
Business Management

PD-2022-11-01

**Comparison of Selected Measures and Costs by
Quartiles of Profitability**

138 Dairy Farms, New York State, 2021

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For farms that participated in the Dairy Farm Business Summary and Analysis Program in 2021, earnings were most affected by traditional factors and less impacted by government programs in response to the pandemic in 2020. The average rate of return on capital without appreciation for all farms decreased from 6.8 percent in 2020 to 4.2 percent in 2021.¹ While the average decreased, variation continued to be wide in earnings. With 138 farms participating for 2021, the data was sorted by quartile of earnings, as measured by rate of return on all capital without appreciation. The following tables contain selected measures and costs associated with the four quartiles of farms and can be used to identify differences across the earning quartiles. The lowest quartile of farms averaged -1.4 percent rate of return on all capital without appreciation, with the second quartile averaging 2.4 percent, the third quartile earning 4.8 percent, and the highest quartile of farms earning 6.8 percent.

Table 1 highlights selected measures of size, efficiency, costs, and profitability for the four groups. Continuing an ongoing trend, as earnings increased, so did herd size, with the lowest quartile of farms averaging the smallest herd size, and the highest quartile of farms by earnings averaging the largest herd size. While there is a trend towards larger farms averaging higher earnings, a range of herd sizes is represented in each quartile of farms. In **Table 3**, the quartile range of herd sizes for the lowest earning group of farms was 102 to 1,585 cows and the quartile range in herd size for the highest earning farms was 596 to 3,997. The quartile range of farms is the average of farms by 20 percent increments for that measure.

Increase in herd sizes are correlated with increased worker equivalent, or one person working 2,760 hours a year, and total tillable acres. However, with increased herd sizes, efficiency is increased, with milk sold per worker equivalent going from an average of 1,204,175 pounds for the lowest quartile of farms to 1,613,257 pounds for the highest quartile of farms. With this increase in efficiency, the highest quartile of farms achieved the lowest cost per cwt for hired labor, averaging six cents per cwt less than the next closest quartile, while averaging the highest cost per worker equivalent. While the higher earning quartiles worked more acres in total, the acres worked per cow fell from 1.98 acres per cow for the lowest quartile of farms to 1.66 for the highest quartile of farms. The utilization of less acres per cow helped lead to the second lowest total capital investment per cow and the lowest investment per cow in machinery and equipment for the highest quartile of farms.

¹ Progress of the Dairy Farm Report, E.B 2022-10, Karszes, J & Augello, L, 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, June 2022

The highest quartile of farms averaged the second highest milk sold per cow, with the second highest quartile of farms averaging the highest production per cow at 28,029 pounds. All four quartiles averaged within 1,670 pounds of each other. While the average milk sold per cow is higher for the two highest quartile of farms, as is reported in **Table 3**, there is a large range in milk sold per cow. Farms in the highest earnings quartile range from 24,884 pounds sold per cow to 29,648 sold per cow. Along with averaging the highest milk production, the two highest quartile of farms by earnings had the lowest cull rate, averaging 34 percent for the year.

The average net milk price received across the four quartiles ranged from a low of \$18.55 per cwt for the third quartile of farms to a high of \$18.70 for the lowest quartile of farms. There is no relationship between milk prices and average earnings across the quartiles, with the highest quartile of farms averaging 14 cents lower milk price than the lowest quartile of farms.

Total costs to operate the farm decreased, moving from the lowest quartile of farms to the highest quartile of farms, with the average falling from \$21.33 per cwt to \$18.09 per cwt, a difference of \$3.24 per cwt (**Table 2**). With the smaller variation in milk production per cow across the quartiles, the lower cost per cwt is driven by lower total expenses per cow, with the highest quartile of farms averaging the lowest operating cost to run the farm on a per cow basis. With expenses divided into 31 separate expense categories, differences can be highlighted across the four groups. The highest quartile of farms had the lowest average cost per cow in 21 of the 31 expense categories. Machinery repair, fuel, fertilizer, seed, spray and chemicals, and rent expenses all averaged the lowest of the four groups and can potentially be a result of less acres per cow and higher asset utilization. However, with purchased forage expense for the highest quartile averaging the highest per cow across the quartiles, this also may be a result of less acres per cow.

The highest quartile of farms averaged the second highest milk sales per cow, following the third quartile. They also average second highest in revenue per cow for dairy cattle, dairy calves, and crops. They were the second highest in crops, even though they average the lowest acres per cow. The combined impact of all the revenue sources resulted in the highest quartile of farms averaging the second highest in revenue per cow, \$265 dollars less revenue per cow than the third quartile.

For the lowest quartile of farms, the operating costs to produce milk averaged \$18.70 per cwt, with the highest quartile of farms averaging \$15.23 per cwt. Incorporating depreciation expenses and values for family contributions of labor, management, and equity resulted in a total cost of producing milk of \$22.48 per cwt for the lowest quartile of farms, and \$18.77 per cwt for the highest quartile of farms as determined by the rate of return on all capital without appreciation.

Analyzing how your business compares to industry benchmarks can be useful to identify areas to consider making management changes. If you are interested in participating in the Dairy Farm Business Summary and Analysis Program, please reach out to the Cornell Cooperative Extension farm business management extension educator in your county.

TABLE 1**DAIRY FARM BUSINESS SUMMARY SELECTED FACTORS**Sorted by Return on All Capital without Appreciation, 138 New York Dairy Farms, DFBS, 2021¹

SELECTED FACTORS	Average of Lowest Quartile	Average of 2nd Quartile	Average of 3rd Quartile	Average of Top Quartile
<i>Size of Business</i>				
Average number of cows	612	957	1,404	1,803
Average number of heifers	481	769	1,034	1,320
Milk sold, pounds	16,128,923	25,458,243	39,354,716	48,736,493
Worker equivalent	13.4	19.1	27.2	30.2
Total tillable acres	1,210	1,900	2,491	2,839
<i>Rates of Production</i>				
Milk sold per cow, pounds	26,370	26,611	28,029	27,029
Hay DM per acre, tons	3.35	3.65	3.87	3.69
Corn silage per acre, tons	17.48	19.67	19.35	19.31
Cull rate, percent	39%	36%	34%	34%
<i>Labor Efficiency</i>				
Cows per worker	45.7	50.1	51.5	59.7
Milk sold per worker, pounds	1,204,175	1,332,543	1,444,475	1,613,257
<i>Cost Control and Milk Price</i>				
Grain & concentrate per cwt. milk	\$7.17	\$6.99	\$6.53	\$6.54
Net milk income over purchased grain & conc. per cow	\$2,838	\$2,976	\$3,209	\$3,335
Dairy feed & crop expense per cwt. milk	\$8.95	\$8.63	\$8.11	\$8.09
Labor and machinery costs per cow	\$2,069	\$1,929	\$1,852	\$1,692
Hired labor costs per cwt. milk	\$3.32	\$3.20	\$3.01	\$2.95
Hired labor costs per worker equivalent	\$49,723	\$50,867	\$48,553	\$52,234
Operating cost of producing milk per cwt.	\$18.70	\$16.74	\$15.84	\$15.23
Purchased input cost of producing milk per cwt.	\$20.20	\$18.45	\$17.30	\$16.66
Total cost of producing milk per cwt.	\$22.48	\$20.92	\$19.53	\$18.77
Net milk price	\$18.70	\$18.55	\$18.27	\$18.56
<i>Capital Efficiency (average for year)</i>				
Farm capital per cow	\$11,521	\$12,646	\$13,079	\$11,781
Machinery and equipment per cow	\$2,130	\$2,054	\$1,950	\$1,606
Asset turnover ratio	0.54	0.52	0.51	0.54
<i>Profitability</i>				
Net farm income without appreciation	-\$32,272	\$388,103	\$935,218	\$1,533,685
Net farm income without appreciation per cow	-\$53	\$406	\$666	\$851
Net farm income with appreciation	\$149,763	\$835,230	\$1,382,378	\$1,942,790
Net farm income with appreciation per cow	\$245	\$873	\$985	\$1,077
Labor & management income per operator/manager	-\$113,926	-\$4,943	\$121,827	\$326,855
Rate return on equity capital with appreciation	-0.2%	7.6%	9.0%	10.9%
Rate return on equity capital without appreciation	-4.5%	2.0%	5.4%	8.3%
Rate return on all capital with appreciation	1.2%	6.1%	7.2%	8.8%
Rate return on all capital without appreciation	-1.4%	2.4%	4.8%	6.8%
<i>Financial Summary (based on market value, excluding deferred taxes)</i>				
Farm net worth, end year	\$4,215,592	\$8,261,237	\$13,093,031	\$16,127,412
Debt to asset ratio	0.41	0.34	0.31	0.27
Farm debt per cow	\$4,732	\$4,441	\$4,151	\$3,243
Debt coverage ratio*	0.41	1.23	1.58	2.21

*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, 138 New York Dairy Farms, DFBS, 2021¹

SELECTED FACTORS	Average of Lowest Quartile	Average of 2nd Quartile	Average of 3rd Quartile	Average of Top Quartile
<i>Income Generation</i>				
% Butterfat*	4.02%	4.00%	4.01%	4.00%
% Protein*	3.20%	3.18%	3.16%	3.17%
Lbs. of Butterfat and Protein per Cow*	1,908	1,912	2,010	1,939
Component Value per Cwt.*	\$18.70	\$18.63	\$18.57	\$18.59
Gross Milk Price	\$20.00	\$19.97	\$19.67	\$19.81
<i>Balance Sheet Analysis</i>				
Working Capital as % of Operating Expenses	14%	26%	31%	33%
Long Term Debt to Asset Ratio	0.38	0.32	0.34	0.22
Intermediate/Current Debt to Asset Ratio	0.43	0.36	0.29	0.31
Debt to Asset Ratio, Total	0.41	0.34	0.31	0.27
<i>Debt Analysis</i>				
Accounts payable as percent of total debt	6%	3%	3%	3%
Long-term debt as percent of total debt	40%	43%	49%	35%
Current & intermediate debt as percent of total debt	60%	57%	51%	65%
Cost of term debt(weighted average)	3.4%	3.3%	3.0%	2.9%
<i>Net Worth Change</i>				
Retained earnings	-\$181,066	\$178,113	\$505,866	\$962,373
Contributed capital	\$67,566	\$70,472	\$71,148	\$69,593
Valuation equity	\$139,335	\$305,451	\$237,776	\$132,226
<i>Cash Flow</i>				
Net provide by operating activities, per cow	\$119	\$475	\$488	\$581
Net provided by investing activities, per cow	-\$448	-\$829	-\$794	-\$882
Net provided by financing activities, per cow	\$356	\$341	\$377	\$271
Net provided by reserves, per cow	-\$36	\$8	-\$73	\$29
<i>Repayment Analysis**</i>				
Planned debt payments per Cow	\$629	\$637	\$578	\$460
Planned debt payments per Cwt.	\$2.39	\$2.39	\$2.07	\$1.70
Percent of total receipts	11%	11%	10%	8%
Percent of milk receipts	12%	12%	11%	9%
Cash flow coverage ratio	0.57	0.98	1.12	1.48
Debt coverage ratio	0.41	1.23	1.58	2.21
<i>Crop Program Analysis</i>				
Crop input costs per acre	\$156	\$158	\$178	\$175
Total tillable acres per cow	1.98	1.99	1.77	1.66
Total forages acres per cow	1.80	1.70	1.52	1.42
Harvested dry matter per cow	8.14	8.64	8.06	7.35
Percent tillable land owned	40%	53%	57%	54%
<i>Capital and Financial Efficiency</i>				
Farm capital per cow	\$11,521	\$12,646	\$13,079	\$11,781
Real estate per cow	\$4,949	\$5,980	\$5,935	\$5,131
Machinery and equipment per cow	\$2,130	\$2,054	\$1,950	\$1,606
Asset turnover	0.54	0.52	0.51	0.54
Operating expense ratio	0.92	0.84	0.81	0.78
Interest expense ratio	0.03	0.02	0.02	0.02
Depreciation expense ratio	0.07	0.07	0.06	0.06

*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, 138 New York Dairy Farms, DFBS, 2021¹

Item	Lowest Quartile		2nd Quartile		3rd Quartile		Top Quartile	
	Per Cow	Per Cwt.	Per Cow	Per Cwt.	Per Cow	Per Cwt.	Per Cow	Per Cwt.
Average number of cows	612		957		1,404		1,803	
Cwt. of milk sold		161,289		254,582		393,547		487,365
ACCRUAL OPERATING RECEIPTS								
Milk	\$5,274	\$20.00	\$5,314	\$19.97	\$5,514	\$19.67	\$5,355	\$19.81
Dairy cattle	\$226	\$0.86	\$278	\$1.04	\$300	\$1.07	\$271	\$1.00
Dairy calves	\$60	\$0.23	\$69	\$0.26	\$63	\$0.22	\$68	\$0.25
Other livestock	\$90	\$0.34	\$13	\$0.05	\$28	\$0.10	\$3	\$0.01
Crops	\$121	\$0.46	\$254	\$0.95	\$321	\$1.15	\$280	\$1.04
Miscellaneous receipts	<u>\$200</u>	<u>\$0.76</u>	<u>\$204</u>	<u>\$0.77</u>	<u>\$176</u>	<u>\$0.63</u>	<u>\$160</u>	<u>\$0.59</u>
Total Operating Receipts	\$5,971	\$22.64	\$6,132	\$23.04	\$6,402	\$22.84	\$6,137	\$22.70
ACCRUAL OPERATING EXPENSES								
Hired labor	\$877	\$3.32	\$853	\$3.20	\$843	\$3.01	\$798	\$2.95
Dairy grain & concentrate	\$1,891	\$7.17	\$1,860	\$6.99	\$1,831	\$6.53	\$1,767	\$6.54
Dairy roughage	\$137	\$0.52	\$102	\$0.38	\$115	\$0.41	\$147	\$0.54
Nondairy feed	\$1	\$0.00	\$0	\$0.00	\$0	\$0.00	\$0	\$0.00
Professional nutritional services	\$0	\$0.00	\$1	\$0.01	\$1	\$0.00	\$1	\$0.00
Machine hire, rent & lease	\$227	\$0.86	\$134	\$0.50	\$178	\$0.64	\$152	\$0.56
Machine repair & vehicle expense	\$315	\$1.20	\$302	\$1.14	\$291	\$1.04	\$244	\$0.90
Fuel, oil & grease	\$149	\$0.56	\$157	\$0.59	\$150	\$0.53	\$131	\$0.48
Replacement livestock	\$57	\$0.22	\$15	\$0.06	\$21	\$0.08	\$46	\$0.17
Breeding	\$74	\$0.28	\$55	\$0.21	\$55	\$0.20	\$49	\$0.18
Veterinary & medicine	\$162	\$0.61	\$161	\$0.60	\$148	\$0.53	\$146	\$0.54
Milk marketing	\$342	\$1.30	\$378	\$1.42	\$393	\$1.40	\$338	\$1.25
Bedding	\$114	\$0.43	\$103	\$0.39	\$95	\$0.34	\$82	\$0.30
Milking supplies	\$96	\$0.36	\$101	\$0.38	\$93	\$0.33	\$83	\$0.31
Cattle lease	\$8	\$0.03	\$2	\$0.01	\$0	\$0.00	\$2	\$0.01
Custom boarding	\$149	\$0.57	\$28	\$0.10	\$128	\$0.46	\$87	\$0.32
BST expense	\$0	\$0.00	\$0	\$0.00	\$0	\$0.00	\$0	\$0.00
Livestock professional fees	\$31	\$0.12	\$23	\$0.08	\$16	\$0.06	\$16	\$0.06
Other livestock expense	\$38	\$0.15	\$20	\$0.08	\$25	\$0.09	\$34	\$0.12
Fertilizer & lime	\$129	\$0.49	\$149	\$0.56	\$132	\$0.47	\$112	\$0.41
Seeds & plants	\$114	\$0.43	\$120	\$0.45	\$121	\$0.43	\$103	\$0.38
Spray & other crop expense	\$72	\$0.27	\$61	\$0.23	\$68	\$0.24	\$54	\$0.20
Crop professional fees	\$16	\$0.06	\$4	\$0.02	\$7	\$0.02	\$4	\$0.02
Land, building & fence repair	\$81	\$0.31	\$90	\$0.34	\$79	\$0.28	\$72	\$0.27
Taxes	\$63	\$0.24	\$74	\$0.28	\$71	\$0.25	\$59	\$0.22
Real estate rent & lease	\$105	\$0.40	\$84	\$0.32	\$86	\$0.31	\$90	\$0.33
Insurance	\$55	\$0.21	\$54	\$0.20	\$53	\$0.19	\$36	\$0.13
Utilities	\$98	\$0.37	\$112	\$0.42	\$99	\$0.35	\$94	\$0.35
Interest paid	\$154	\$0.58	\$138	\$0.52	\$136	\$0.49	\$94	\$0.35
Other professional fees	\$33	\$0.13	\$27	\$0.10	\$24	\$0.08	\$21	\$0.08
Miscellaneous	<u>\$34</u>	<u>\$0.13</u>	<u>\$33</u>	<u>\$0.12</u>	<u>\$23</u>	<u>\$0.08</u>	<u>\$25</u>	<u>\$0.09</u>
Total Operating Expenses	\$5,624	\$21.33	\$5,243	\$19.70	\$5,282	\$18.84	\$4,889	\$18.09
Expansion livestock	\$6	\$0.02	\$30	\$0.11	\$47	\$0.17	\$9	\$0.03
Extraordinary expenses	\$0	\$0.00	\$1	\$0.00	\$0	\$0.00	\$0	\$0.00
Machinery depreciation	\$210	\$0.80	\$240	\$0.90	\$204	\$0.73	\$224	\$0.83
Real estate depreciation	<u>\$183</u>	<u>\$0.70</u>	<u>\$213</u>	<u>\$0.80</u>	<u>\$204</u>	<u>\$0.73</u>	<u>\$164</u>	<u>\$0.61</u>
Total Expenses	\$6,023	\$22.84	\$5,727	\$21.52	\$5,736	\$20.46	\$5,286	\$19.56
Net Farm Income w/o Appreciation	-\$53	-\$0.20	\$406	\$1.52	\$666	\$2.38	\$851	\$3.15

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, 138 New York Dairy Farms, DFBS, 2021¹
 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.
102	19,892	613,579	12,217	15.05	21.09	18.89	8,636	-5.0
200	23,489	862,057	41,132	17.12	22.91	19.84	11,414	-1.7
434	25,260	1,081,776	45,058	18.56	23.79	20.41	13,089	-1.1
737	26,898	1,237,349	49,509	19.03	25.05	20.99	14,886	-0.5
1,585	28,738	1,574,470	66,475	20.21	28.53	22.34	23,831	0.1

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.
222	19,513	917,229	39,028	15.03	19.99	19.09	8,654	1.2
456	25,135	1,135,233	45,348	16.11	20.56	19.73	11,142	1.9
799	26,761	1,263,466	48,606	16.69	21.16	20.09	12,976	2.2
1,226	27,919	1,411,621	51,831	17.09	21.83	20.48	15,222	2.8
2,080	29,534	1,751,992	60,267	18.18	23.70	21.98	19,428	3.2

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.
445	22,742	1,064,623	42,283	13.54	18.68	18.83	10,459	3.9
826	27,030	1,238,185	45,628	15.00	19.20	19.32	11,560	4.3
1,197	27,939	1,391,982	47,619	15.88	19.71	19.68	12,963	4.6
1,619	28,754	1,506,956	49,188	16.47	20.28	20.29	14,854	5.2
3,188	30,575	1,876,034	56,174	17.75	21.65	21.78	18,568	5.5

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.
596	24,884	1,257,675	43,868	13.04	17.64	18.71	7,270	5.6
1,101	26,303	1,484,841	47,941	14.48	17.99	19.63	10,466	6.1
1,429	27,486	1,611,417	50,871	15.17	18.91	19.98	11,621	6.7
2,208	28,411	1,812,717	54,862	16.00	19.48	20.37	12,999	7.7
3,997	29,648	2,203,537	59,867	17.05	20.42	21.23	18,364	10.8

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