

Profitability of Northeast Organic Dairy Farms

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Profitability of Northeast Organic Dairy Farms

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 119 in early 2006. 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). Participating farms had to be in organic production before January 1, 2003 so that the farms were not in their transition year. It is important to emphasize that these results are indicative of economic conditions in 2004 and do not reflect current production conditions.^a Overall, we find that the average organic dairy operation was not profitable in 2004 with a 2.8% return on farm assets.

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 by state indicated there was no statistically significant difference between the two states by financial performance or farm characteristics. The sample was then pooled for joint analysis.

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 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 14,857^b for non-organic (ns)^c). Organic farms earned on average \$158,075 from milk sales and only 43% earned off-farm income.

Table 1. Descriptive Statistics for Organic Dairy Farms

	Std.				
	Mean	Median	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

^a Economic events in 2005 that will affect farm financial performance include a dramatic increase in organic milk prices. However, they also experienced rising organic seed and feed prices. Organic farms also experienced rising interest rates and fuel prices as did all farms.

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

^c NS indicates that the two values are not statistically different.

Revenues for Organic Farms

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 (Table 2).

Operating and Depreciation Costs

In this section, important cost centers (purchased feed, labor, seed and fertilizer, herd health and breeding) 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 (\$4.90/cwt) 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/cow or approximately \$7.24/cwt of milk produced. This was \$298/cow ($p < 0.01$) and \$2.66/cwt ($p < 0.01$) more 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.

By contrast, hired labor is a representative practice of the organic producers while less 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

Table 2. Total farm, per cow, and per hundredweight costs and returns to organic dairy farming in 2004.

Revenue	Farm	Per cow	Per Cwt
Milk	158,075	3,219.96	22.97
Dairy cattle	2,754	58.71	0.43
Cull cows and veal calves	4,436	87.22	0.65
Crop	750	16.18	0.11
MILC and other government payments	5,513	122.37	1.00
Other	4,567	85.03	0.65
Total Farm Cash Receipts (a)	\$176,095	\$3,589.47	\$25.82
Accrual Changes in Inventory/Livestock			
Change in Inventory/Livestock	1,976	56.95	0.47
Value of Farm Production {c}	\$178,071	\$3,646.43	\$26.29
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
Total Cash Farm Expenses (b)	\$134,397	\$2,715.23	\$19.73
Accrual Expenses Adjustments			
Accounts payable/prepaid expenses	906	22.22	0.23
Depreciation	19,332	388.51	2.79
Accrual Adjusted Farm Expenses (d)	\$154,635	\$3,125.97	\$22.74
Net Farm Income (a-b)	\$41,698	\$874.24	\$6.09
Net Farm Earnings (c-d)	\$25,248	\$564.90	\$4.00
Owner Withdrawals for Unpaid Labor and Management	(37,178.00)	(854.84)	(6.68)
Off-Farm Income	15,173.63	379.44	3.32
Net Earnings w/out off farm income	(\$11,930)	(\$289.94)	(\$2.68)
Net Earnings with off farm income	\$3,381	\$93.43	\$0.69

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, schedule F. The amount of depreciation charged by organic and non-organic producers was not significantly different. On average, farms charged \$19,332 against depreciation which amounts to \$389/cow or \$2.79/cwt.

Table 3. Groupings by Herd Size and Profitability Level

<i>Herd Size</i>	Small	Medium	Large
Cows	32.3	46.6	66.2
Milk sold per cow	12,339	15,569	14,272
Cwt sold per farm	3993.701	7245.167	9430.278
<i>Profitability Level</i>	Low	Middle	High
Cows	49.1	46.8	49.2
Milk sold per cow	12,295	13,969	15,915
Cwt sold per farm	6309.533	6656.347	7703.266

Farm Profitability and the Return to Farm Family Resources

The total cost (cash operating expenses plus depreciation) of producing organic milk is estimated at \$22.74/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 into the cost and returns budget, net farm income from operations amounts to \$22,366 in 2004.^d When this amount is divided by family labor, net farm income from operations generated an implicit return to family labor and management of \$4.43/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 \$14,812 in 2004. When accrual adjustments are included, the farm experienced a loss of \$11,930 for 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 barely positive (\$93.43 per cow or \$0.69 per cwt of milk produced for the whole sample, and even lower when the outlier is removed).

Accrual net farm income

On an accrual basis, net farm income was \$25,248 before charges for family living. After charges for family living was charged as a cost of family labor, net farm income drops to -\$11,930. Accrual adjustments included \$an average of \$1976 for changes in inventory and -\$966 change in accounts payable.

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 6. On average, the return to farm assets was -2.3% 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 1.6% rate of return on farm assets in 2004, one of the most profitable years for dairy farming in recent history^e (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 21% higher or \$27.91/cwt instead of \$22.97/cwt. To generate a 5% rate of return would have required an average price of \$28.05/cwt. Overall,

^d Net farm income from operations is 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.

^eDirect 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.

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.

Table 6. 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 (%)	-2.30	-2.38	5.89	-19.0	9.00
Return on Equity (%)	-3.01	-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 conservative estimates of a 10% average fuel price increase and a 7.5% concentrated feed price increase are assumed, the return to farm assets drops to -3.7%. 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 to generate a rate of return on assets of 5%, the milk price would need to increase by 26.7% to \$29.11/cwt. These results are summarized in Table 7.

Table 7. 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.

Farm Characteristics

In addition to the financial data, we also collected demographic and production data. While some demographics are similar to other farms and farmers, there remains some distinct differences. Surprisingly, only 57% of the organic dairy farmers grew up on a farm, indicating many more than 40% came into dairy (Table 8). This is believed to be quite different from the general population. In addition, the study revealed the average age was 51.3 years, about 3 years higher than a similar survey in 2002 of all dairy farms. The organic farmers, on average, have more years of formal education than their neighbors with 14 years, the equivalent of an associate degree. Sole proprietorship is the favorite type of ownership (80%). Eighty percent did have some health insurance, even if it was just a state supported program for the children.

Table 8. Demographic Characteristics of the Farm Owners

Grew up on a farm	57%
Operating same farm	36.8%
Years as primary operator	21.5 years
Farmed elsewhere	41.4%
Age	51.3
Years of education	14.1

Although Jersey cows are not as popular as Holsteins, 33.3% of the herds are 51-100% Jersey and 13.3% are 100% Jersey. Cross-breeding is popular with 43% having some cross-breeds in the herd. Cows are grazed on all farms with 73% moving their cows to fresh grass at least once a day (Table 9). Forage was provided on the farm as less than 1% of forage fed to cows was purchased in 2004.

We found that 88.3% of the farms use AI and 44% are on DHIA, both similar to conventional herds. As a farm business, the mean hundred shipped per year is 6889.72 cwt. Two of the farms that had scheduled veterinary visits had no emergency veterinary visits and the mean number of emergency veterinary visits per year was 4.81. It's difficult to get data from conventional farms to see if vet visits have gone down for these farms.

Technology wise, 70% of the farms milked in stanchions with a pipeline milking system. But only 33% used computers for record keeping. We found that 60% sold to Cropp. More of the farms in Vermont than Maine sell to Cropp.

What are the farms planning for the future? Fifty three percent have decided it will be more than 10 years before they plan to stop milking cows. But in a major contrast to other farms, only 13% said they planned to increase cow numbers in the next 5 years. Normally, more than 40% of conventional dairy farmers plan to increase herd in the next 5 years.

Table 9. Farm Characteristics

	N	Frequency	Percent	Mean
<u>Legal Structure</u>				
-Sole proprietorship	30	24	80%	
-LLC, S- or C-Corp., or Ltd				
Partnership	30	5	16.7%	
-Family partnership	30	1	3.3%	
<u>Practices/Techniques</u>				
-Artificial insemination	30	25	83.3%	
-DHIA	30	13	44.8%	
-PC-based herd management software	30	10	33.3%	
<u>Infrastructure and equipment</u>				
-Stanchion tie stall barn with pipeline	30	21	70%	
<u>Cow breeds in herd</u>				
-No Holstein	30	11	36.7%	
-1-50% Holstein	30	8	29.6%	
-51-100% Holstein	30	11	36.7%	
-100% Holstein	30	5	16.7%	
-No Jersey	30	14	46.7%	
-1-50% Jersey	30	6	20%	
-51-100% Jersey	30	10	33.3%	
-100% Jersey	30	4	13.3%	
-Cross breeds in herd	30	13	43.3%	
<u>Pasturing</u>				
-Cows moved every day	30	22	73.3%	
-Cows moved every 2-7 days	30	6	20%	

Table 10. Farm as Business

	N	Frequency	Percent	Mean
<u>CWT shipped</u>	30			6889.72
<u>Buyer</u>				
-CROPP	30	18	60%	
-Horizon	30	12	40%	
<u>Veterinary visits and supplies</u>				
-Scheduled visits per year	29			6.28
-1-5 visits	30	10	34.3%	
-6-12 visits	30	11	37.9%	
-Emergency visits per year	27			4.81
-1-5 visits	27	17	62.9%	
-6-14 visits	27	7	25.9%	
<u>Growing the herd</u>				
-Added to herd less than 1 year ago	30	5	16.7%	
-Added to herd less than 5 years ago	30	8	26.7%	
-Added to herd less than 10 years ago	30	17	56.7%	
-Likely to increase herd size within 5 years	30	4	13.3%	
-Likely to reduce herd size within 5 years	30	3	10%	
<u>Future outlook</u>				
-Likely transfer of management within 5 years	29	4	13.8%	
-Likely exit of dairy farming within 5 years	30	4	13.3%	
-Likely exit of dairy farming within 10 years	30	16	53.3%	

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 \$4.43/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. Organic dairy herds continue to be smaller and they will likely continue that way as only 13% plan to add more cows.

So what does the future hold? This study is a bit distorted by the high conventional milk price in 2004. But as you read this, organic milk price has gone up more than 20% while conventional milk price have dropped to 1978 levels. As a result, many conventional dairy farmers have decided to give organic a try.

As we continue with the 2nd year of the study, we expect to find organic dairy farm incomes to go up but we will also see a decline in conventional milk prices, driving the switch

to organic by more than 100 dairy farmers just this year. So, can 120 Vermont organic dairy farmers be wrong?

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