MPP Decision Guide 15-03

Case Studies with MPP-Dairy Financial Stress-test Calculator: The Costs and Benefits of Homegrown Feeds on a Dairy 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 mature 145-cow dairy farm in Minnesota that grows livestock feed on the farm.

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 mature dairy farm in Minnesota. This case study illustrates the costs and benefits of homegrown feeds on a dairy, instead of purchasing all the feed.

Case Study: Crosswind Holsteins

Rita and Kirk Stedleaf have owned and operated their farm (Crosswind Holsteins) since 1987 after farming with Rita's father for five years. They are both 55 years old and have three adult children who do not farm with them. They have one full-time and two part-time employees. They own 330 acres of land with a real estate loan of $141,000 on their most recent parcel acquisition in 2011. Rita and Kirk are currently producing their own feed and market a small amount of grain. They would like to farm for five to ten more years and then transition to one of their children or someone outside the family. Crosswind Holsteins has 145 milking cows and expected yield in 2016 is 22,500 pounds per cow annually, for a total expected milk production of 3,262,500 pounds. Their MPP-Dairy Production History, as established on the form CCC-781 in 2014, was 3,186,054. The 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 3,297,652 pounds.

Crosswind Holsteins Balance Sheet 1/1/2016

Current Assets	$242,106	Current Liabilities	$64,007
Intermediate Assets	$566,433	Intermediate Liabilities	$11,756
Long Term Assets	$1,381,024	Long Term Liabilities	$141,068
Personal Assets	$381,836	Personal Liabilities	$0
Total Assets	**$2,571,399**	**Total Liabilities**	**$216,831**
		Equity	**$2,354,568**

To estimate expenses other than feed in 2016, Rita and Kirk divided their year-to-date expenses for the first nine months of 2015 by the milk pounds shipped over the same period: $229,119/25,317cwt = $9.05/cwt. Working with their Farm Business Management instructor, they estimated worst-case income-over-feed cost basis over MPP-Dairy to be -$0.75/cwt. To estimate other revenue, they summed up year-to-date sales of cattle, crops and other miscellaneous items and divided the sum by the milk shipped over the first nine months of 2015: $35,191/25,317cwt = $1.39/cwt.

From their balance sheet, they calculated working capital per cow to be $1,228/cow. This number was obtained as the difference between current assets ($242,106) and current liabilities ($64,007), divided by the number of milking cows (145). Dividing total assets ($2,571,399) by the number of milking cows (145), they calculated assets per cow to be $17,733/cow. Dividing total liabilities ($216,831) by total assets ($2,571,399), they calculated debt-to-asset ratio to be 8.4%. Rita believes the value of their assets would decline by 5% in case of a major crisis. The figure on the right side shows the Crosswind Holsteins profile based on these numbers.

Production & Prices	
Cows	145
Milk Per Cow (lbs/yr)	22,500
Expenses, Other than Feed ($/cwt)	$9.05
Worst-Case IOFC Basis over MPP ($/cwt)	-$0.75
Other Revenue (beef, crops, etc.) ($/cwt)	$1.39
Risk Management	
MPP-Dairy: Production History	3,297,652
MPP-Dairy: Coverage Percentage	90%
CME & Other: % of 2016 Milk and Feed Hedged	0%
CME & Other: Average Hedged IOFC	
Financials	
Working Capital Per Cow	$1,228
Assets Per Cow	$17,733
Debt-to-Asset Ratio (At Market Value)	8%
Effect of Crisis on Assets Value	-5%
Scenario: Average MPP-Dairy Margin in 2016	$9.24
Diagnostics	
Expected 2016 Milk Production	3,262,500
Cash-Flow Breakeven MPP-Dairy Margin	$8.41

Rita and Kirk are fairly optimistic about the future of their dairy farm. Their debt is very low, they have a lot of land to borrow against if needed, and their working capital and cash reserves are high. To evaluate if their farm really is robust, Kirk ran the MPP-Dairy Advanced Tool with margins adjusted downward to $5.07/cwt in 2016.

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

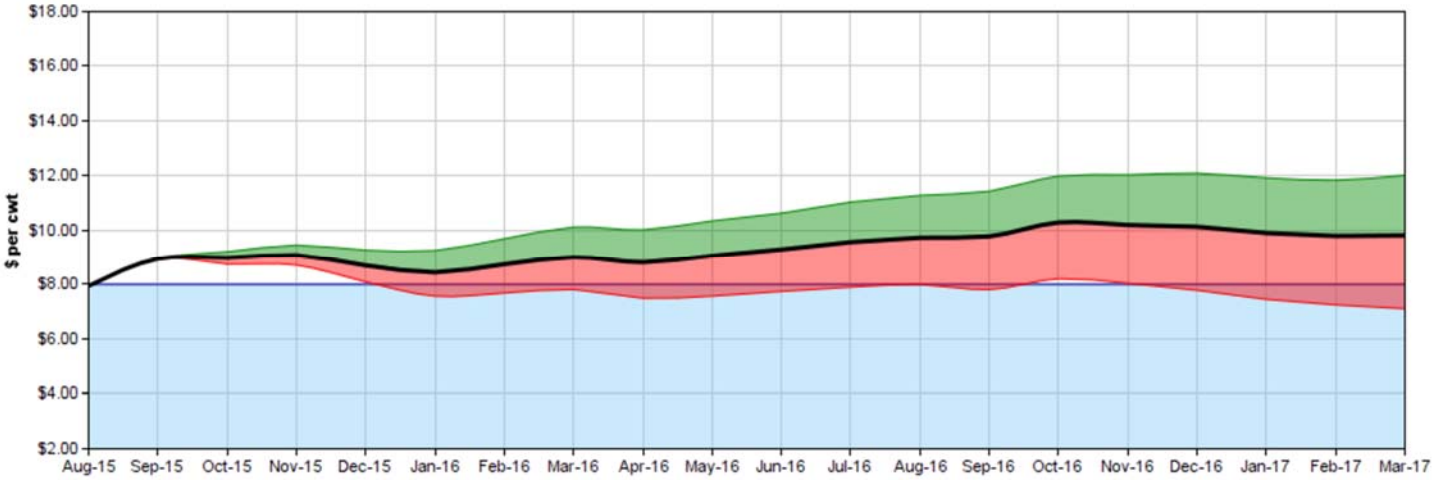
1. **What is the farm's financial risk exposure?**

Given Crosswind Holsteins' costs of production, basis and other revenue, their cash-flow break-even MPP-Dairy margin is $8.41/cwt. If the margins decline to $5.07/cwt, they would lose -$3.34/cwt or $108,967 (($8.41-$5.07) x 32,625 cwt).

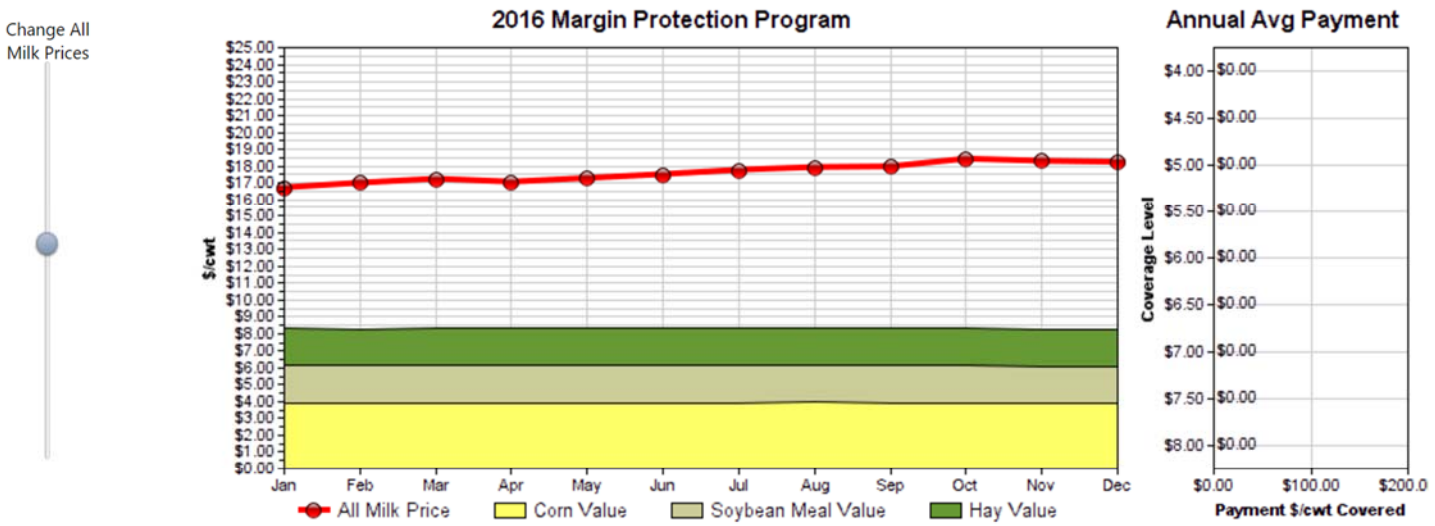
2. **How large is the potential loss a farm business can afford? And how will the farm business deal with the losses if they occur?**

Given their robust financial position, Crosswind Holsteins farm does not have to worry about liquidity or solvency risk, even in case of a major downturn like 2009. Rita and Kirk would still like to cap their potential losses to less than -$125,000 (-$3.83/cwt) to preserve their equity and manage their finances conservatively as they prepare to retire over the next decade.

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



The colored bands show the middle 50% probability interval for forecast margins. There is a 25% chance that the margin could be above the green band and a 25% chance that the margin could be below the red band. The graph data and probabilities are calculated from futures market data available on 10/30/2015.

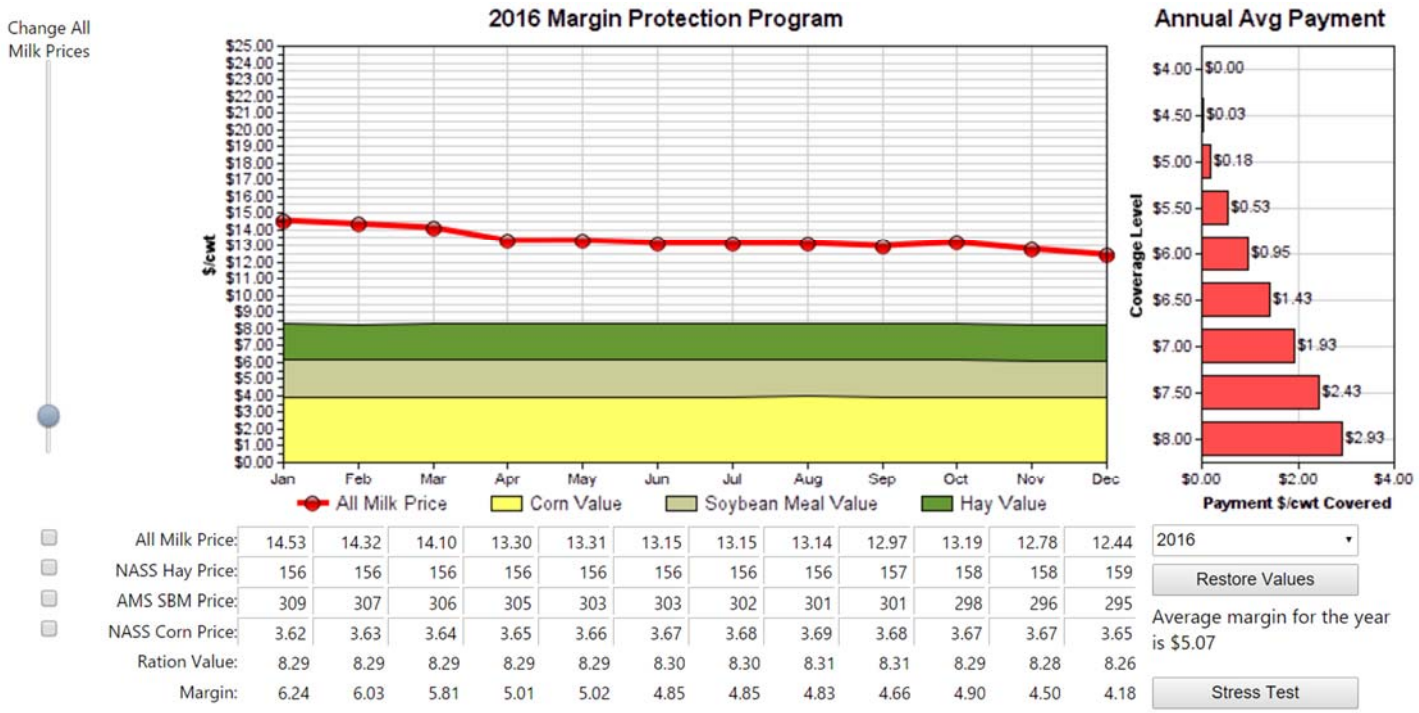


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Milk Price:	16.70	16.98	17.22	17.04	17.26	17.49	17.75	17.91	17.95	18.41	18.28	18.22
NASS Hay Price:	156	156	156	156	156	156	156	156	157	158	158	159
AMS SBM Price:	309	307	306	305	303	303	302	301	301	298	296	295
NASS Corn Price:	3.62	3.63	3.64	3.65	3.66	3.67	3.68	3.69	3.68	3.67	3.67	3.65
Ration Value:	8.29	8.29	8.29	8.29	8.29	8.30	8.30	8.31	8.31	8.29	8.28	8.26
Margin:	8.41	8.69	8.93	8.75	8.97	9.19	9.45	9.60	9.64	10.12	10.00	9.96

2016
Restore Values
Average margin for the year is $9.31
Stress Test

Rita and Kirk 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 30, 2015 margins for 2016 are forecasted to be in $8.41-$10.12/cwt range for 2016. Forecasted US all-milk prices are $16.70-$18.22, and corn is expected to be in the $3.62-$3.69 range. If this outlook were to materialize, their profit in 2016 would be at least $0.90/cwt, more if IOFC basis is better than -$0.75/cwt.

Stress-Test Scenario 2: 2016 MPP-Dairy Margins Unexpectedly Decline to $5.07/cwt



If MPP-Dairy margins unexpectedly decline to $5.07/cwt in 2016, Crosswind Holsteins stand to lose up to -$3.34/cwt. Their working capital per cow would shrink from $1,228/cow to $476/cow, and their debt-to-asset ratio would increase to 8.7%. Neither liquidity nor solvency presents a problem for Rita and Kirk, but as stated before they do prefer to keep the potential losses under $125,000 or -$3.83/cwt. That goal can be achieved even with just the catastrophic coverage of $4.00/cwt, as that level would cap their potential losses to no more than -$108,967.

	MPP-Dairy		Profitability	Liquidity	Solvency
	Premium Costs		Net Income	Working Capital/Cow	Debt/Asset Ratio
	Total $	$/cwt	$/cwt	$/cow	%
No MPP			-$3.34	$476	8.7%
$4.00	$100	$0.00	-$3.34	$476	8.7%
$4.50	$397	$0.01	-$3.33	$480	8.7%
$5.00	$842	$0.03	-$3.20	$507	8.7%
$5.50	$1,287	$0.04	-$2.90	$576	8.6%
$6.00	$1,732	$0.05	-$2.53	$660	8.6%
$6.50	$2,771	$0.08	-$2.12	$751	8.6%
$7.00	$6,540	$0.20	-$1.79	$826	8.5%
$7.50	$9,004	$0.28	-$1.41	$910	8.5%
$8.00	$14,198	$0.44	-$1.12	$977	8.4%

Implications of Homegrown Feeds

Rita and Kirk farm 330 acres of land, and milk 145 cows. That is a ratio of 2.27 acres per cow, more than sufficient to grow all their forage and grain needed for livestock feed. They buy some protein (soybean meal, blood meal, etc.), vitamins and minerals, etc. Their purchased feed costs are $6.77/cwt and their agronomy costs are additional $5.95/cwt, for a total feed cost of $12.72/cwt. Does it matter for their risk management program that they grow over half of their livestock feed needs? And how does it impact their MPP Advanced Tool farm profile? There are two impacts of importance. First, agronomy costs are usually more predictable than purchased feed expenses, so it may make sense to include them in "expenses, other than feed" ($9.05+$5.95 = $15.00). If we do that, we have to reduce the feed costs which would increase the "worst-case scenario basis" in the same amount as illustrated above (-$0.75+$5.95=$5.20).

Production & Prices	
Cows	145
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Worst-Case IOFC Basis over MPP ($/cwt)	$5.20
Other Revenue (beef, crops, etc.) ($/cwt)	$1.39
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Minnesota vs. MPP-Dairy Feed Costs ($/cwt)

Year	MN Feed Costs	MPP-Dairy Feed Costs	Basis
2006	$5.34	$5.21	$0.13
2007	$6.76	$7.12	($0.36)
2008	$8.19	$9.77	($1.58)
2009	$7.34	$8.25	($0.91)
2010	$7.22	$8.01	($0.79)
2011	$8.86	$11.32	($2.46)
2012	$10.26	$13.21	($2.95)
2013	$10.46	$12.86	($2.40)
2014	$10.30	$10.67	($0.37)

When the "worst case scenario" contemplates just the decline in milk prices, the cash-flow break-even MPP-Dairy margin will not change at all, and neither will the optimal decision on MPP-Dairy coverage level. The second impact of importance has to do with the "worst-case scenario basis" when contemplating dramatic increases in feed prices. In that scenario, IOFC margin basis will be more positive, as homegrown feeds will serve as a natural hedge against volatility in feed expenses. The table on this page illustrates this effect using data from FINBIN database maintained by the Center for Farm Financial Management at the University of Minnesota. The data in this database is collected by farm business management instructors from Riverland Community College and other state colleges and universities in Minnesota. When feed costs experienced a sharp spike in 2008 and again in 2011, feed costs on Minnesota dairy farms did not jump nearly as fast as the MPP-Dairy feed ration costs. On the other hand, when grain prices are very cheap, growing livestock feed may be adding to production costs.

Conclusions

In choosing the optimal risk management strategy for their farm, producers would be well advised not to put emphasis exclusively on expected margins and dairy outlook, but rather should ask themselves a simple and fundamental question: is my dairy farm financially ***fragile*** or ***robust***? A farm can be deemed as financially robust if the working capital, owner's equity and value of farm assets allow the producer to withstand even a major downturn in profit margins without liquidity or solvency risk. In contrast, a farm is financially fragile if the structure of the business is such that the magnitude of risk a farm faces threatens to seriously compromise the quality of life of the producer, or even the existence of the dairy farm itself. In the DMaP Decision Guide 15-02 we met B & K Dairy, operated by a young dairy family that does not yet have high equity or cash reserves. That farm was financially fragile and they chose MPP-Dairy coverage level of $6.50/cwt for 2016.

In contrast, Crosswind Holsteins are a mature dairy farm that is very financially robust. Their investments in crop land increased their assets per cow over years to very high $17,733/cow. While that reduced their returns on assets and returns on equity, it did make their farm more robust against vicissitudes of grain market prices. Crosswind Holsteins faces different kind of risk – long-term efficiency risk, as their costs of production are fairly high as they do not benefit from economies of scale in dairying due to their size. Rita and Kirk need not worry about liquidity or solvency risk, however, and they can select MPP-Dairy coverage level primarily based on their risk preferences as to the maximum losses they are willing to tolerate.

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.

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