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Comparing New York dairy farm characteristics, costs, and performance across four quartiles of profitability in 2022

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In 2022, the milk price paid to farms reached a 30-year high, according to data from New York dairy farms participating in the Dairy Farm Business Summary and Analysis Program (DFBS).[1] These data also show that 2022 was the third most profitable year in the past thirty, after 2014 and 2007. The average rate of return on all assets without appreciation for the same 130 New York dairy farms rose from 4.2 percent in 2021 to 11.6 percent in 2022.[2] Despite this increase in average earnings, variation across individual farms was high, and not all farms were profitable in 2022. DFBS data from 2022 provides insight into key measures of productivity, efficiency, and financial performance for New York dairy farms during a year of strong earnings.

With a total of 140 New York dairies completing the DFBS in 2022, farms were sorted into four groups representing earnings quartiles, using the rate of return on all assets without appreciation (ROA) to measure earnings. Each quartile represents 35 farms. The average ROA was four percent for the lowest quartile, 7.9 percent for the second quartile, 11.1 percent for the third quartile, and 16.6 percent for the highest quartile. The following tables present selected farm characteristics, costs, and performance measures associated with each quartile to identify similarities and differences across the four groups. Table 1 highlights selected measures of size, efficiency, costs, and profitability for each earnings quartile.

Herd size tends to increase as farm profitability rises, and there was a positive correlation between herd size and earnings in 2022. As in past years, the lowest earnings quartile reported the smallest average herd size, 482 cows. The average herd size for the top two quartiles was almost the same. Farms in the third quartile had an average herd size of 1,711 cows, compared to 1,712 cows for the top quartile. Larger farms were not always more profitable, however, and each earnings quartile contained a range of herd sizes that overlapped with other quartiles. Table 3 presents a quintile range for herd size and other selected measures within each of the four earnings quartiles. The quintile range in herd size for the lowest earning farms was 99 to 1,096 cows. The highest earning farms had a quintile range in herd size from 822 to 3,323 cows, which

[1] Karszes, J. K. (August 2, 2023). Dairy Farm Business Summary & Analysis Program: 30 years of change.
[2] Karszes, J. K., Augello, L. (June 28, 2023). Progress of the dairy farm report. EB 2023-08. Cornell Dairy Farm Business Summary and Analysis Program, Charles H. Dyson School of Applied Economics and Management, College of Agriculture and Life Sciences, Cornell University, Ithaca, NY.

was a narrower range compared to farms in the third earnings quartile. The quintile range is the average of farms by 20 percent increments for that measure. In Table 3, each quintile represents seven farms.

As herd size increases, dairy farms tend to utilize more labor and land. In 2022, the average number of worker equivalents increased from 10.6 for the lowest earnings quartile to 29.5 for the highest.[3] The lowest quartile of farms reported an average of 1,153 tillable acres, compared to 2,796 for the highest earnings quartile. However, farms in the third earnings quartile used the most labor and land, on average, with 32.7 worker equivalents and 2,962 tillable acres.

Typically, herd size is also positively correlated with labor and land efficiencies. Farms in the lowest earnings quartile reported the lowest labor efficiency levels, with 1.13 million pounds of milk sold per worker, compared to 1.63 million pounds per worker for farms in the highest earnings quartile. There was little variation in the average hired labor cost per worker equivalent across earnings quartiles. Farms in the second quartile spent the most, on average, with a hired labor cost of $54,978 per worker, just 7.6 percent more than farms in the lowest earnings quartile with the lowest average hired labor cost per worker. Variation within each quartile was greater. Farms in the highest earnings quartile had a quintile range in hired labor cost per worker equivalent from $47,240 to $64,293, a difference of 36.1 percent. Better labor efficiency among farms in the top quartile contributed to an average hired labor cost of $2.96 per cwt., the lowest among the four groups. Despite the similarity in average herd size, farms in the third quartile utilized labor less efficiently and spent an average of $0.52 more per cwt on hired labor compared to farms in the top earnings quartile.

Farms in the two highest earnings quartiles worked the most acres overall, yet farms in the lowest quartile cropped more acres per cow, and reported the highest crop revenue per cow, compared to the other groups. Average tillable crop acres dropped from 2.39 acres per cow for the lowest quartile of farms to 1.68 acres per cow for the highest quartile of farms. Utilizing fewer acres per cow contributed to lower capital investment per cow for farms in the highest quartile, with an average machinery and equipment investment of $1,810 per cow and an average total capital investment of $12,426 per cow.

In 2022, the highest quartile of farms produced an average of 28,044 pounds of milk per cow, more than any other group, and 3,222 more pounds per cow than the lowest quartile. However, high producing farms are not always high profit farms. Table 3 shows more variation in pounds of milk sold per cow within each earnings quartile. The lowest earning farms had a quintile range in milk pounds per cow from 15,719 to 29,087, while farms in the highest quartile ranged from 25,685 to 30,171. Cull rates showed little variation across earnings quartiles, with an average annual cull rate of 35 percent for the highest earnings quartile versus 33 percent for the lowest. There was more variation in the ratio of heifers to cows, with farms in the top quartile averaging 72 percent heifers to cows, compared to 83 percent heifers to cows for the lowest quartile.

The average total farm operating cost dropped from $25.61 per cwt. for farms in the lowest earnings quartile to $21.05 per cwt. for farms in the highest quartile, a difference of $4.56 per

[3] In the Dairy Farm Business Summary, one worker equivalent equals 2,760 annual labor hours.

cwt. (Table 2). With expenses divided into 31 categories, differences can be highlighted across the four groups. The highest quartile of farms had the lowest average cost per cwt. in 23 of 31 expense categories, and the lowest average cost per cow in 14 of 31 categories, including machinery repair, fuel, fertilizer, crop chemicals, land rent, and property taxes. Lower costs in these expense categories may be driven by utilizing fewer acres per cow and achieving higher levels of asset utilization. However, cropping fewer acres per cow may drive up purchased feed costs. Farms in the highest earnings quartile spent an average of $2,211 per cow on purchased grain, more than any other group, and they had the second highest average purchased forage cost per cow.

The highest quartile of farms averaged the highest milk sales, cattle sales, and calf sales per cow. They achieved the second highest average crop revenue per cow, despite having the fewest crop acres per cow. The combined impact of all revenue sources resulted in average total operating receipts of $8,507 per cow, higher than all other groups. Farms in the highest earnings quartile also reported the lowest average farm operating expense per cow. Including expansion livestock and depreciation expenses, total expenses for farms in the highest quartile averaged $6,406 per cow, about $400 less per cow than farms in the lowest quartile. As a result, the highest quartile of farms generated an average net farm income of $2,101 per cow, compared to $791 per cow for the lowest quartile.

The average operating cost to produce milk fell from $22.29 per cwt. for the lowest quartile of farms to $18.20 per cwt. for the highest quartile, a difference of $4.09 per cwt. This pattern resulted from the highest quartile of farms having the lowest total cost of production per cow and the highest milk output per cow. Notably, the difference across earnings quartiles in the average cost of production was much greater than the difference in average milk price. Average gross milk sales ranged from a low of $26.90 per cwt. for the third earnings quintile to a high of $27.24 per cwt. for the top quintile, a difference of $0.34 per cwt. After incorporating costs associated with depreciation, family labor and management contributions, and a five percent return on owner equity, the total economic cost of producing milk averaged $27.57 per cwt. for the lowest quartile of farms and $21.93 per cwt. for the highest quartile, a difference of $5.64 per cwt.

Analyzing how businesses compare to industry benchmarks can be useful to identify areas within the business that could benefit from further evaluation and possible management changes. To participate in the Dairy Farm Business Summary and Analysis Program visit our website for more information: cals.cornell.edu/pro-dairy/our-expertise/business/dfbs.

TABLE 1

DAIRY FARM BUSINESS SUMMARY SELECTED FACTORS

Sorted by Return on All Capital without Appreciation, 140 New York Dairy Farms, DFBS, 2022[1]

SELECTED FACTORS	Average of Lowest Quartile	Average of 2nd Quartile	Average of 3rd Quartile	Average of Top Quartile
Size of Business				
Average number of cows	482	920	1,711	1,712
Average number of heifers	401	726	1,198	1,226
Milk sold, pounds	11,953,721	24,365,297	46,929,974	48,024,384
Worker equivalent	10.6	18.4	32.7	29.5
Total tillable acres	1,153	1,764	2,962	2,769
Rates of Production				
Milk sold per cow, pounds	24,822	26,492	27,436	28,044
Hay DM per acre, tons	2.94	3.04	3.68	3.17
Corn silage per acre, tons	17.31	18.55	19.01	18.30
Cull rate, percent	33%	34%	33%	35%
Labor Efficiency				
Cows per worker	45.3	50.1	52.3	58.1
Milk sold per worker, pounds	1,125,409	1,326,544	1,435,533	1,628,221
Cost Control and Milk Price				
Grain & concentrate per cwt. milk	$8.53	$7.95	$7.54	$7.88
Net milk income over purchased grain & conc. per cow	$3,932	$4,510	$4,827	$4,923
Dairy feed & crop expense per cwt. milk	$11.31	$9.99	$9.71	$9.70
Labor and machinery costs per cow	$2,416	$2,254	$2,183	$1,933
Hired labor costs per cwt. milk	$3.20	$3.59	$3.48	$2.96
Hired labor costs per worker equivalent	$51,144	$54,978	$54,854	$53,260
Operating cost of producing milk per cwt.	$22.29	$20.55	$20.21	$18.20
Purchased input cost of producing milk per cwt.	$24.03	$22.32	$21.73	$19.75
Total cost of producing milk per cwt.	$27.57	$25.26	$23.85	$21.93
Net milk price	$25.46	$25.32	$25.25	$25.59
Capital Efficiency (average for year)				
Farm capital per cow	$14,519	$15,215	$12,970	$12,426
Machinery and equipment per cow	$2,665	$2,393	$2,043	$1,810
Asset turnover ratio	0.55	0.55	0.66	0.72
Profitability				
Net farm income without appreciation	$381,060	$1,164,220	$2,425,551	$3,597,324
Net farm income without appreciation per cow	$791	$1,266	$1,418	$2,101
Net farm income with appreciation	$568,764	$1,511,173	$3,199,065	$4,420,549
Net farm income with appreciation per cow	$1,181	$1,643	$1,870	$2,581
Labor & management income per operator/manager	$55,316	$298,103	$668,064	$1,128,223
Rate return on equity capital with appreciation	8.1%	12.8%	20.3%	26.8%
Rate return on equity capital without appreciation	4.1%	9.4%	14.9%	21.5%
Rate return on all capital with appreciation	6.7%	10.4%	14.6%	20.4%
Rate return on all capital without appreciation	4.0%	7.9%	11.1%	16.6%
Financial Summary (based on market value, excluding deferred taxes)				
Farm net worth, end year	$4,820,433	$10,742,785	$15,580,690	$17,246,442
Debt to asset ratio	0.33	0.26	0.34	0.26
Farm debt per cow	$4,889	$4,173	$4,547	$3,416
Debt coverage ratio*	1.95	2.49	2.62	4.67

*Farm participating both years

1 Groups determined by Percent Rate of Return to All Capital w/o Appreciation

TABLE 1 Continued -

DAIRY FARM BUSINESS SUMMARY SELECTED FACTORS

Sorted by Return on All Capital without Appreciation, 140 New York Dairy Farms, DFBS, 2022[1]

SELECTED FACTORS	Average of Lowest Quartile	Average of 2nd Quartile	Average of 3rd Quartile	Average of Top Quartile
Income Generation				
% Butterfat*	4.11%	4.07%	4.05%	4.05%
% Protein*	3.21%	3.19%	3.17%	3.20%
Lbs. of Butterfat and Protein per Cow*	1,815	1,924	1,980	2,033
Component Value per Cwt.*	$24.51	$24.41	$24.27	$24.35
Gross Milk Price	$27.21	$27.10	$26.90	$27.24
Balance Sheet Analysis				
Working Capital as % of Operating Expenses	16%	35%	27%	42%
Long Term Debt to Asset Ratio	0.28	0.29	0.36	0.25
Intermediate/Current Debt to Asset Ratio	0.37	0.25	0.33	0.26
Debt to Asset Ratio, Total	0.33	0.26	0.34	0.26
Debt Analysis				
Accounts payable as percent of total debt	7%	5%	3%	3%
Long-term debt as percent of total debt	39%	46%	46%	36%
Current & intermediate debt as percent of total debt	61%	54%	54%	64%
Cost of term debt(weighted average)	5.3%	5.3%	5.1%	4.3%
Net Worth Change				
Retained earnings	$238,446	$818,341	$1,820,760	$2,931,307
Contributed capital	$64,605	$42,854	$136,482	$64,485
Valuation equity	$87,333	$231,109	$382,541	$497,047
Cash Flow				
Net provide by operating activities, per cow	$552	$693	$970	$1,099
Net provided by investing activities, per cow	-$942	-$1,094	-$1,303	-$1,376
Net provided by financing activates, per cow	$430	$401	$292	$287
Net provided by reserves, per cow	-$26	$4	$34	-$7
Repayment Analysis*				
Planned debt payments per Cow	$572	$619	$628	$484
Planned debt payments per Cwt.	$2.30	$2.33	$2.29	$1.73
Percent of total receipts	8%	8%	8%	6%
Percent of milk receipts	9%	9%	9%	7%
Cash flow coverage ratio	1.53	1.73	1.82	2.50
Debt coverage ratio	1.95	2.49	2.62	4.67
Crop Program Analysis				
Crop input costs per acre	$224	$231	$241	$225
Total tillable acres per cow	2.39	1.92	1.76	1.68
Total forages acres per cow	1.86	1.71	1.49	1.52
Harvested dry matter per cow	7.95	7.93	7.60	7.22
Percent tillable land owned	47%	52%	52%	54%
Capital and Financial Efficiency				
Farm capital per cow	$14,519	$15,215	$12,970	$12,426
Real estate per cow	$6,790	$6,561	$5,722	$4,939
Machinery and equipment per cow	$2,665	$2,393	$2,043	$1,810
Asset turnover	0.55	0.55	0.66	0.72
Operating expense ratio	0.81	0.76	0.75	0.69
Interest expense ratio	0.03	0.02	0.02	0.01
Depreciation expense ratio	0.06	0.06	0.05	0.05

*Average of farms reporting milk check detail **Farm participating two years

1 Groups determined by Percent Rate of Return to All Capital w/o Appreciation

TABLE 2

RECEIPTS & EXPENSES PER COW AND PER HUNDREDWEIGHT

Sorted by Return on All Capital without Appreciation, 140 New York Dairy Farms, DFBS, 2022[1]

	Lowest Quartile		2nd Quartile		3rd Quartile		Top Quartile	
Item	Per Cow	Per Cwt.	Per Cow	Per Cwt.	Per Cow	Per Cwt.	Per Cow	Per Cwt.
Average number of cows	482		920		1,711		1,712	
Cwt. of milk sold		119,537		243,653		469,300		480,244
ACCRUAL OPERATING RECEIPTS								
Milk	$6,755	$27.21	$7,180	$27.10	$7,380	$26.90	$7,640	$27.24
Dairy cattle	$335	$1.35	$331	$1.25	$335	$1.22	$368	$1.31
Dairy calves	$50	$0.20	$76	$0.29	$108	$0.39	$114	$0.41
Other livestock	$5	$0.02	$42	$0.16	$29	$0.11	$8	$0.03
Crops	$306	$1.23	$153	$0.58	$144	$0.53	$207	$0.74
Miscellaneous receipts	$148	$0.59	$179	$0.68	$142	$0.52	$170	$0.60
Total Operating Receipts	$7,598	$30.61	$7,961	$30.05	$8,138	$29.66	$8,507	$30.33
ACCRUAL OPERATING EXPENSES								
Hired labor	$794	$3.20	$951	$3.59	$953	$3.48	$829	$2.96
Dairy grain & concentrate	$2,117	$8.53	$2,107	$7.95	$2,068	$7.54	$2,211	$7.88
Dairy roughage	$64	$0.26	$92	$0.35	$172	$0.63	$135	$0.48
Nondairy feed	$2	$0.01	$0	$0.00	$0	$0.00	$0	$0.00
Professional nutritional services	$0	$0.00	$0	$0.00	$2	$0.01	$1	$0.00
Machine hire, rent & lease	$254	$1.02	$176	$0.67	$211	$0.77	$177	$0.63
Machine repair & vehicle expense	$398	$1.60	$351	$1.33	$337	$1.23	$299	$1.07
Fuel, oil & grease	$302	$1.22	$258	$0.98	$269	$0.98	$226	$0.81
Replacement livestock	$18	$0.07	$34	$0.13	$98	$0.36	$50	$0.18
Breeding	$75	$0.30	$63	$0.24	$73	$0.27	$50	$0.18
Veterinary & medicine	$156	$0.63	$158	$0.60	$157	$0.57	$159	$0.57
Milk marketing	$435	$1.75	$472	$1.78	$453	$1.65	$464	$1.65
Bedding	$101	$0.41	$110	$0.41	$105	$0.38	$108	$0.38
Milking supplies	$86	$0.35	$111	$0.42	$121	$0.44	$86	$0.31
Cattle lease	$9	$0.04	$3	$0.01	$5	$0.02	$4	$0.01
Custom boarding	$42	$0.17	$83	$0.32	$103	$0.38	$92	$0.33
BST expense	$1	$0.00	$0	$0.00	$0	$0.00	$0	$0.00
Livestock professional fees	$22	$0.09	$19	$0.07	$19	$0.07	$17	$0.06
Other livestock expense	$81	$0.33	$30	$0.11	$32	$0.12	$36	$0.13
Fertilizer & lime	$355	$1.43	$226	$0.85	$212	$0.77	$181	$0.64
Seeds & plants	$147	$0.59	$126	$0.47	$122	$0.44	$123	$0.44
Spray & other crop expense	$118	$0.48	$87	$0.33	$81	$0.29	$67	$0.24
Crop professional fees	$6	$0.03	$10	$0.04	$9	$0.03	$4	$0.01
Land, building & fence repair	$93	$0.37	$126	$0.48	$93	$0.34	$108	$0.39
Taxes	$86	$0.35	$78	$0.29	$63	$0.23	$62	$0.22
Real estate rent & lease	$106	$0.43	$89	$0.34	$92	$0.34	$70	$0.25
Insurance	$102	$0.41	$69	$0.26	$51	$0.19	$54	$0.19
Utilities	$129	$0.52	$142	$0.54	$115	$0.42	$123	$0.44
Interest paid	$195	$0.78	$165	$0.62	$180	$0.65	$114	$0.41
Other professional fees	$31	$0.12	$34	$0.13	$30	$0.11	$28	$0.10
Miscellaneous	$32	$0.13	$36	$0.14	$24	$0.09	$26	$0.09
Total Operating Expenses	$6,357	$25.61	$6,208	$23.43	$6,251	$22.78	$5,903	$21.05
Expansion livestock	$18	$0.07	$18	$0.07	$51	$0.18	$68	$0.24
Extraordinary expenses	$4	$0.02	$0	$0.00	$0	$0.00	$0	$0.00
Machinery depreciation	$237	$0.95	$275	$1.04	$232	$0.84	$236	$0.84
Real estate depreciation	$190	$0.77	$194	$0.73	$187	$0.68	$199	$0.71
Total Expenses	$6,807	$27.42	$6,695	$25.27	$6,720	$24.49	$6,406	$22.84
Net Farm Income w/o Appreciation	$791	$3.19	$1,266	$4.78	$1,418	$5.17	$2,101	$7.49

1 Groups determined by Percent Rate of Return to All Capital w/o Appreciation

TABLE 3

SELECTED FARM BUSINESS CHARTS

Sorted by Return on All Capital without Appreciation, 140 New York Dairy Farms, DFBS, 2022[1]

Each Column Sorted Independently

Lowest Quartile

Average Number of Cows	Pounds Milk Sold Per Cow	Pounds Milk Sold Per Worker	Hired Labor Cost per Worker Equiv.	Operating Cost to Produce Milk Per Cwt.	Total Cost of Milk Prod. Per Cwt.	Milk Receipts per Cwt.	Investment Per Cow	% Rate of Return on All Capital w/o Apprec.
99	15,719	567,285	15,639	18.80	25.83	25.39	9,191	-4.5
199	22,756	886,816	45,450	20.93	26.96	26.35	12,636	1.3
325	24,956	1,061,410	48,059	22.02	28.38	27.07	14,160	3.8
689	27,147	1,246,476	51,619	22.92	30.45	27.80	16,916	4.9
1,096	29,087	1,436,049	68,280	25.52	35.04	29.27	26,707	5.8

2nd Quartile

Average Number of Cows	Pounds Milk Sold Per Cow	Pounds Milk Sold Per Worker	Hired Labor Cost per Worker Equiv.	Operating Cost to Produce Milk Per Cwt.	Total Cost of Milk Prod. Per Cwt.	Milk Receipts per Cwt.	Investment Per Cow	% Rate of Return on All Capital w/o Apprec.
283	22,037	912,599	37,483	17.31	23.47	25.73	9,663	6.5
563	24,974	1,134,482	49,743	19.80	24.80	26.53	11,815	7.0
885	26,518	1,278,578	51,803	20.94	25.31	26.92	13,866	7.8
1,115	27,567	1,442,104	55,088	21.88	26.30	27.63	16,207	8.4
1,753	29,260	1,671,296	63,283	24.12	28.45	30.09	21,051	9.1

3rd Quartile

Average Number of Cows	Pounds Milk Sold Per Cow	Pounds Milk Sold Per Worker	Hired Labor Cost per Worker Equiv.	Operating Cost to Produce Milk Per Cwt.	Total Cost of Milk Prod. Per Cwt.	Milk Receipts per Cwt.	Investment Per Cow	% Rate of Return on All Capital w/o Apprec.
336	23,815	1,121,073	45,035	16.90	22.12	25.64	9,771	9.8
916	26,420	1,235,242	48,788	17.90	23.11	26.47	12,075	10.3
1,360	27,471	1,379,215	52,406	19.24	24.08	26.93	13,128	10.7
2,177	28,404	1,558,727	54,951	20.52	24.53	27.51	14,707	11.4
3,764	30,325	1,924,039	60,982	22.78	25.63	28.27	17,607	12.3

Top Quartile

Average Number of Cows	Pounds Milk Sold Per Cow	Pounds Milk Sold Per Worker	Hired Labor Cost per Worker Equiv.	Operating Cost to Produce Milk Per Cwt.	Total Cost of Milk Prod. Per Cwt.	Milk Receipts per Cwt.	Investment Per Cow	% Rate of Return on All Capital w/o Apprec.
822	25,685	1,239,843	47,240	15.26	19.95	25.96	8,747	12.9
1,205	27,198	1,418,819	49,308	17.27	21.52	26.68	11,136	14.4
1,419	27,929	1,588,914	51,197	18.06	21.82	27.09	12,697	15.6
1,794	28,940	1,864,437	56,016	18.68	22.42	27.48	14,306	16.9
3,323	30,171	2,243,544	64,293	20.99	23.92	28.54	17,067	21.7

1 Groups determined by Percent Rate of Return to All Capital w/o Appreciation