MPP Decision Guide 15-02

Case Studies with MPP-Dairy Financial Stress-test Calculator: A Young Dairy Family in Minnesota

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A financial stress-test tool has been created to help dairy farm managers in determining how MPP-Dairy might assist in farm financial risk management. This case study illustrates the use of the stress-test tool by a young dairy family in Minnesota.

The National Program on Dairy Markets and Policy released Advanced MPP-Dairy Calculator in July 2015 to support risk management decision making by U.S. dairy producers. The advanced tool enables dairy producers to create their own stress-test scenario with low milk prices, high feed costs or a combination of both. The tool evaluates the impact of low IOFC margins on a dairy farm profitability, liquidity and solvency. In this case study, produced in collaboration with Farm Business Management Education Program of the Riverland Community College, we illustrate the use of tool by a young dairy family in Minnesota.

Case Study: B & K Dairy

Bob and Kelly Peterson have operated B & K Dairy for 4 years. After graduating from college with honors, Bob wanted to return to the farm and his parents wanted to sell him the cows. The plan was to purchase the cows from his parents, rent the land and lease the machinery from his parents. Bob and Kelly entered into a contract with his parents for the cows with payments coinciding with the sale of cull cows over the next 4 – 5 years. Bob and Kelly were married two years ago. Kelly works off the farm after completing her degree, but provides considerable help with the calves. Bob and Kelly are milking 233 cows in their herd. Good quality genetics had been used on the farm for many years, but the production was less than they had desired. They recently identified stray voltage as causing abortions and cow loss. Since taking over the operation the milk production has improved and pregnancy rates have skyrocketed. Expected yield in 2016 is 20,500 pounds per cow annually, so they expect to ship 4,776,500 pounds of milk in 2016. Their MPP-Dairy Production History, as established on the form CCC-781 in 2014, was 4,060,025. Because they participated in MPP-Dairy in 2015, their production history from form CCC-781 has been multiplied by 1.0087 and by 1.0261 for 2016, so the total production history for 2016 is 4,202,235 pounds.

B & K Dairy Balance Sheet 1/1/2016

Current Assets	$324,254	Current Liabilities	$133,868
Intermediate Assets	$762,124	Intermediate Liabilities	$430,767
Long Term Assets	$50,109	Long Term Liabilities	$0
Personal Assets	$42,300	Personal Liabilities	$24,129
Total Assets	**$1,178,787**	**Total Liabilities**	**$564,635**
		Equity	**$590,023**

Working with their Farm Business Management instructor, Bob and Kelly calculated that the milk production expenses other than feed are likely to be $415,812 in 2016, or $8.69 per hundredweight. In 2015, cull cows and bull calves have netted them $3.87/cwt, but with the expected decline in beef prices, Bob and Kelly decided to use a conservative estimate of $1.82/cwt for other revenue in 2016. To be conservative, Bob and Kelly used -$1.25/cwt for worst-case scenario income-over-feed-cost margin basis relative to MPP-Dairy margin.

Production & Prices	
Cows	233
Milk Per Cow (lbs/yr)	20,500
Expenses, Other than Feed ($/cwt)	$8.69
Worst-Case IOFC Basis over MPP ($/cwt)	-$1.25
Other Revenue (beef, crops, etc.) ($/cwt)	$1.87
Risk Management	
MPP-Dairy: Production History	4,202,235
MPP-Dairy: Coverage Percentage	90%
CME & Other: % of 2016 Milk and Feed Hedged	0%
CME & Other: Average Hedged IOFC	
Financials	
Working Capital Per Cow	$817
Assets Per Cow	$7,375
Debt-to-Asset Ratio (At Market Value)	48%
Effect of Crisis on Assets Value	-10%
Scenario: Average MPP-Dairy Margin in 2016	$9.25
Diagnostics	
Expected 2016 Milk Production	4,776,500
Cash-Flow Breakeven MPP-Dairy Margin	$8.07

From their balance sheet, they calculated working capital per cow to be $817/cow. This number was obtained as the difference between current assets ($324,254) and current liabilities ($133,868), divided by the number of milking cows (233). Dividing total assets ($1,178,787) by the number of milking cows (233), they calculated assets per cow to be $7,375/cow. Dividing total liabilities ($564,635) by total assets ($1,178,787), they calculated debt-to-asset ratio to be 47.89%. Bob believes the value of his assets would decline by 10% in case of a major crisis. The figure on the right side shows the B & K Dairy farm profile based on these numbers.

Bob believes that MPP-Dairy margins will be around $7.00/cwt for 2016, but he also wants to make sure his farm is well protected in case of a large and unexpected downtown in margins. For that reason he ran the MPP-Dairy Advanced Tool with margins adjusted downward to $4.22/cwt in 2016.

In deciding what MPP-Dairy coverage level to choose for 2016, Bob and Kelly assessed the following questions:

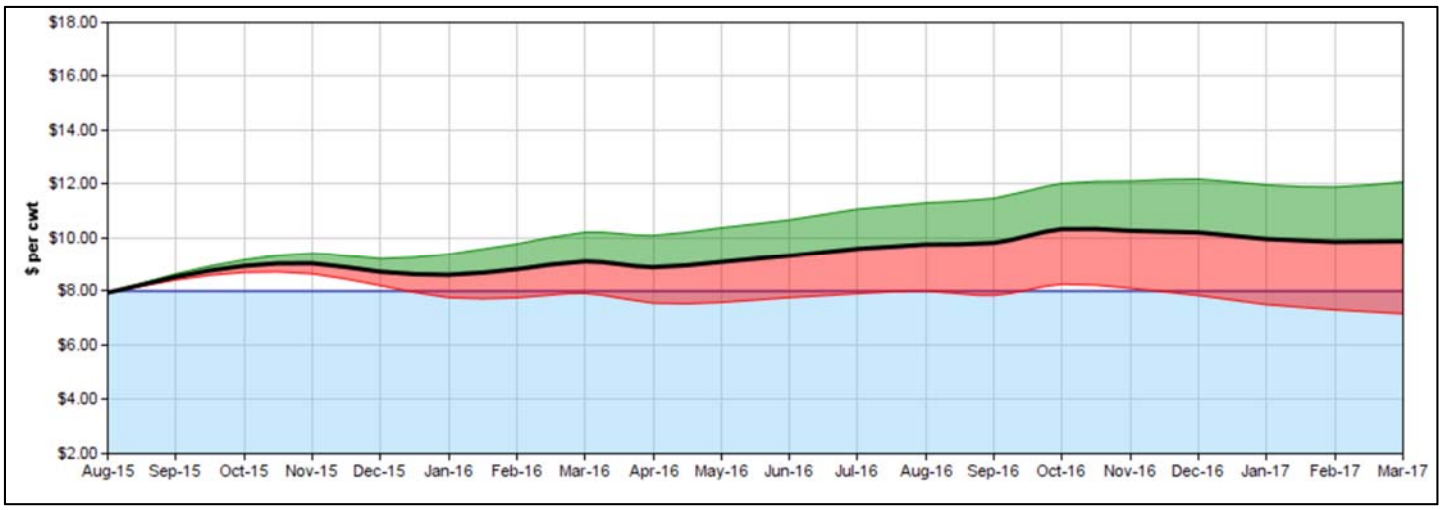
1) **What is the farm's financial risk exposure?**

Given B & K costs of production, basis and other revenue, their cash-flow break-even MPP-Dairy margin is $8.07/cwt. If the margins decline to $7.00/cwt, they would lose $1.07/cwt or $51,109 (($8.07-$7.00) x 47,765 cwt). In case of a major unexpected decline, with margins declining to $4.22/cwt in 2016, they would lose $183,895.

2) **How large is the potential loss a farm business can afford? And how will the farm business deal with the losses if they occur?**

Given their high leverage, Bob and Kelly would want to make sure they do not lose more than $2.00/cwt. Any loses less than $2.00/cwt can be temporarily absorbed by partially delaying payments to Bob's parents, but it would be difficult to secure more long-term debt from the bank in the event of larger losses.

Stress-Test Scenario 1: Expected 2016 MPP-Dairy Margins

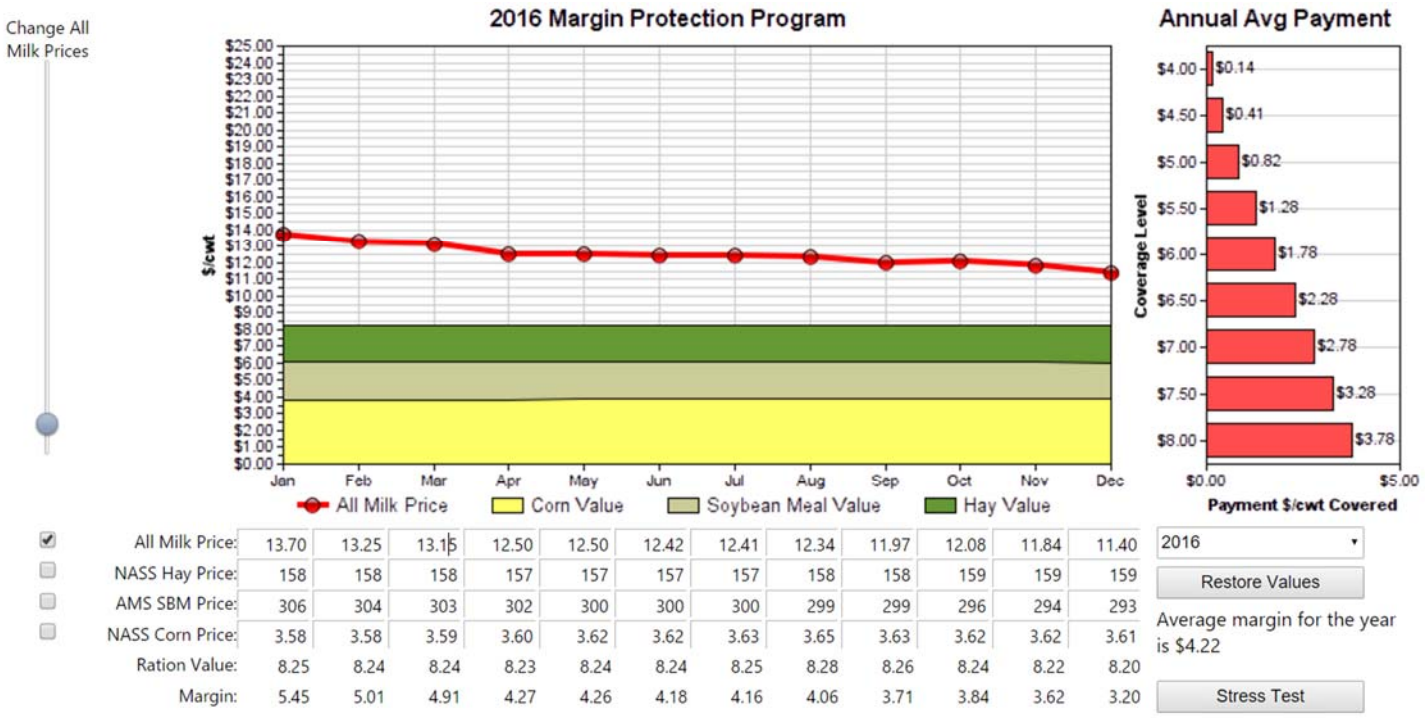


Margin Level	Sep-Oct 2015	Nov-Dec 2015	Jan-Feb 2016	Mar-Apr 2016	May-Jun 2016	Jul-Aug 2016	Sep-Oct 2016	Nov-Dec 2016	Jan-Feb 2017
Expected	$8.74	$8.88	$8.71	$9.0	$9.21	$9.68	$10.08	$10.24	$9.91
< $8.00	-	7%	31%	30%	30%	25%	24%	25%	31%
< $7.50	-	1%	18%	20%	21%	18%	18%	19%	25%
< $7.00	-	-	9%	13%	14%	12%	13%	14%	20%
< $6.50	-	-	4%	7%	8%	8%	8%	9%	16%
< $6.00	-	-	1%	3%	5%	4%	5%	6%	12%
< $5.50	-	-	-	1%	3%	3%	3%	4%	8%
< $5.00	-	-	-	1%	1%	1%	1%	2%	6%
< $4.50	-	-	-	-	1%	1%	1%	1%	3%
< $4.00	-	-	-	-	-	-	-	-	2%

This table shows the expected margin and probability of a Payment in the two-month intervals protected by the insurance levels in the Margin Protection Plan. The Expected Marqin and Probabilities are calculated from futures market data available on 10/28/2015.

Bob and Kelly start their risk management planning by looking at the forecasted MPP-Dairy margins for 2016. At www.dairymarkets.org/MPP they find that on October 28, 2015 margins for 2016 are forecasted to be in $8.71-$10.24/cwt range for 2016. If this outlook were to materialize, their profit in 2016 would be at least $1.30/cwt, more if IOFC basis is better than -$1.25/cwt. In that scenario, no MPP-Dairy payments would occur, and purchasing protection at e.g. $6.50/cwt would reduce their net profit by 7 cents, down to $1.23/cwt. As of this date, probability of payments for $6.50/cwt coverage level is in the single digits, and overall, the market consensus seems to be that 2016 is going to be a reasonably good year for B & K dairy. But Bob and Kelly know that risk management is about protecting against *unexpected*, and given their low equity and consequently modest ability to ride out bad times, they turn to the MPP-Dairy Advanced Tool to help them plan for the adverse margin scenario.

Stress-Test Scenario 2: 2016 MPP-Dairy Margins Unexpectedly Decline to $4.22/cwt



If MPP-Dairy margins unexpectedly decline to $4.22/cwt in 2016, and B & K dairy chose $4.00/cwt coverage level, they would lose -$3.74/cwt, and short of taking any new long-term debt, their working capital per cow would decline from $817/cow to $50/cow. Because they do not own land or machinery, most of their assets are cows and their market value would decline, bringing B & K debt-to-asset ratio at market value up to 60.3%, even if they do not take any new loans. Given their preference to limit their losses to -$2.00/cwt, Bob and Kelly are considering choosing $6.50/cwt coverage level to protect against catastrophic downside risk.

	MPP-Dairy		Profitability	Liquidity	Solvency
	Premium Costs		Net Income	Working Capital/Cow	Debt/Asset Ratio
	Total $	$/cwt	$/cwt	$/cow	%
No MPP			-$3.85	$28	60.5%
$4.00	$100	$0.00	-$3.74	$50	60.3%
$4.50	$478	$0.01	-$3.53	$93	59.9%
$5.00	$1,046	$0.02	-$3.22	$156	59.2%
$5.50	$1,613	$0.03	-$2.87	$229	58.5%
$6.00	$2,180	$0.05	-$2.49	$306	57.8%
$6.50	$3,504	$0.07	-$2.12	$383	57.1%
$7.00	$8,307	$0.17	-$1.82	$444	56.5%
$7.50	$11,446	$0.24	-$1.49	$511	55.9%
$8.00	$18,065	$0.38	-$1.24	$563	55.5%

Conclusions

Producers like Bob and Kelly face trade-offs when choosing risk management strategies. For example, if 2016 turns out exactly as expected as of late October 2015, then having chosen e.g. $6.50/cwt coverage level would reduce B & K profits by a modest seven cents per hundredweight. On the other hand, in the stress-test scenario where margins decline to $4.22/cwt in 2016, MPP-Dairy $6.50/cwt coverage level would reduce their losses by $1.62/cwt and may make a difference between a difficult but manageable year, and a "black swan" event that may push B & K dairy out of business.

In choosing risk management strategy, Bob and Kelly considered not just dairy outlook and MPP-Dairy subsidies, but also their own costs of production, milk and feed price basis relative to MPP-Dairy, their balance sheet situation and the stress-test scenario in which milk prices dramatically and unexpectedly decline. The metrics Bob and Kelly will use to measure if their risk management strategy is effective will be profitability (capping the losses at manageable levels), liquidity (keeping working capital per cow above a desired threshold) and solvency (keeping debt-to-asset ratio lower than a critical threshold no matter what happens with milk or feed prices).

The DMaP Team includes Marin Bozic, University of Minnesota, Brian Gould, University of Wisconsin, Charles Nicholson, The Pennsylvania State University, Andrew Novakovic, Cornell University, Mark Stephenson, University of Wisconsin, Cameron Thraen, The Ohio State University, and Christopher Wolf, Michigan State University. With respect to any opinions, findings, conclusions, or recommendations, neither the United States Government, the University of Illinois, nor the National Program on Dairy Markets and Policy makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Users bear the sole responsibility for decisions affecting program participation and may want to consult other resources. The National Program on Dairy Markets and Policy is working with the University of Illinois led consortium National Coalition for Producer Education, which is supported by the U.S. Department of Agriculture, Farm Service Agency, under Agreement No. 58-0210-4-002 N. This material is based upon work supported by USDA/NIFA under Award Number 2012-49200-20032.