

Heather Darby¹
Sarah Flack²
Sara Ziegler¹
Avery Anderson³

2024 Cost of Production on Grass-fed Dairy Farms in the Northeast

¹ University of Vermont, St. Albans, VT
² Sarah Flack Consulting, Fairfield, VT
³ University of Vermont, Burlington, VT

Introduction

Since 2018 our research team has been collecting and analyzing financial data from 100% grass-fed dairy farms in the Northeast with the goal of better understanding the cost of producing milk in this production system. With several years of data, we have been able to create useful benchmarks for northeast grass-fed dairy farmers.^{1,2} This article will summarize the 2024 dataset and explore the impact of management practices on cost of production and profitability with data from 2023 and 2024.

Dairy farms located in NY, NH, and VT that are shipping 100% grass-fed milk were able to participate in the study. Data are presented as an overall average for all farms in the study and also divided into groups by total cost of production. Three groups were created representing low (<\$45), medium (\$45-\$55), and high (>\$55) production costs on a hundredweight equivalent (cwt eq.) basis. Total cwt eq. shipped by each farm was determined by converting dairy-related non-milk income (i.e., crop sales, calf sales, etc.) into an equivalent number of milk hundredweights (cwt) which is then added to the milk hundredweights sold. While our focus is on the cost to produce grass-fed milk, the data collected included information on changes in inventory (herd, equipment, etc.), and asset values allowing net farm income from operations (NFIFO), return on assets (ROA), and operating profit margin (OPM) to be calculated. This data is reported in Table 1.

2024 Farm Demographics

Participating farms (32) were selling milk to Organic Valley (59%), Maple Hill Creamery (25%), and other local markets (16%). The herd size ranged from 28 to 153 milking cows with an average of 65 cows per farm. Farms were managing an average of 365 acres resulting in 5.17 acres available per mature cow (Figure 1). The farms estimated they purchased on average 30.3% of their herd's forage needs.

Herds were mainly composed of crossbreeds, although there were farms milking pure-bred Holstein, Jersey, and other breeds which differ in milk and fat production. While most farms milked twice daily year-round (68%), there were some fully seasonal herds (16%) and herds milking at frequencies other than twice daily (16%).

Income and Expenses

Farm production practices and management varied widely among the farms influencing farm income and expenses (Table 1). Farms shipped an average of 548,150 lbs of milk/year equating to 8,410 lbs/cow/year. However, this ranged widely from 4,570 to 12,138 lbs/cow/year. These values reflect only milk that was shipped off the farm and do not include milk fed to youngstock or diverted for other uses and therefore does not reflect total milk production. In 2024, the quantity of milk being diverted to youngstock was collected and added to the pounds of milk sold to estimate total milk produced. The average total milk production for the farms was 622,026 lbs compared to the average milk sold of 548,150 lbs. Therefore, milk production per cow averaged 9,207 lbs/cow while milk shipped averaged 8,410 lbs/cow. Farms fed an average of 1.86 gallons/calf/day for 5.25 months which equated to 2,518 lbs/milk/calf. These farms raised on average 19 calves which consumed \$22,696 worth of milk per farm per year. With an average herd size of 65 cows, these farms could raise only 15 calves each year to meet their replacement rates. The extra 4 calves represent \$4,251 of lost milk income per year for each farm on average. If extra animals are going to be raised to sell, the quantity of milk and high-quality forage fed prior to sale needs to be considered as this may not always be a profitable venture.

For the purposes of this publication, grass-fed dairy is defined as dairy production in which the ration does not contain any grain or grain byproducts. Nutrient needs on these farms are met with grazed and stored forages.

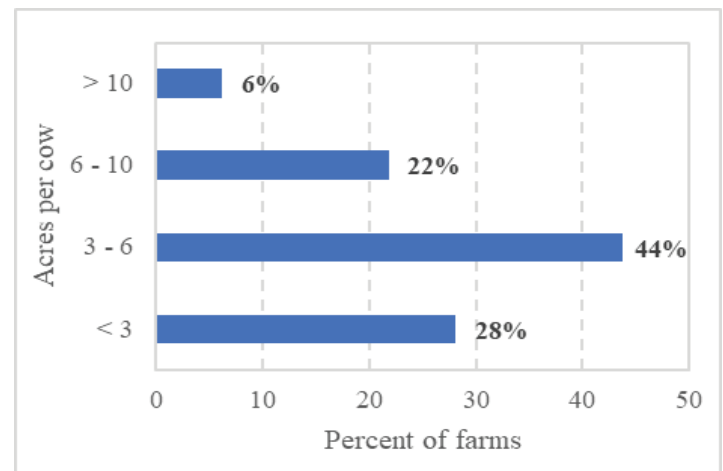


Figure 1. Distribution of acres per cow for participating farms

¹ https://www.uvm.edu/sites/default/files/Northwest-Crops-and-Soils-Program/Articles_and_Factsheets/2018-2020_COP_Report_1_Cost_of_Grassfed_Production.pdf

² <https://uvmd10.drupal2.uvm.edu/d10-files/documents/2025-04/2023-COP-article.pdf>

Table 1. Average farm summary statistics by cost group, 2024

	Low Cost (<\$45)	Medium Cost (\$45-\$55)	High Cost (>\$55)	Overall Average (\$51.47)
	n = 10	n = 14	n = 8	n = 32
Farm Information				
Herd size (mature cows)	79	61	53	65
Acres	477	322	300	365
Acres per cow	5.48	4.69	5.61	5.17
Cost of fertilizer & seed (\$/ac)	\$39	\$44	\$20	\$36
Cost of fertilizer & seed (\$/cow)	\$130	\$156	\$110	\$136
Purchased forage cost (\$/cow)	\$492	\$536	\$437	\$497
Purchased forage cost (\$/ac)	\$188	\$166	\$116	\$161
Milk Information				
Milk sold (lbs/yr)	776,986	487,852	367,628	548,150
Milk sold (lbs/cow)	9,792	8,360	6,771	8,410
Milk sold (lbs/ac)	2,739	2,233	1,489	2,205
Fat sold (lbs/cow)	426	385	295	375
Fat sold (lbs/ac)	121	104	65	99
Labor Efficiency				
Full-time Equivalents (FTE)	2.5	2.3	2.0	2.3
Cows per FTE	34	29	26	30
Milk sold (cwt eq./FTE)	3,943	2,988	1,794	2,988
Unpaid labor (hours)	4572	5249	5765	5167
Unpaid labor (\$)	\$67,356	\$79,546	\$80,004	\$75,851
Return to labor (\$)	\$108,930	\$44,960	-\$27,944	\$46,724
Labor earnings (\$/hr)	\$19.21	\$10.26	-\$3.47	\$9.62
Farm Income				
Milk price (\$/cwt)	\$41.23	\$42.94	\$41.72	\$42.10
Gross Milk Income (\$)	\$322,421	\$209,891	\$150,185	\$230,130
Gross Cull, Calf, & Livestock Sales (\$)	\$29,005	\$17,269	\$21,539	\$22,004
Gross Crop Sales (\$)	\$4,137	\$3,419	\$913	\$3,017
Other Income (\$)	\$14,972	\$20,860	\$9,565	\$16,196
Total Gross Income (\$)	\$370,535	\$251,439	\$182,201	\$271,347
Net				
Net Cash Income (\$)	\$148,402	\$93,348	\$52,350	\$100,303
Inventory change (\$)	\$14,896	-\$9,290	-\$42,925	-\$10,141
Net farm income from operations (NFIFO, \$)	\$163,298	\$84,058	\$9,425	\$90,162
4% Equity charge (\$)	\$54,367	\$39,098	\$37,370	\$43,437
Return on assets (ROA, %)	7.23%	-0.40%	-8.32%	0.00%
Operating profit margin (OPM, %)	21.3%	-0.84%	-50.8%	-6.40%
Asset turnover ratio (ATR, %)	35.4%	32.3%	18.6%	29.8%
ATR length (years)	3.33	3.57	6.25	4.17

The average pay price farms received for their milk was \$42.10 per cwt but ranged from \$31.27 to \$58.15 per cwt of milk sold. Milk buyers pay different base rates and premiums leading to a range of pay prices that farms were receiving for their milk. Gross farm income averaged \$271,347 with \$230,130 from milk sales and an additional \$41,217 of other income (i.e., calf sales, crop sales, cull beef and other income). Note that federal and state milk insurance program payments were not included in the data, however, other dairy program income (e.g., organic certification reimbursement) was included in the other income category. The additional non-milk income (\$41,217 /yr/farm on average) represents 15.6% of the total gross income which is about 5% higher than in 2023. The largest increase of 2.7% was observed in income from livestock sales. This may be due to the high pay price for cull cows, breeding stock, and calves observed in 2024 but it may also be from farmers trying to diversify their income with other enterprises or off-farm income. Of the participating farms, 59% had other income sources besides the dairy, including raising other livestock, producing maple products, growing bedding plants, processing meat, and running other on-farm enterprises. In addition, 22% of farms indicated that they generated income from two or more additional sources.

Data were collected using the Dairy TRANS financial analysis tool with a standardized method (<https://www.extension.iastate.edu/dairyteam/files/page/files/DairyTRANS44.pdf>). In-depth interviews were also conducted for each participating farm in 2024 to gain additional details related to management on grass-fed dairies. In addition to cash expenses, this method includes an unpaid labor charge per owner/operator and per additional unpaid full-time worker (3,000 hours). It also includes 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 and 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 has been used in previous years, but was increased to \$47,512 in 2024 to account for cost-of-living increases.

Table 2. Average of cash expenses (\$/cwt eq.) by total cost group

	Low cost ≤\$45 per cwt eq.	Medium cost \$45-\$55 per cwt eq.	High cost ≥\$55 per cwt eq.	All
Bedding*	\$1.07	\$0.71	\$1.69	\$3.97
Breeding	\$0.32	\$0.31	\$0.06	\$0.25
Custom hire	\$0.94	\$1.11	\$1.47	\$1.15
Machine rental	\$0.06	\$0.05	\$0.55	\$0.18
Land rental	\$0.61	\$0.67	\$1.16	\$0.77
Supplies	\$1.89	\$2.38	\$4.55	\$2.77
Insurance	\$0.59	\$0.64	\$0.75	\$0.65
Fuel, Gas and Oil	\$1.56	\$1.56	\$2.53	\$1.80
Hired Labor	\$2.98	\$3.26	\$1.05	\$2.62
Property Taxes	\$1.10	\$1.17	\$2.66	\$1.52
Purchased Forage	\$3.38	\$3.49	\$4.02	\$3.58
Minerals	\$0.86	\$1.16	\$1.00	\$1.02
Energy supplements	\$0.11	\$0.21	\$1.06	\$0.39
Repairs	\$2.84	\$3.18	\$4.05	\$3.29
Seed and fertilizer	\$1.06	\$1.52	\$1.72	\$1.43
Utilities	\$0.84	\$0.96	\$1.72	\$1.11
Veterinary and medicine	\$0.26	\$0.30	\$0.36	\$0.30
Stop and hauling	\$0.97	\$1.18	\$0.95	\$1.05
Other	\$2.14	\$1.24	\$3.48	\$7.13
Total Cash Expense (\$/cwt eq.)**	\$23.94	\$25.46	\$35.41	\$27.47
Total Cash Expense (\$/cow)	\$2,797	\$2,704	\$2,431	\$2,665
Total Cash Expense (\$/farm)	\$222,133	\$158,091	\$129,851	\$171,044
Total Cost (\$/cwt eq.)***	\$37.80	\$49.00	\$72.87	\$51.47

*Costs and cost groups expressed on a \$/CWT eq. basis adjusted for additional non-milk income.

**As calculated in Dairy TRANS; interest expenses are not included

***Total cost per cwt eq. includes balance sheet adjustments such as inventory change, a 4% charge on farm equity in lieu of interest payments, and a standard charge for unpaid labor.

This unpaid labor charge standardizes owner/worker income allowing for fair comparison between owners who draw an income and those who rely on off-farm income or another enterprise to cover living expenses. With these standardizations, the average total cost per cwt eq. across all farms was \$51.47, about \$2.00 higher than in 2023. The average pay-price per cwt of milk sold was \$42.10, about \$1.50 higher than in 2023. The lowest cost group, representing approximately 31% of farms, had a total cost per cwt eq. of \$37.80, \$4.30 below the average pay price of \$42.10. For the other two groups (69% of farms) their total cost of production exceeded the average pay price. It is important to recognize that this includes the standardized family living draw which may differ considerably from what they may choose to pay themselves. Many participants in the study were paying themselves significantly less or nothing at all.

Looking at some of the expenses in more detail, cash expenses ranged widely across farms (Table 2). Note that, in Dairy TRANS, a 4% charge on the farm's equity is included instead of interest. The largest cash expense on farms was purchased forage which accounted for 13.7% of cash expenses. Other major expenses included repairs, supplies, and hired labor.

Acreage ranged from 1.9 to 12.9 acres per mature cow, with some farms purchasing a significant portion of their forages, while other farms produced all their own feed and even sold hay. Some of the lowest expense categories included machine rental, breeding fees, veterinary expenses, and energy supplements (e.g., molasses) which each accounted for <2% of the cash expenses. Interestingly, in previous years energy supplements accounted for approximately 2% of the cash expenses and 3-4% for the high-cost groups. Supplemental energy costs increased in 2022 compared to 2019 and 2020 levels which may be due to farmers utilizing energy supplements to balance poorer quality forage. This decreased to 1% in 2023 and 2024. While the high-cost group is still spending significantly more than the other groups on supplemental energy, it still only accounts for 2.7% of the cash expenses in the highest cost group. This may be due to higher quality forage being produced or farmers deciding not to purchase energy due to its significant cost. To better understand the impact molasses supplementation has on milk production and cost of production, additional questions regarding molasses feeding were asked in 2023 and 2024. Farms varied in the ways they were supplementing molasses, including feeding different amounts, using different feeding methods, feeding at different times, and feeding to different groups/ages of livestock. Unfortunately, with so much variation in management and a small sample size (6 farms), we could not complete a robust and meaningful analysis. In some cases, molasses supplementation may be a useful strategy to support grass-fed cow health and productivity.

Labor Efficiency

The average number of full-time equivalent (FTE) workers operating a farm was 2.3. One FTE is defined as 3,000 labor hours per year and includes both paid and unpaid labor. Therefore, the average number of cows managed by 1 FTE was 30. This metric had an enormous range from 19 to 52 cows per FTE, indicating large differences in labor efficiency. The high-cost group was managing 8 fewer cows per FTE compared to the low-cost group. If we consider milk produced per FTE, adding milk diverted to youngstock back in, the low-cost group averaged 3,309 cwt/FTE while the high-cost farms produced only 2,196 cwt/FTE. This suggests that the high-cost farms aren't simply diverting more milk to youngstock but are actually producing less milk per FTE. However, milk isn't the only output on these farms that each FTE contributes to, some farms are selling livestock and/or crops, or generating other related income with their farm labor. You can see in Table 1 that the low-cost farms sold more than twice as much milk cwt eq. per FTE as high-cost farms, which includes adjustments for dairy related non-milk income. In terms of value, the low-cost farms are also generating over \$10,000 per FTE more income in addition to milk sales compared to the high-cost farms. This may suggest that the more labor efficient farms are using their available labor to capture value from the dairy other than just milk sales. As grass-fed dairy farms work to find ways to be financially sustainable, labor efficiency is clearly one of the areas that will benefit from additional focus.

Farm Financial Health Metrics

The Net Cash Income (NCI) is the farm's total gross income minus the farm's total cash expenses. Dairy TRANS does not include the farm's interest expense in the calculation of NCI, instead it uses a 4% equity charge on assets in the calculation of total cost. The calculation of NCI also does not include adjustments for inventory change, principal payments on loans, or unpaid labor (family living expense). Assigning a 4% equity charge and assigning \$47,512 per owner/operator and per FTE of additional unpaid labor allows farms' total cost of production to be compared on a more level playing field.

Net Farm Income from Operations (NFIFO) is the farm's NCI plus inventory change, depreciation, and other capital adjustments. So, this calculation includes changes in quantity and value of feed, livestock, machinery, equipment, accounts payable and receivable, and real estate from the beginning to the end of the year. The average NFIFO was \$90,162 but ranged from -\$21,263 to \$290,642. For easier interpretation, this value can be looked at per cwt of milk sold. In doing so the average NFIFO was \$11.71 per cwt eq. and ranged from -\$8.39 to \$24.61 per cwt eq. The NFIFO is not farm profit; it is just what remains after accounting for cash expenses and inventory changes that is available to pay the opportunity costs of unpaid family labor, unpaid equity, and capital investments in the farm.

Return on Assets (ROA) averaged 0%, however it ranged from -10.3% to 16.3%. This indicates that on average grass-fed dairy farms are breaking even on every dollar of assets on the farm. This is an improvement over 2023 where farms were on average losing \$1.25 on every dollar of assets on the farm. Operating Profit Margin (OPM) averaged -6.40% but ranged from -82.1% to 34.0%. The low-cost group had a positive OPM of 21.3% on average, while the medium- and high-cost groups were negative with the high-cost group at an average of -50.8%. The OPM is the percentage of profit generated from every dollar of output prior to paying interest and equity costs. This means on average grass-fed dairies lost 6.4 cents on every dollar of output before interest and equity payments are made. However, in both ROA and OPM calculations here, it is important to remember that the total cost calculation used does not reflect the farm's actual family living expense or interest but instead uses the standardized \$47,512 per operator and additional FTE of unpaid labor as well as a 4% equity charge. Many of the farms that participated here were paying themselves substantially less than this standardized wage or nothing at all, meaning they were relying solely on off-farm or other enterprise income to cover their living expenses. The standardizations provide a fairer assessment of the dairy enterprise alone.

Emerging Management Trends in 2023 and 2024

Grazing and forage management

Without grain supplementation, forage quality becomes one of the top priorities for a grass-fed dairy farm. A grass-fed cow requires a large quantity of forage with high nutrient content and fiber digestibility to allow her to consume enough dry matter and nutrients to support her bodily maintenance and milk production needs. Some grass-fed farms have access to affordable hay markets where they can purchase such forage while others do not and instead take on more land to be able to produce such forage on their own farms. In either case, forage quality drives milk production. From the data collected in 2023 and 2024, we found that farmers who ranked their forages (made or purchased) as "excellent" quality produced 1,432 lbs more milk per cow than those who ranked their forages of lower quality.

For at least five months of the year, however, grass-fed dairy farms must utilize pasture to obtain at least 60% of the herd's dry matter needs. In the Northeast, with such a short growing season, maximizing pasture output can reserve high-quality stored forages necessary to feed through the winter. To achieve this, pastures must be managed in ways that encourage high yields, plant density, and fast recovery rates after grazing while maintaining plants in vegetative stages.

Generally, achieving this would require varying rest periods in response to changes in plant growth rates and maintaining sufficient post-grazing residual as to protect the plants and allow for fast regrowth. Often, this requires moving the cows to new paddocks multiple times each day, managing residue sometimes with post-grazing clipping, and increasing the pasture acreage used as rest periods lengthen. These strategies may take additional labor, infrastructure and land, so do they lower the cost of production or increase milk production? To answer this, in 2023 and 2024 we asked participating farmers questions about their grazing management practices in addition to collecting their financial data.

We found that, in 2023 and 2024, farms that had longer grazing season lengths had lower costs of production with each additional grazing day representing a \$0.18 per cwt eq. reduction in total cost of production. Interestingly, farms that spent more per acre on seed and fertilizer produced more milk per cow. This may be related to farms continuing to improve perennial forage stands with improved grass species and varieties and adding legumes or also planting additional acreages of annual crops to provide more pasture throughout the season. In addition, higher proportions of pasture in the diet were associated with lower milk production. A similar trend was observed in the national survey conducted as part of this project.

While this may seem counterintuitive, there are some possible explanations including variable forage quality/quantity of pastures, the impacts this has on feed intake and animal nutrition, and overall herd management. Pasture productivity and quality change over the course of the grazing season. Generally, forage quality decreases as plants progress in maturity. Most of the grass species in our pastures will mature and therefore be at their lowest quality between mid-May and mid-June. Other species, including legumes and forbs, mature throughout the summer. Figure 2a shows the fiber, soluble carbohydrate, and available protein contents of northeast pastures throughout the grazing season. This demonstrates that, early in the season prior to plants reaching maturity, the pasture is low in fiber but balanced in soluble carbohydrates and protein. As the plants mature, they increase in fiber content, decrease substantially in carbohydrate content and decrease somewhat in protein content. Throughout the summer months, fiber remains relatively stable, while protein contents rise as more protein-rich legumes dominate as the cool season grasses slow in growth or go dormant. Through this time and by the end of the season, you can see that the pastures are no longer very balanced in available carbohydrates and protein. In the rumen, if there is too much available protein relative to carbohydrate, ammonia can build up requiring the animal spend energy converting it to safer forms like urea and excreting it which wastes energy that could

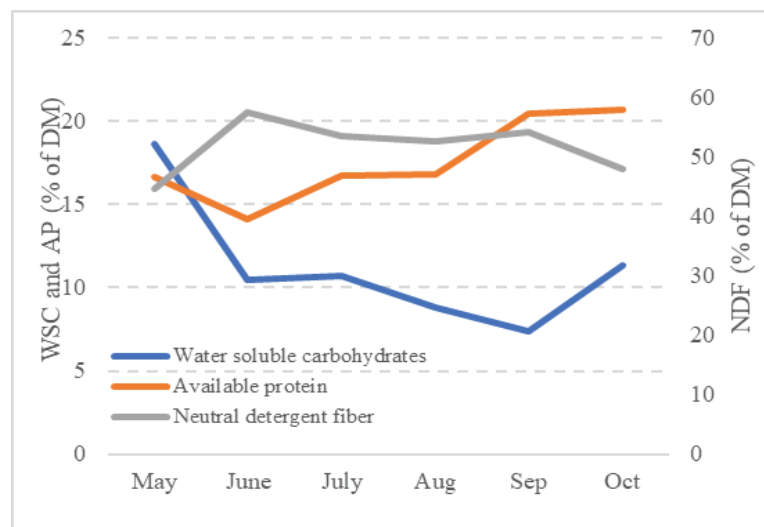


Figure 2a. Pasture AP, WSC, and NDF across the grazing season

These data were collected on 5 grass-fed dairy farms in NY and VT in 2021 and 2022 (OREI project no. 2018-02802). Pasture samples were collected as a hand grab sample and analyzed via NIR procedures and milk yield data were collected monthly via DHIA testing.

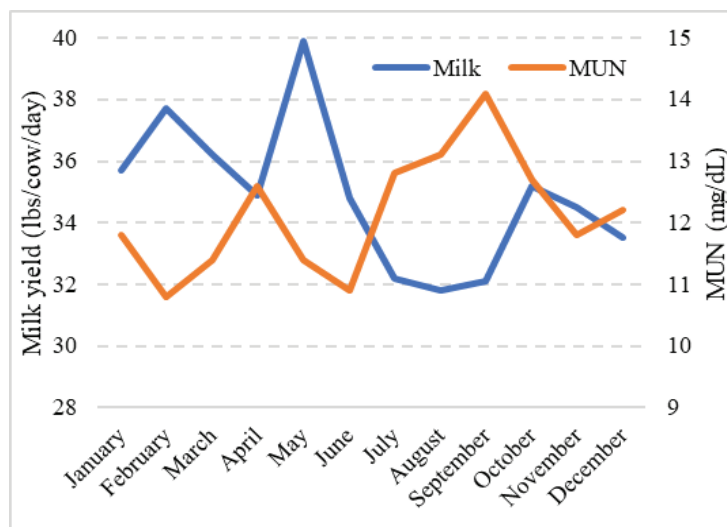


Figure 2b. Milk production and MUN levels across the year

Growing conditions, including temperature, moisture, soil fertility, and pest/disease pressure can all impact pasture productivity and quality as well. Since cool season perennial grasses provide the majority of dry matter coming from our pastures, we typically recommend making decisions such as grazing timing based on the grasses. Increasingly, farmers are interested in adapting their grazing management to enhance species diversity, soil health and provide other ecosystem services. This might include increasing the pre-grazing height, increasing recovery periods, seeding diverse species, fallowing, etc. While these strategies may provide environmental benefits, it is important to understand how these may impact forage quality, animal performance, and ultimately farm viability. Regardless of the species present, pastures with more mature plants will have lower fiber digestibility and nutritive value. These pastures will provide less energy to the animal thereby reducing milk production. In addition, mature plants are typically less palatable which can reduce grazing efficiency and overall dry matter intake. Therefore, although the cows have a higher proportion of the ration coming from pasture, they may have consumed more and made more milk if the stage of maturity and palatability of the pasture was more conducive to grazing.

Relying more heavily on pasture also often requires more land to be utilized in the grazing system. Long walking distances between the barn, water, and pasture can expend energy that could have otherwise been used to support milk production. Similarly, other conditions like heat and flies can negatively impact cow grazing behavior. All these could lead to a lower dry matter intake despite a higher proportion of it coming from pasture. Finally, when cows are managed off pasture during the non-grazing season, there may be more opportunities to observe and manage the herd more effectively. For example, in the winter, farmers may be able to push feed up to the animals more frequently supporting increased forage intake. Similarly, it may be easier to spend time observing cows in the barn to catch heats and illnesses which can impact the breeding and health programs which ultimately impact milk production. These are factors that may explain why herds that receive more of their nutrition from pasture may be less productive.

Despite potentially lower milk production, higher pasture intake could lead to higher net income; depending on the cost of managing the grazing system and the value of milk produced, pasture could be a lower cost feed source compared to stored forages. If the pasture infrastructure is very labor efficient, provides easy heat abatement and water access, and is managed to produce a high density of high-quality forage throughout the entire grazing season, maximizing pasture in the ration may increase net income. In this way, different farms will have different “break-even” points for pasture intake and they will have to determine for their farms.

Labor efficiency

As with any other resource on the farm, being efficient with the amount of labor available will have a significant impact on the farm’s cost of production and profitability. While making stored forages has high labor demand, milking, feeding/bedding, and grazing management can all vary widely in their labor needs depending on the farm. To better understand labor efficiency on grass-fed dairies additional information regarding milking and housing systems and labor was collected in 2023 and 2024.

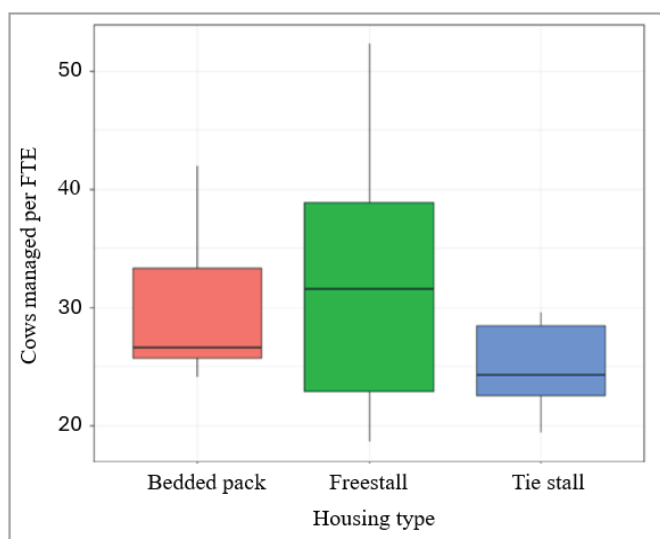


Figure 3. Cows managed per FTE by housing type

We found that farms that managed more cows per FTE had lower total costs of production with each additional cow managed representing a \$0.56 per cwt eq. reduction in cost. With limited labor resources farmers often look to installing milking parlors that require fewer employees and less time to milk, freeing up labor for other tasks and reducing costs. Interestingly, the number of cows milked per labor hour did not differ significantly between farms with parlors and farms milking in tie stalls. Farms with tie stalls did, however, manage about 6 fewer cows per FTE compared to farms with other systems (Figure 3) and they sold 652 fewer cwt milk per FTE. These farms also had production costs averaging \$8.32 per cwt eq. higher than farms with other milking and housing systems. As grass-fed dairy farms work to find ways to be financially sustainable, labor efficiency is clearly one of the areas that will benefit from additional focus.

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