

Cost and Returns to Organic Dairy Farming in Maine and Vermont for 2004

Timothy J. Dalton^a
Lisa A. Bragg^a
Rick Kersbergen^b
Robert Parsons^c
Glenn Rogers^d
Dennis Kauppila^d
Qingbin Wang^c

November 23, 2005

University of Maine
Department of Resource Economics and Policy Staff Paper #555

^a Associate Professor and Research Associate, Department of Resource Economics and Policy, University of Maine, Orono, ME 04473

^b Trustee Professor, University of Maine Cooperative Extension, University of Maine, Orono, ME 04473

^c Extension Associate Professor, Department of Community Development and Applied Economics, University of Vermont, Burlington, VT 05405

^d Extension Associate Professor, University of Vermont Extension, University of Vermont, Burlington, VT 05405

Acknowledgement

This research is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2004-51300-02250, 'Profitability and Transitional Analysis of Northeast Organic Dairy Farms' an Organic Initiative project. This research also received financial support from the Vermont Agricultural Experiment Station, University of Vermont Extension, and the John Merck Fund.

The researchers also indebted to support from Nat Bacon and Lisa McCrory, Northeast Organic Farming Association of Vermont (NOFA-VT); and the Maine Organic Milk Producers (MOMP).

Any opinions, findings, conclusions, or recommendations expressed in this presentation are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Cost and Returns to Organic Dairy Farming in Maine and Vermont for 2004

There is a vacuum of any rigorous, quantified studies on the costs of producing organic milk in the United States despite growth and interest in the farming activity. The situation is particularly acute in the Northeast and upper Midwest where there is a small but rapidly growing organic dairy sector. Organic milk production has been the fastest growing agricultural sector in New England, with Vermont experiencing growth from just 2 certified organic farms in 1993 to more than 70 today. Maine has seen similar growth, increasing from 25 farms in 1997 to 63 certified organic dairy farms today

This study reports average production costs and returns for 2004 from a sample of thirty organic dairy farms (thirteen from Vermont and seventeen from Maine). It is important to emphasize that these results are indicative of economic conditions in 2004 and do not reflect current production conditions¹. Overall, we find that the average organic dairy operation was not profitable in 2004. The average rate of return on farm assets was -2.9%.

Descriptive Information

Farm visits were conducted by personnel from both states in the winter and spring of 2005 to collect production and financial information. Data analysis was conducted first by state. Tests of the mean values of financial performance and of farm characteristics indicated no statistically significant differences between the two states. The sample was then pooled and a single representative budget developed.

The financial information presented in the following sections is based upon an 'average' farm that is described in Table 1. The representative farm milked 48 cows, sold 6,890 cwt of milk and earned an average of \$22.97/cwt for milk sold during the year. This milk price includes all premiums earned by the farm. There was a \$7.16/cwt price spread between the minimum average price received by a farm (\$19.88/cwt) and the highest (\$27.04/cwt). By contrast, similar sized non-organic farms in Maine producing for the non-organic market received an average milk price of \$18.07/cwt during 2004, \$4.90/cwt less ($p < 0.01$) than the average for organic producers. The rolling herd average was similar between organic and non-organic producers (14,060 for the organic sample versus 14,857² for non-organic (ns)³). Organic farms earned on average \$158,075 from milk sales and only 43% earned off-farm income.

Revenues

Ninety percent of farm revenues were derived from milk sales. The sale of dairy cattle, cull cows, beef and government payments were other important sources of income but no one category contributed more than 3.5% towards total revenue from farm operations. On average, farms earned an additional \$18,020 from non-milk operations that increased total farm income to \$176,095 in 2004.

¹ Economic events in 2005 that will affect farm financial performance include a dramatic increase in organic feed prices, fuel prices, and an increase in interest rates. Milk prices have gone up significantly also.

² Lower rolling herd averages on organic dairy farms do not reflect milk that is fed to calves.

³ NS indicates that the two values are not statistically different.

Table 1. Descriptive Statistics for Organic Dairy Farms

	Mean	Median	Std. Deviation	Minimum	Maximum
Cows (N)	48	47	15.4	20	80
Hundredweight Produced (cwt)	6,890	6,870	2,783	2,100	13,000
Rolling Herd Average (lbs/cow)	14,060	14,021	3,416	6,940	21,316
Milk Price (\$/cwt)	22.97	22.90	1.70	19.88	27.04
Milk Revenue (\$)	158,075	165,537	65,883	49,013	339,117
Off-Farm Income (%)	0.43	0	0.50		
Off-Farm Income (\$) ^a	15,173	0	29,340	0	132,107

^aMean value is highly influenced by a statistical outlier. When this outlier is removed, the sample average is \$10,651.

N=30

Operating and Depreciation Costs

In this section, important cost centers (purchased feed, labor, veterinary visits, herd health supplies, seed and fertilizer) are described and compared against budgets for a representative non-organic farmer with a similar herd size. In order to determine which cost centers differ between organic and non-organic production, tests of mean differences are conducted.

The two most important cost centers in organic and non-organic dairy production are purchased feed and hired labor. These two cost centers account for 50% of the annual cost of producing organic milk. Higher feed and hired labor costs account for 84% of the price premium paid to organic producers.

Purchased feed

Overall, the 48 cow organic farm spent \$49,416 for purchased feed during 2004 which translates to \$1,003 per cow or approximately \$7.24 per cwt of milk produced. This was \$298 per cow more ($p < 0.01$) and \$2.66 per cwt ($p < 0.01$) than non-organic producers in Maine. Organic feeding practices were significantly more expensive than non-organic practices. Higher feed cost was the largest and most important difference between organic and non-organic production. The additional expense of feeding organic dairy cows is equal to 54% of the price differential received for organic milk.

Labor

In organic dairy production, the majority of farm labor is provided by the family. On average 5,042 hours of family labor were used on organic farms which converts to approximately 113 hrs/cow or 0.89 hrs/cwt of milk produced. These numbers are not significantly different from those of non-organic farmers.

Table 2. Total Farm, Per cow and Per Hundredweight Costs and Returns to Organic Dairy Farming in 2004

Revenue	Per Farm	Per cow	Per Cwt
Milk	158,075	3,219.96	22.97
Dairy cattle	2,754	58.71	0.43
Cull cows	3,554	68.22	0.50
Veal	881	19.00	0.15
Crop	750	16.18	0.11
MILC and other government payments	5,513	122.37	1.00
Dividend	890	18.20	0.13
Custom work	30	0.40	0.00
Syrup	3	0.07	0.00
Timber	263	7.27	0.08
Other	3,382	59.09	0.45
<i>Total Farm Revenue</i>	176,095	3,589.47	25.82
Operating Costs and Expenses:			
Auto	2,479	54.33	0.41
Bedding	2,756	60.00	0.43
Breeding	2,339	51.68	0.37
Chemicals	252	3.83	0.02
Custom hire	3,242	67.92	0.53
DHIA	648	13.94	0.09
Fertilizers	540	11.51	0.07
Purchased feed	49,416	1,003.46	7.24
Fuel and oil	4,520	92.95	0.68
Insurance	3,946	84.10	0.64
Interest	6,216	132.24	1.04
Hired labor	17,088	320.18	2.10
Marketing	4,237	90.27	0.62
Taxes	3,314	68.93	0.52
Rent	656	12.86	0.10
Repairs	9,359	185.34	1.31
Seeds	351	5.57	0.04
Supplies	12,061	221.76	1.73
Utilities	5,412	114.38	0.90
Veterinary	1,945	42.40	0.30
Medicinal supplies	299	5.64	0.04
Miscellaneous	3,662	79.72	0.58
<i>Total Cash Expense</i>	134,740	2,723.02	19.77
Depreciation	19,457	391.91	2.81
<i>Total Expenses</i>	154,197	3,114.92	22.58
Net Farm Income from Dairy Production	3,878	105.04	0.39
Net Farm Income from Operations	21,898	474.55	3.24
<i>Owner Withdrawals for Unpaid Labor and Management</i>	37,178	854.84	6.68
Net Farm Income	-15,280	-380.3	-3.44
<i>Off-Farm Income</i>	15,174	379.44	3.32
Net Farm Earnings	-106.37	-0.86	-0.12

Note: Per cow and per cwt columns are average farm numbers and are not created by dividing the first column by the average herd size and production.

N=30

By contrast, hiring labor is a representative practice of the organic producers while non-representative of small non-organic farms. The quantity and cost of hired labor per cow and per cwt of milk produced are significantly higher for organic production. Fifty seven percent of the organic farms hired labor to complement family labor in the form of a part-time employee working approximately 23 hrs per week. This employee was compensated at an average rate of \$14.51/hr including all taxes and benefits. Hired labor expense contributes \$320 per cow or \$2.10/cwt towards the total cost of organic milk production. Only 35% of non-organic producers hired labor and when they did, they hired a part-time worker for fewer hours despite having a very similar herd size. As a result, organic producers spend \$218/cow ($p < 0.01$) or \$1.48/cwt ($p < 0.01$) more than non-organic producers for hired labor. This additional cost is equivalent to 30% of the price differential between organic and non-organic milk.

Overall, there are well defined differences in labor utilization between organic and non-organic dairy production. Both farm types used family labor at similar levels. Organic farms are using hired labor more frequently than non-organic producers and they compensate hired labor at higher wage rates.

Seed, fertilizer, herd health, breeding, fuel, and utilities

Relative to non-organic producers, seed costs are equivalent and fertilizer costs are lower for organic producers. They spend nearly \$1,300 less on fertilizer for their operations ($p < 0.01$) or about \$0.19 less per cwt of milk produced, translating to a 4% cost savings. They also spend similar amounts of money on veterinary visits but significantly less on the cost of medicine and other health supplies (\$0.08/cwt, $p < 0.01$) than non-organic producers. This is an additional 4% cost savings. Fuel, repairs, utilities, and breeding expenses are not significantly different between the two groups.

Depreciation

Depreciation on fixed assets is derived from Federal income tax returns. The amount of depreciation charged by organic and non-organic producers was not significantly different. On average, farms charged \$19,457 against depreciation which amounts to \$391.91/cow or \$2.81/cwt.

Farm Profitability and the Return to Farm Family Resources

The total cost (cash operating expenses plus depreciation) of producing organic milk is estimated at \$22.58/cwt but this cost of production does not include owner withdrawals for unpaid labor, or a return to farm management and equity. By contrast, farms earned, on average, \$22.97/cwt of milk produced. The total cost of production per cwt is not significantly different from milk revenues when compared on a pair wise basis ($t = 0.505$, $p = 0.0618$) or when the mean values are compared ($t = 0.475$, $p = 0.638$). Furthermore, total expenses are not significantly different from milk revenue on a per cow or on a farm basis. In summary, organic milk production does not generate any return to unpaid labor or management nor does it generate sufficient net income to produce a positive return to farm assets or equity. As a result, organic dairy farming is largely supported by non-dairy farming activities, off-farm income and withdrawals from farm equity.

Non-dairy farming activities

Non-dairy related farm activities generated approximately \$18,020 of revenue in addition to milk sales. When non-milk income is added to into the cost and returns budget, net farm income from operations, the residual difference between the total cost of producing milk and the value of farm production (including all farm sources of income but not off-farm earnings), amounts to \$21,898 in 2004. When this amount is divided by family labor net farm income from operations generated an implicit return to family labor and management of \$4.34/hr.

By contrast, small dairy farms in the Northeast withdrew \$37,178 for family living expenses and taxes in 2004 (Sobson et al, 2005). Adjusting net farm income from operations by an equivalent value for family living withdrawals and taxes generates a loss of \$15,280 in 2004.

Off-farm income

Organic farm losses were only partially offset by non-farm earnings. Only 43% of organic dairy farms reported off-farm income. On average, \$15,173 of off-farm income was reported and this amount was heavily influenced by a statistical outlier non-representative of the whole sample. When this outlier was removed, off-farm income amounted to only \$10,651. Irrespective of the statistic chosen to represent off-farm income, the average net earnings to dairy farms including off-farm income was negative (-\$106 total, -\$0.86 per cow ,or -\$0.12 per cwt of milk produced for the whole sample, and even lower when the outlier is removed).

Withdrawals from equity

Another measure of farm profitability is the return to farm assets or equity. This is calculated by adding interest expense back into the farm income from operations and subtracting family withdrawals. This amount is then divided by farm assets or equity to derive the return to farm assets (or equity). These results are presented in Table 3. On average, the return to farm assets was -2.9% and significantly different from zero ($t=2.47$, $p=0.04$), while the return to farm equity was also negative (-3.0%) and significantly different from zero ($t=1.83$, $p=0.08$). Current farm operations do not generate a positive rate of return to assets or equity for organic producers. By contrast, small dairy farms in the Northeast region generated a 4.1% rate of return on farm assets in 2004, one of the most profitable years for dairy farming in recent history⁴ (Sobson et al, 2005).

In order to generate a similar rate of return to organic farm assets, the average price of organic milk would have had to have been 19% higher or \$27.37/cwt instead of \$22.97/cwt. To generate a 5% rate of return would have required an average price of \$28.05/cwt. Overall, there are few incentives to invest in organic dairy farming. Furthermore, organic dairy producers are withdrawing farm equity in order to stay in operation based upon cost and returns generated in 2004. Farms businesses have to show a competitive return on assets for long-term industry sustainability.

⁴Direct comparison between the Farm Credit report and this study are cautioned because the Farm Credit rate of return on farm assets and equity includes net non-farm income while this study does not. The Farm Financial Standards Council does not recommend including non-farm income into the rate of return on farm assets or equity.

Table 3. Farm Assets, Liabilities and Rates of Return

	Mean	Median	Std. Deviation	Minimum	Maximum
Farm Assets (\$)	517,623	494,078	21,0705	175,305	1,094,240
Farm Liabilities (\$)	133,768	106,757	112,278	.00	387,650
Farm Equity (\$)	388,989	300,473	240,080	58,708	1,033,143
Return on Assets (%)	-2.85	-2.38	5.89	-19.0	9.00
Return on Equity (%)	-3.00	-2.36	-18.0	-18.0	15.0

Note: Return on Assets (Equity)=(Farm income from operations + interest – owner withdrawals for unpaid labor)/Assets (Equity)

Cost Sensitivity Analysis

On average, data collected in 2004 indicates that organic dairy farming in Maine and Vermont was not profitable and forced producers to withdraw farm equity in order to remain in business. We felt it important to simulate farm profitability for 2005 given that prices for two critical factors of production, feed and fuel, have risen over the past year. In order to estimate the impact of increased costs upon the cost of production and farm profitability, a sensitivity analysis is performed based upon recent market trends.

On average, organic feed concentrate costs have increased between 5% to 10%, depending upon supplier, since 2004 levels. Concentrate feed costs constitute 92% of the purchased feed bill and amount to \$45,462 for the organic farm. Second, fuel prices have risen to levels higher than 2004 despite recent price abatements in the late fall. Based upon information from the Department of Energy, diesel prices are 27% higher in 2005 than in 2004 while gasoline is 17% higher (EIA, 2005).

If an average fuel price increase of 10% and a concentrated feed price increase of 7.5% is assumed (the average increase of organic feed suppliers), the return to farm assets drops to -3.7%. These assumptions are conservative estimates of the increases in cost of producing organic milk in 2005. The average milk price would need to increase by 11.4% to \$25.59/cwt for farmers to breakeven and not erode farm equity in order to remain in business. To generate a positive return on assets of 4.1%, milk prices would need to increase by nearly 24.1% to \$28.50/cwt. In order for farms generate a rate of return on assets of 5%, the milk price would need to increase by 26.7% or equal to \$29.11/cwt is required. These results are summarized in Table 4.

Table 4. Return to Assets Sensitivity Analysis and Production Cost Simulation

Scenario	ROA	Average Milk Price (\$/cwt)	% Change from 2004 Average Price
2004 Observed	-2.9	22.97	<i>Base</i>
	Breakeven (0)	25.00	+8.8
	4.1	27.91	+21.4
	5.0	28.05	+24.3
2005 Simulated ^a	-3.7	22.97	<i>Base</i>
	Breakeven (0)	25.59	+11.4
	4.1	28.50	+24.1
	5.0	29.11	+26.7

^aIncludes the impact of a 7.5% increase in concentrated feed cost and a 10% increase in fuel cost.

Conclusions

Organic dairy farming has grown rapidly in New England over the past decade due to stable producer prices and perceived positive returns to farm operations. This study has analyzed cost and returns data from 2004 for 30 organic dairy producers in Maine and Vermont and has found that organic dairy farming is not profitable, on average. The total cost of producing organic milk was not significantly different than the revenue earned from milk sales. Non-milk farming activities contributed to farm revenues and generated an implicit wage of \$4.34/hour for unpaid labor. This amount was significantly lower than average owner withdrawals for unpaid labor, management and equity for the Northeast region indicating that organic producers withdrew farm equity in order to stay in operation. Farm equity was eroded by approximately 3% in 2004.

Feed and fuel prices are but two factors of production that have increased in 2005. In addition, inflation will continue to place upward pressure on hired wage rates and other costs. Input price increases will continue to negatively affect the returns to organic dairy farming and erode incentives for investment in current operations or for non-organic producers to transition into organic production. Furthermore, farmers are likely to respond to higher feed prices by reducing the amount of concentrate fed to their herds, thereby reducing milk production from their current levels.

Sources

EIA. (U.S. Department of Energy, Energy Information Agency). 2005. Available: <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>. Accessed: November 2, 2005.

Sobson, C., R. Hermonot, and B. Zweigbaum. 2005. "2004 Northeast Dairy Farm Summary." Enfield, CT: Northeast Farm Credit.