

COST OF PRODUCTION ON DAIRY FARMS UTILIZING ALTERNATIVE MILKING STRATEGIES IN THE NORTHEAST

What are alternative milking strategies?

Under **seasonal production** the entire herd is bred within a narrow window of time so that all the cows are dry simultaneously and no milk is produced on the farm during that time. Some farms are interested in this practice as a way to align herd production curves with seasonal changes in milk pricing or reduce seasonal demands for labor, pasture or forage, or other limited resources on the farm.

Farms are also interested in alternatives to a twice daily milking schedule. Some **alternative milking frequencies** include milking once per day, where there are 24 hours between milkings, or three times every two days where the herd is milked twice one day and once the following day resulting in 16-hour milking intervals. These lower milking frequencies are of interest because they may help reduce labor and resource constraints on farms as time and costs associated with milking are reduced.

INTRODUCTION AND METHODS

As farmers continue to find ways to adapt to milk and labor market conditions, adopting alternative production strategies is becoming increasingly appealing to address labor and resource limitations on farms and provide opportunities for flexibility and potentially increased quality of life. Although the benefits of these strategies may come at the expense of reduced milk production, farmers in some markets, such as 100% grass-fed where production is generally lower and the pay price is higher, may be better able to compensate for such impacts.

To better understand the economic impacts of these strategies, researchers from the University of Vermont Extension collected financial data from dairy farms in the Northeast utilizing these alternative strategies in 2019 and 2020. Researchers used the Dairy TRANS financial analysis tool to collect the data using a standardized method (<https://www.extension.iastate.edu/dairyteam/files/page/files/DairyTRANS44.pdf>). The Dairy TRANS method includes an unpaid labor charge of \$40,000 per full-time worker, inventory change adjustments (to factor in changes in herd size or equipment inventory and value), and a 4% charge on the farm's assets instead of loan interest payments. These standardizations allow farms with no debt and farms with significant debt to be more evenly compared. The unpaid labor charge of \$40,000 standardizes owner/workers income, allowing even comparison of farmer/owners who draw an income, and those rely on off farm income or another enterprise to cover living expenses. This method also transforms dairy-related non-milk income (i.e., crop sales, calf sales, etc.) into an equivalent number of milk hundredweights which is then added to the milk hundredweights sold, and in total provides the milk hundredweight equivalents (cwt eq.) over which the total expenses are distributed. Due to relatively small sample size within any one production strategy, data are represented as an average across all alternative strategies across two years shown in comparison to organic grass-fed farms producing milk year-round and milking twice per day.

FARM DEMOGRAPHICS

Participating farms were located in NY (63%), VT (26%), and PA (11%), (Figure 1). All participating farms were certified 100% grass-fed and approximately 32% belonged to the Plain community. All participating farms were selling milk to either Organic Valley (74%) or Maple Hill Creamery (26%). The majority (75%) of farms using alternative milking strategies produced milk seasonally. Approximately 53% implemented an alternative milking frequency (once a day or three times in two days). See Table 1 for the full distribution of strategies. Herds averaged 69 mature cows but ranged from 34 to 220. Farms were managing an average of 359 acres resulting in 5.5 acres available per mature cow.

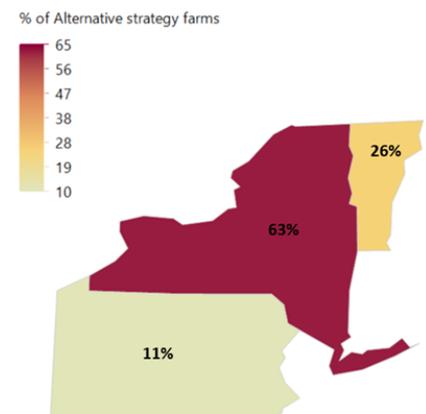


FIGURE 1. DISTRIBUTION OF PARTICIPATING FARMS, 2019-2020.

INCOME AND EXPENSES

Farms using alternative strategies shipped an average 549,085 lbs of milk per year (Table 2). Milk sold averaged 8,083 lbs per cow per year but ranged from 4,485 to 14,990 lbs per cow per year. Gross farm income averaged \$214,937 from milk sales plus an additional \$30,382 of dairy related non-milk income (i.e., calves, crops, etc.). Note that COVID-19 related grant funds were not included in this data, however, other government dairy program income was included in the other income category. The average total cost per cwt eq. across all farms using alternative strategies in all years was \$49.70 which was similar to the farms milking year-round twice daily averaging \$51.37.

Looking at some of the expenses in more detail, total cash expense (not including interest) per cwt eq. was \$26.60 on farms using alternative strategies, \$1.29 higher than average grass-fed farms milking twice daily year-round (Table 3 and Figure 2). Cash expenses differed significantly in some categories between farms using alternative strategies and those using the standard year-round twice daily milking strategy. Under both scenarios purchased forages, repairs, supplies, hired labor, and other expenses were the top five cash expenses. This alignment was expected as both groups were managing 100% grass-fed. However, the largest differences were seen in custom hire, machine and land rentals, and purchased energy supplements.

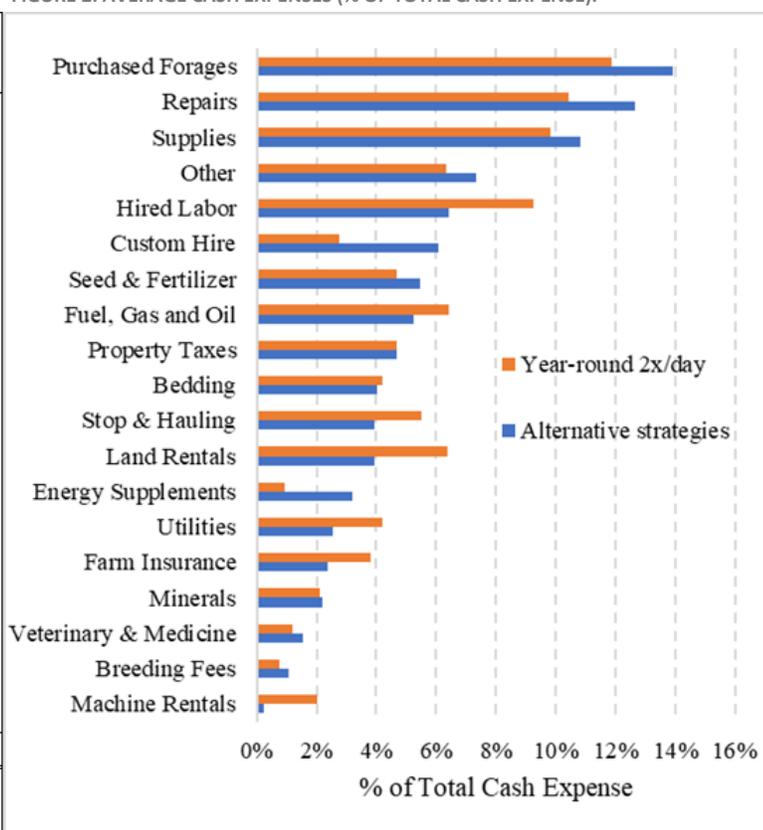
TABLE 1. DISTRIBUTION OF ALTERNATIVE MILK PRODUCTION AND MILKING FREQUENCY STRATEGIES, , 2019-2020.

Production strategy	% of farms
Seasonal twice daily	47%
Seasonal alt. frequency	32%
Year-round alt. frequency	21%

TABLE 2 AVERAGE CASH EXPENSES (\$/CWT EQ.), 2019-2020.

	Alternative strategies	Year-round 2x/day
Bedding	\$0.98	\$1.13
Breeding Fees	\$0.29	\$0.18
Custom Hire	\$1.61	\$0.70
Machine Rentals	\$0.06	\$0.59
Land Rentals	\$1.10	\$1.66
Supplies	\$3.01	\$2.29
Farm Insurance	\$0.71	\$0.90
Fuel, Gas and Oil	\$1.30	\$1.51
Hired Labor	\$1.75	\$2.52
Property Taxes	\$1.20	\$1.10
Purchased Forages	\$3.39	\$2.93
Minerals	\$0.59	\$0.51
Energy Supplements	\$1.07	\$0.29
Repairs	\$3.50	\$2.64
Seed & Fertilizer	\$1.52	\$1.22
Utilities	\$0.80	\$1.05
Veterinary & Medicine	\$0.42	\$0.31
Stop & Hauling	\$0.99	\$1.37
Other	\$1.84	\$1.68
Total Cash Expense (\$/CWTEq.)	\$26.60	\$25.31
Total Cash Expense (\$/cow)	\$2,425	\$2,609
Total Cash Expense (\$/farm)	\$174,962	\$149,851

FIGURE 2. AVERAGE CASH EXPENSES (% OF TOTAL CASH EXPENSE).



Farms utilizing alternative production strategies were spending on average over 3.5 times more per cwt eq. on energy supplements (i.e., molasses) compared to farms using the traditional strategy. This alone equated to a 3.1% increase in total cash expenses. More information on the economics of feeding molasses is needed to better understand its return on investment.

TABLE 2. AVERAGE FARM SUMMARY STATISTICS, 2019-2020.

2019-2020	Alternative strategies	Year-round 2x/day
	Average (n = 19)	Average (n = 23)
Farm Information		
Herd Size	69	59
Acres	359	342
Acres per cow	5.47	5.56
Fertilizer & seed expenses (\$/cow)	\$126	\$131
Fertilizer & seed expenses (\$/acre)	\$28	\$29
Purchased forage expenses (\$/cow)	\$340	\$308
Purchased forage expenses (\$/acre)	\$99	\$111
Milk Information		
Total milk sold (lbs/year)	549085	533058
Total milk sold (CWTs)	5491	5331
Total milk sold (CWT eq.)	6361	6219
Milk per cow (lbs/cow)	8038	9083
Milk per acre (lbs/acre)	1987	2264
Fat per cow (lbs/cow)	369	378
Fat per acre (lbs/acre)	86	96
Labor efficiency		
Full Time Equivalents (FTEs)	1.94	2.71
Cows per FTE	35	23
Milk Sold per FTE (CWT eq.)	3226	2480
Return to labor	\$27,518	\$34,065
Labor earnings per hour	\$9.27	\$4.37
Unpaid labor (cost)	\$67,820	\$97,146
Unpaid labor (hours)	5087	7286
Farm Income		
Milk price (\$/CWT)	\$39.40	\$38.13
Gross Milk Income	\$214,937	\$199,406
Gross Cull, Calf, & Livestock Sales	\$12,214	\$6,098
Gross Crop Sales	\$310	\$2,371
Other Income*	\$17,858	\$21,010
Total Gross Income	\$245,319	\$228,885
Net		
Net Cash Income	\$70,357	\$79,034
Inventory change	-\$8,384	-\$9,616
Net farm income from operations (NFIFO)	\$61,973	\$69,418
4% Equity	\$34,455	\$35,353
Rate of Return on Assets (ROA)	1.84%	3.72%
Operating Profit Margin (OPM)	0.00%	4.98%
Asset Turnover Ratio (ATR)	32.8%	36.6%
Time period (years)	3.8	4.0
DairyTrans Total Expense per CWT eq.		
	\$49.70	\$51.37

In addition, these farms also spent more than twice as much per cwt eq. on custom hire which equated to a 3.6% increase in total cash expenses compared to farms using the traditional strategy. However, farms using alternative strategies spent only 6.4% of total cash expenses on hired labor compared to 9.3% on farms using the traditional year-round twice daily milking strategy. While the alternative strategy farms had slightly lower cash expenses on a per cow basis, managing larger herds contributed to higher cash expenses per farm which. When the cash expenses are then divided over a similar amount of milk sold, the result is a similar cost on a cwt eq. basis.

LABOR

On average, farms utilizing alternative milking strategies were managing the herd using the equivalent of 1.94 full-time workers (FTE), including both paid and unpaid, while farms using the traditional year-round twice daily milking strategy had 2.71 FTEs. If we consider FTEs in relation to herd size, the alternative strategy farms appear more efficient managing and average of 35 cows/FTE while the traditional strategy farms managed only 23 cows/FTE. Similarly, since the overall total milk sold was similar between the production system, the milk sold/FTE was higher on the alternative strategy farms averaging 3,226 cwt eqs., while the traditional strategy farms averaged 2,480 cwt eqs. While the alternative strategy farms have less hired labor, they also spend a higher proportion of their total cash expenses on custom hire. These expenses may be related to managing a slightly larger land base and herd size but more information on specific custom hire activities would be needed to better understand this trend.

FARM FINANCIAL HEALTH METRICS

Net Farm Income From Operations (NFIFO) is the farm's Net Cash Income (NCI) plus inventory change, depreciation, and other capital adjustments. This calculation includes changes in numbers and value of stored feed, livestock, machinery, equipment, accounts payable and receivable, and real estate from the beginning to the end of the year. NFIFO is not profit; it is what is left over after the cash expenses and inventory changes are accounted for to pay the opportunity costs of unpaid family labor and unpaid equity. The average NFIFO on the alternative strategy farms was \$61,973 while the traditional strategy farms averaged \$69,418. For easier interpretation this value can be expressed per cwt eq. of milk sold. In doing so, the average NFIFO was \$10.14 and \$10.64 per cwt eq. for the alternative and traditional strategy farms respectively.

Return on Assets averaged 1.84% for the alternative strategy farms and 3.72% for the traditional strategy farms. This indicates that on average alternative and traditional strategy farms were generating 1.84 and 3.72 cents on every dollar of assets on the farm respectively. There were large ranges in both strategy groups with the alternative group ranging from -12.5% to 19.0% in the traditional strategy group ranging from -12.5% to 32.1%. Operating Profit Margin (OPM) averaged 0.00% for the alternative strategy group but 4.98% for the traditional strategy group. The OPM is the percentage of profit generated from every dollar of output prior to paying interest and equity costs. This means that on average the alternative strategy farms are breaking even on every dollar of output while the traditional strategy farms are generating 4.98 cents of profit on every dollar of output. Again, these are prior to paying interest and equity costs. For both the ROA and OPM calculations used here, it is important to recognize that the total cost calculation does not reflect the farms' actual family living draw or interest payments but instead uses the standardized \$40,000 per FTE owner/operator and a 4% charge on the farms' equity.

CONCLUSIONS AND NEXT STEPS

This report provides only a snapshot of some of the data on the cost of production on a relatively small group of organic grass-fed dairy farms in the Northeast that have implemented alternative milking strategies. Overall, the total cost of production was similar between the two groups, although there were some differences in labor efficiency and cash expense categories. However, the small sample size for each alternative production system (i.e., milking once a day, milking three times in two days, and seasonal milk production) limits the specificity to which we can frame these data. In the future, if more farms begin utilizing these strategies and more years of data are collected, further analyses and conclusions on the use of each of these alternative milking schedule strategies can be made.

ACKNOWLEDGMENTS

This work was made possible with funding from USDA National Institute of Food and Agriculture (NIFA) Northeast Sustainable Agriculture Research and Education Program (project no. ONE 20-360). This resource was developed by the University of Vermont Extension in collaboration with Sarah Flack of Sarah Flack Consulting. We would like to thank Dr. Larry Tranel for his collaboration on this project and for providing access to the Dairy TRANS tool.

Thank you to all the farmers who graciously participated in this project. The information gathered through this project is helping us learn more about the use of alternative milking strategies on farms and helping to identify areas of research and outreach critical to helping farmers successfully evaluate and implement these strategies on their own farms.



United States Department of Agriculture National Institute of Food and Agriculture



NORTHWEST CROPS & SOILS PROGRAM



Northwest Crops and Soils Program

278 South Main Street, Suite 2 | St. Albans, VT 05478-1866
802-524-6501 or 1-800-639-2130 (toll-free in Vt.) | cropsoil@uvm.edu

uvm.edu/extension/nwcrops

CULTIVATING HEALTHY COMMUNITIES

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. University of Vermont Extension, Burlington, Vermont. University of Vermont Extension, and U.S. Department of Agriculture, cooperating, offer education and employment to everyone without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or familial status. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Published: June 2022

