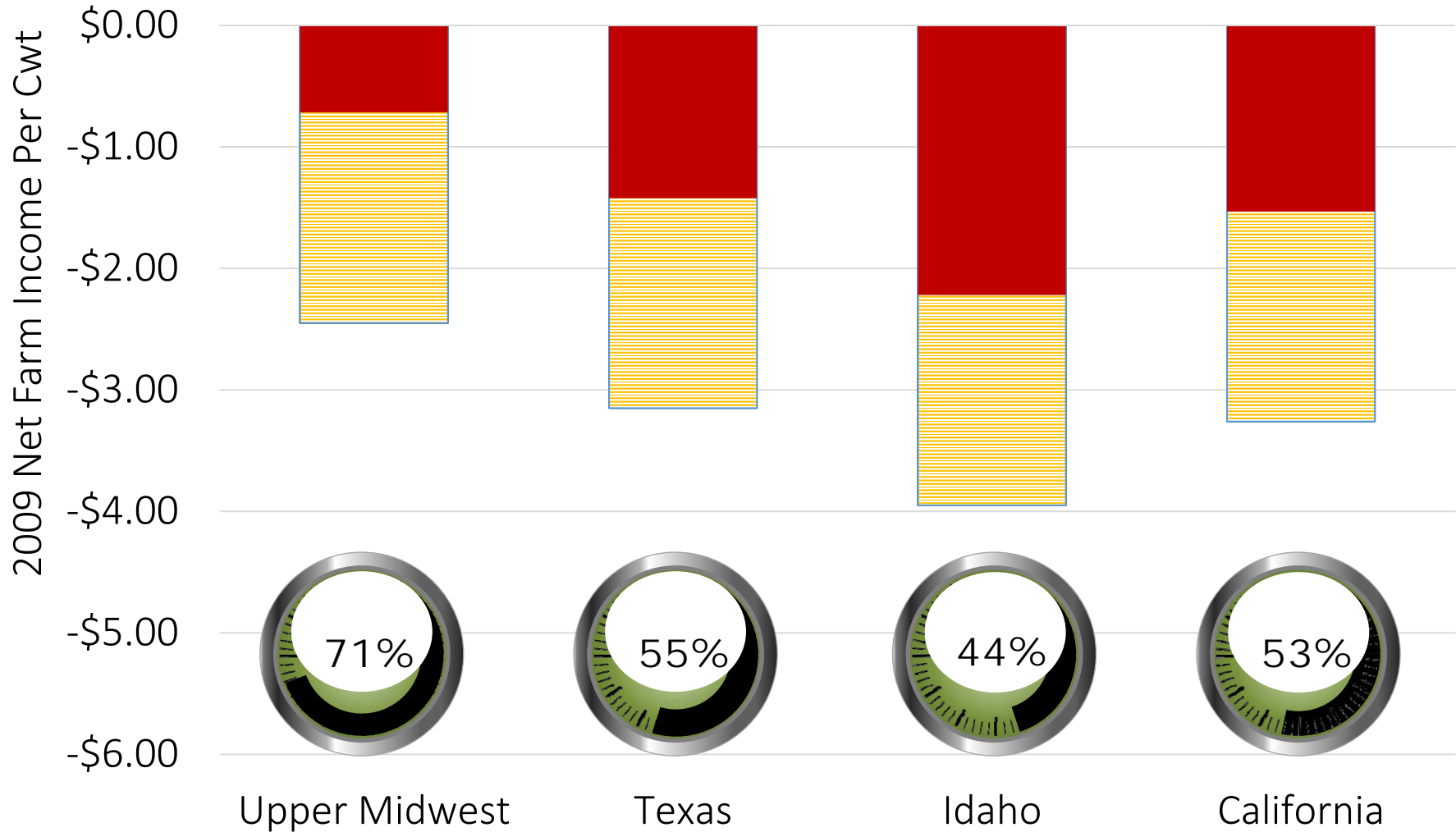
MPP-Dairy: Milk Income over Feed Costs Margin Basis



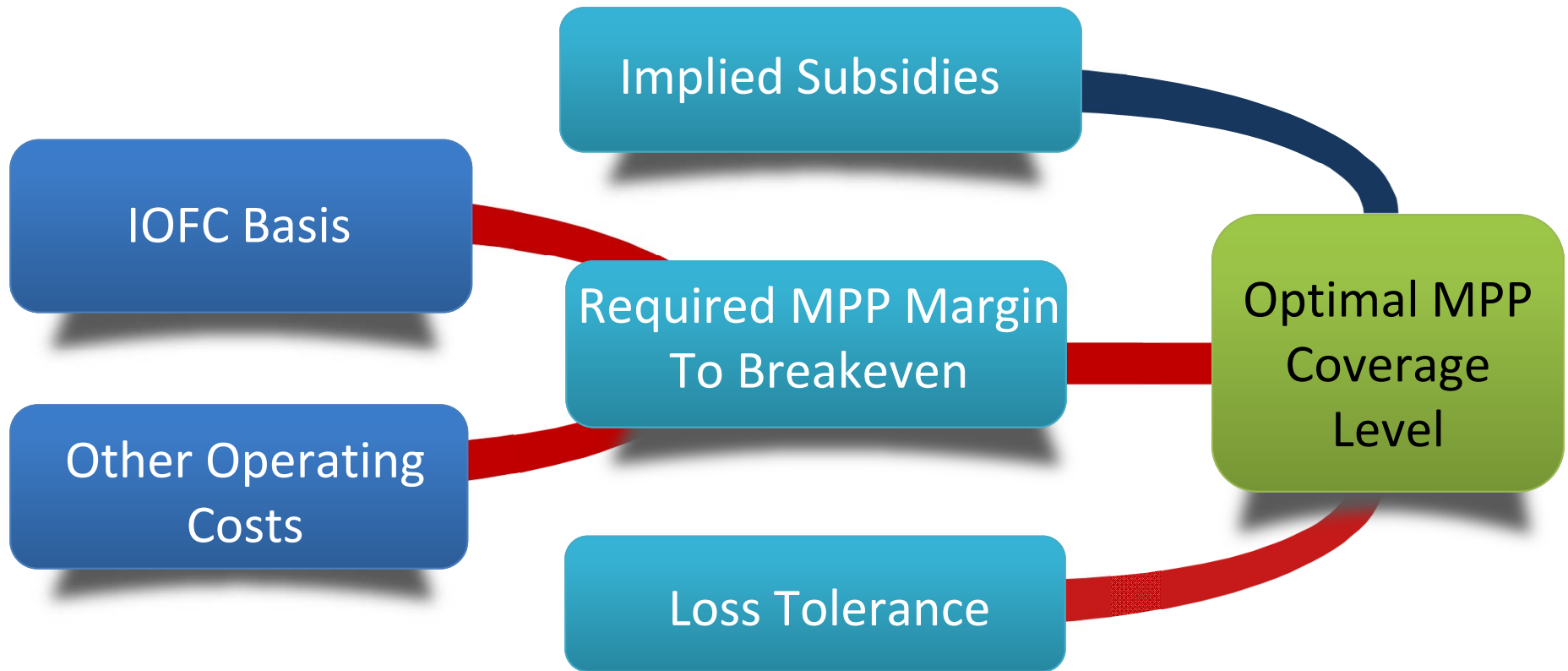
Other Operating Costs (Excluding Feed, Herd Replacement and Depreciation)



How much would MPP-Dairy help in a year like 2009?



How to make a well-reasoned risk management decision?



What Do We Need to Know?

1. Production and Prices
 - Number of Cows
 - Milk Per Cow
 - Non-Feed Expenses per Cwt
 - MPP-Dairy Basis
2. Farm Financial Measures
 - Working Capital Per Cow
 - Debt-to-Asset Ratio
 - Assets Per Cow
3. Risk Management Program

Case Study 1.

1. Production and Prices

- Number of Cows **4,000**
- Milk Per Cow **24,000**
- Non-Feed Expenses per Cwt **\$7.00/cwt**
- MPP-Dairy Basis **-\$2.00/cwt**

2. Farm Financial Measures

- Working Capital Per Cow **\$600/cow**
- Debt-to-Asset Ratio **45%**
- Assets Per Cow **\$7,000/cow**

3. Risk Management Program

MPP Cov. Percentage 90%, no CME hedging

Case 1: If MPP-Dairy margin in 2016 averages \$5.00/cwt

MPP CL	Profitability	Liquidity	Solvency
	Net Loss/Cwt	Working Capital/Cow	Debt-to-Asset Ratio
\$4.00	(\$4.86)	(\$567)	67.8%
\$4.50	(\$4.45)	(\$468)	66.4%
\$5.00	(\$4.04)	(\$369)	65.0%
\$5.50	(\$3.67)	(\$280)	63.7%
\$6.00	(\$3.29)	(\$189)	62.4%
\$6.50	(\$2.99)	(\$117)	61.4%
\$7.00	(\$3.08)	(\$138)	61.7%
\$7.50	(\$2.87)	(\$88)	61.0%
\$8.00	(\$2.55)	(\$12)	59.9%

Case Study 1b.

1. Production and Prices

- Number of Cows **4,000**
- Milk Per Cow **24,000**
- Non-Feed Expenses per Cwt **\$7.00/cwt**
- MPP-Dairy Basis **-\$2.00/cwt**

2. Farm Financial Measures

- Working Capital Per Cow **\$600/cow**
- Debt-to-Asset Ratio **45%**
- Assets Per Cow **\$7,000/cow**

3. Risk Management Program

MPP Cov. Percentage 90%; \$7.00/cwt @ 40%

Case 1b: If MPP-Dairy margin in 2016 averages \$5.00/cwt

MPP CL	Profitability	Liquidity	Solvency
	Net Loss/Cwt	Working Capital/Cow	Debt-to-Asset Ratio
\$4.00	(\$3.26)	(\$183)	62.3%
\$4.50	(\$2.85)	(\$84)	60.9%
\$5.00	(\$2.44)	\$15	59.5%
\$5.50	(\$2.07)	\$104	58.2%
\$6.00	(\$1.69)	\$195	56.9%
\$6.50	(\$1.39)	\$267	55.9%
\$7.00	(\$1.48)	\$246	56.2%
\$7.50	(\$1.27)	\$296	55.5%
\$8.00	(\$0.95)	\$372	54.4%

Case Study 2.

1. Production and Prices

- Number of Cows **400**
- Milk Per Cow **24,000**
- Non-Feed Expenses per Cwt **\$10.50/cwt**
- MPP-Dairy Basis **\$1.00/cwt**

2. Farm Financials

- Working Capital Per Cow **\$1100/cow**
- Debt-to-Asset Ratio **35%**
- Assets Per Cow **\$13,000/cow**

3. Risk Management Program

MPP Cov. Percentage 90%, no CME hedging

Case 2: If MPP-Dairy margin in 2016 averages \$5.00/cwt

MPP CL	Profitability	Liquidity	Solvency
	Net Loss/Cwt	Working Capital/Cow	Debt-to-Asset Ratio
\$4.00	(\$5.36)	(\$187)	46.7%
\$4.50	(\$4.95)	(\$87)	46.0%
\$5.00	(\$4.53)	\$12	45.2%
\$5.50	(\$4.14)	\$106	44.5%
\$6.00	(\$3.75)	\$201	43.8%
\$6.50	(\$3.40)	\$284	43.1%
\$7.00	(\$3.31)	\$306	43.0%
\$7.50	(\$3.04)	\$371	42.5%
\$8.00	(\$2.72)	\$448	41.9%

Towards the Integrated Dairy Risk Management Tool

MPP-Dairy Stress-Test Calculator



Production & Prices

Cows	4,000
Milk Per Cow (lbs/yr)	24,000
Expenses, Other than Feed (\$/cwt)	\$7.00
Worst-Case IOFC Basis over MPP (\$/cwt)	-\$2.00

Risk Management

MPP-Dairy: Production History	92,000,000
MPP-Dairy: Coverage Percentage	90%
CME & Other: % of 2016 Milk and Feed Hedged	40%
CME & Other: Average Hedged IOFC	7.00

Financials

Working Capital Per Cow	\$600
Assets Per Cow	\$7,000
Debt-to-Asset Ratio (At Market Value)	45%
Effect of Crisis on Assets Value	-12%

Scenario: Average MPP-Dairy Margin in 2016 5.00

Diagnostics

Expected 2016 Milk Production	96,000,000
Cash-Flow Breakeven Net MPP-Dairy Coverage Level	\$9.00
Debt-to-Asset After Asset Devaluation	51%

Coverage Level	MPP-Dairy		Profitability	Liquidity	Solvency
	Premium Costs		Net Income	Working Capital/Cow	Debt-to-Asset Ratio
	\$	\$/cwt	\$/cwt	\$/cow	%
\$4.00	\$100	\$0.00	(\$3.26)	(\$183)	62.3%
\$4.50	\$16,260	\$0.02	(\$2.85)	(\$84)	60.9%
\$5.00	\$32,620	\$0.04	(\$2.44)	\$15	59.5%
\$5.50	\$80,500	\$0.10	(\$2.07)	\$104	58.2%
\$6.00	\$124,440	\$0.15	(\$1.69)	\$195	56.9%
\$6.50	\$232,220	\$0.28	(\$1.39)	\$267	55.9%
\$7.00	\$662,820	\$0.80	(\$1.48)	\$246	56.2%
\$7.50	\$847,380	\$1.02	(\$1.27)	\$296	55.5%
\$8.00	\$1,090,780	\$1.32	(\$0.95)	\$372	54.4%

Acknowledgements



WHEE!

**Dairy Risk Management:
The Black Swan Approach**

April 30, 2015

NWDEPA 2015

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