THE FINANCIAL PERFORMANCE OF SYSTEMS ACROSS THE U.S.A.

Thomas S. Kriegl
University of Wisconsin Center for Dairy Profitability
University of Wisconsin-Extension
Madison, WI
See http://cdp.wisc.edu for more information
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Abstract

The Great Lakes Grazing Network (GLGN) Grazing Dairy Farms Financial Summary project initially sponsored by USDA IFAFS grant project #00-52501-9708, revealed relatively consistent differences in financial performance between individual Great Lakes states and between dairy systems, and demonstrated that the official USDA cost of production estimates were far different from the cost of production calculated from actual farm financial data from the same states. Multiple years (as many as 20 years from some sources) of actual farm financial data has been collected from many different systems from many states in the U.S. and put into a similar format to compare actual financial performance and trends between states, regions, and dairy systems.

There has been a country wide perception that small (the size that support and be operated mainly by the owner family labor) dairy systems are less economically efficient, lack economies of scale, and are high cost producers. This leads to two questions:

1. Do the state-to-state differences in financial performance observed in the Great Lakes Grazing Network Grazing Dairy Farms Financial Summary project extend to the rest of the country?
2. Are small dairy systems high cost producers?

To test these questions, multiple years of actual farm financial data from several states was collected and put into a format to allow consistent comparisons at the University of Wisconsin Center for Dairy Profitability. The four main dairy systems represented in this comparison are small confinement, large confinement, management intensive rotational grazing, and organic.

Methods

Multiple years of actual farm financial data from several states was collected and put into a format to allow consistent comparisons at the University of Wisconsin Center for Dairy Profitability. The four main dairy systems represented in this comparison are small confinement, large confinement, non-organic management intensive rotational grazing, and organic.

Summarized data was supplied by the accounting firms of Frazer LLP, and Genske, Mulder and Company LLP, Cornell University, the University of Florida, the University of Maine, the University of Maryland, Michigan State University, the University of Minnesota, the University of Vermont, and the University of Wisconsin Center for Dairy Profitability where the comparisons were made.

Several measures should be examined when analyzing financial performance and economic competitiveness because no single measure tells the whole story. However, one usually is limited to just a few measures to explain the results. The primary measure used for illustration in this report is net farm income from operations (NFIFO) as a percent of dairy farm revenue (NFIFO/$ Revenue) based on accrual adjusted income and expenses. A similar measure is used in the non-agricultural business world.

The use of this measure is driven mainly by large variations in the milk price received and in the pounds of milk sold per cow by the many systems and states in the comparison.

In comparing the financial performance of dairy systems across an area as large and diverse as the United States, it is very possible that unique climatic or other conditions can cause the financial performance of any place in any year to be abnormal. A good way to minimize the impact of such unique influences is to compare several years of data. To make the

comparison of this large amount of data more manageable, multiple year simple averages were calculated for all systems. Some of the averaging was done by the source of the data and some was done by the author of this report. Three tables in this report show multiple year averages for the periods from 2001-2005, 2006-2010 and 2011-2014. Unfortunately, less data is available in Table 3 than in the other two tables. While Table 1 contains years of low feed prices and Table 2 contains years of high feed prices, Table 3 has two years of each.

Farm financial data collection and analysis (even from reliable sources) is far from uniform across the country. When such data is obtained from many different sources, some differences will remain. One of the differences is that data from different sources may have different time periods.

All of the data presented in the longest year periods in the analysis have also been compared in the same period with the shorter period data to verify that no change in the observation and conclusions would occur if the comparisons were shown in the same but shorter periods in most cases.

Large confinement systems rely much more on hired labor than the other three systems. This explains part but not all of the difference in their NFIFO/$ revenue. To get a better sense of the impact of the cost of paid labor on the relative performance, the NFIFO/$ revenue was calculated in the standard way and recalculated and **ranked by what NFIFO/$ revenue would be if all labor was unpaid**. Although this ranking for a few dairy systems changes noticeably between two measures, most dairy systems retain a very similar ranking from one to another measure. In Table 3 only, ranking by the other measure would reorder the top seven groups.

This comparison reveals the following major observations:

1. **It is unlikely that any dairy system in any state will always be the low cost or most economically competitive producer under all circumstances. The ability to stay in business can also be influenced by factors not readily identified as economic. Some of that can be observed in 2009 data.**
2. **This economic dairy data indicates that the economics of scale (lowest cost of production per unit) occur at a much smaller size than people expect (somewhat less than 100 cows per farm).**
3. **There were large consistent differences in NFIFO/$ revenue between many states and systems.**
4. **Non-organic graziers have typically attained more NFIFO/$ revenue than other dairy systems in their states. This was especially true from 2001 to 2005 (Table 1). The gap between Wisconsin non-organic graziers and organic narrowed since then (Tables 2 and 3). From 2011 to 2014, Wisconsin grazing, organic and small (0-75 cows) Wisconsin systems were nearly similar to each other in terms of NFIFO as a percent of revenue as if all labor were unpaid. In most years, small Wisconsin dairy farms sell a small amount of excess feed. Since 2009, these crop sales combined with high feed prices enhanced their ranking in Table 3.**
5. **Despite being high cost producers, the larger and more consistent organic price premiums over conventional price have improved organic dairy farm financial performance since 2005 in states that have data available.**
6. **Wisconsin dairy systems have often attained more NFIFO/$ revenue than similar dairy systems in other states.**
7. **Small dairy systems have typically attained more NFIFO/$ revenue than large dairy systems in the same state.**
8. **The largest farms tend to generate more dollars of total NFIFO per farm and per owner compared to the smallest farms.**
9. **The economic forces encouraging growth of dairy production in the west may have shifted a bit more in favor of the mid-west from about 2005 to 2012. The ethanol effect on feed cost that hampered western states from 2005 to 2012 tapered off in 2013 to partially reverse the western disadvantage experienced in the high feed price years. The western financial performance in 2006-2010 (Table 2) was clearly far less desirable than in 2001-2005 (Table 1) and 2011-2014 (Table 3).**
10. **The ranking of financial performance by state is very different from the official USDA cost of production estimate ranking which relies very heavily on opportunity cost.**
11. **For reasons not fully understood, the New York confinement group greatly improved its ranking to the top in 2011-2014 (Table 3). This group had the highest labor cost as a percent of revenue in all tables. Their cost decreased from 14.72% in Table 1 to 13.69$ in Table 2 to 11.14% in Table 3. A few other groups also decreased their labor costs by similar amounts without changing their rank so dramatically.**
12. **NFIFO per owner has probably driven expansion more than NFIFO per unit.** Family size farms (the size that can be operated mainly by family labor) are fairly similar across states in terms of the total NFIFO they generate. However, the size of family-size farms can be quite different from state-to-state. For example, Wisconsin grazing farms have about half as many cows as Michigan grazing farms, and nearly double the margin of NFIFO/$ revenue

in the table. This somewhat challenges the assumption that farm size increases are motivated by economics of scale (increased size increases margins). In fact, the data suggests the opposite. The data suggests that in parts of the U.S. where profit margins are lower, people who want to make a living from dairy farming, operate larger farms because the larger size offsets lower margins to achieve a desired amount of NFIFO from their career choice. Wisconsin graziers could be as large as Michigan graziers and likely generate much more total NFIFO, but may not do so because they can generate as much total NFIFO as Michigan graziers with smaller herds, less work, less stress, etc. The amount of non-farm income was not available from most data sources.

There are some public policy implications from the above observations. Some government policies encourage increased dairy farm size and are often justified at least partly because larger farms are presumed to have economies of scale (lower cost of production). However, this actual farm financial data suggests that the larger farms may not be more economically efficient than smaller farms. Future public policy decisions should consider this information along with environmental and social factors associated with each system.

Further Discussion – Economics of Scale

The term "economies of scale" has a much more specific meaning to economists than it does to non-economists. The theory of economies of scale says that as a business gets larger, it can spread its fixed costs over more production units and reduce the total cost of production per unit as more units are produced. The theory also says that at some size, cost per unit no longer declines, and in fact can increase if further "growth" occurs, creating diseconomies of scale.

The perception of economies of scale of large confinement farms probably came from the misunderstanding of the concept of economies of scale. If one built a facility for 1,000 dairy cows but populated it with only 100 cows, the resulting fixed and total costs would be extremely high. These fixed and total costs would be reduced with each increment of 100 cows added up to the capacity of the dairy facility. While costs decline as more and more of the facility's capacity is used, this is not economy of scale. If the properly designed 1,000 cow facility operated at full capacity has lower costs than the properly designed smaller facility operated at full capacity, then this would demonstrate economies of scale. So far, the data suggests those economies of scale peaks somewhere less than 100 cows when comparing different farm sizes within several states.

While being the low cost producer is a tremendous economic advantage, being the lowest cost producer may not be required for survival. New Zealand is considered to be the world's low cost dairy producer. If New Zealand could produce all of the dairy products the world could consume and barring excessive transportation costs and government intervention, they could put all other dairy producers out of business. However, they lack the productive capacity to supply the whole world. Therefore, higher cost producers can compete outside of New Zealand.

While achieving economies of scale or being the low cost producer is a tremendous economic advantage, it isn't the only economic advantage that a business may have. Non-economists often call these other economic advantages economies of scale. An example of one of these economic advantages is that large Wisconsin confinement farms have received significant milk volume premiums which enhance the income side of the equation for them even if it hasn't made their costs lower. Another economic advantage enjoyed by larger farms is that a lender is more reluctant to foreclose on a large operation than on a small farm assuming the financial performance of the two farms in the example is similar.

All dairy systems in all areas (not necessarily every dairy farm) had desirable farm financial performance in 2007 and 2014, which were some of the best years in the U.S. dairy industry.

In contrast, in the worst year of the century for U.S. dairy farms (2009), the grazing and organic herds had better financial performance than other systems, small confinement herds had better financial performance than large confinement herds in the data, and Midwest herds had better financial performance than other areas. Much of the Midwest advantage likely resulted from their tendency to raise most of their own feed.

In 2009, large dairy farms seemed to experience a different economic disadvantage – the greater willingness of the owner/operator of a small farm to reduce their "own wages" more than employees may be willing to accept.

The farms with the strongest solvency (high cost basis asset values with little or no debt) positions across all systems also fared better in 2009 than their counterparts regardless of their cost of production. Reaching a strong solvency position is rare for high cost producers.

Despite the long time trend toward fewer and larger farms, the actual farm financial data (often in contrast to models) suggests that "skilled and motivated manager/owners" can achieve financial success with different dairy systems including small dairy farms.

Multiple Year Snapshot of Financial Performance of Several U.S. Dairy Systems from 2001-2005					
Sorted by NFIFO as a % of Revenue if all labor were unpaid					
Dairy System	**Approximate Herd Size**	**# of Years in Average**	**Time Period**	**NFIFO as a % of Revenue**	**NFIFO as a % of Revenue if all Labor were Unpaid**
Wisconsin Graziers	61-69	5	2001-2005	24.98%	28.75%
Ontario Graziers	45-55	5	2000-2004	22.56%	28.20%
Wisconsin Confinement 51-75 cows/herd	62-63	5	2001-2005	17.72%	26.72%
Wisconsin Confinement 151-250 cows/herd	188-200	5	2001-2005	14.95%	26.54%
Wisconsin Confinement 101-150 cows/herd	126-127	5	2001-2005	15.73%	26.35%
Wisconsin Confinement 76-100 cows/herd	87-88	5	2001-2005	16.43%	25.87%
Wisconsin Confinement < 50 cows/herd	41-42	5	2001-2005	18.79%	25.83%
Wisconsin Confinement All Sizes	97-134	5	2001-2005	14.25%	25.67%
New York Graziers	79-95	5	2001-2005	16.82%	25.45%
Minnesota Graziers with Replacements, no Organic	46-66	5	2001-2005	20.43%	24.82%
New York Confinement	224-340	5	2001-2005	10.05%	24.77%
Wisconsin Confinement >250 cows/herd	441-555	5	2001-2005	10.97%	24.70%
Minnesota Confinement with Replacements, no graze, no organic	96-118	5	2001-2005	16.16%	24.33%
Wisconsin Organic	47-74	5	2001-2005	19.93%	24.24%
Michigan Graziers	99-118	5	2000-2004	15.73%	24.09%
Maryland Graziers	100	5	2001-2005	21.72%	22.48%
California, Bakersfield to Fresno (GM) Large Confinement	1688-2538	5	2001-2005	13.07%	21.15%
California, Southern (M) Large Confinement	1316-1628	5	2001-2005	8.58%	20.47%
New Mexico (GM) Large Confinement	1878-2075	5	2001-2005	9.68%	20.06%
Washington (GM) Large Confinement	1523-1831	5	2001-2005	10.45%	19.96%
Florida/Georgia SE USA (DBAP)	977-1316	5	2000-2004	4.24%	19.74%
California San Joaquin Valley (M) Large Confinement	2328-2724	5	2001-2005	9.56%	18.90%
California, North of Fresno (GM) Large Confinement	1194-1318	5	2001-2005	9.52%	18.75%
Idaho (GM) Large Confinement	1612-2279	5	2001-2005	7.76%	18.60%
California, South of Bakersfield (GM) Large Confinement	938-1102	5	2001-2005	6.85%	16.95%
Maryland Confinement	108	5	2001-2005	12.90%	16.89%
Arizona (GM) Large Confinement	1586-2018	5	2001-2005	5.19%	14.82%
Central Texas (GM) Large Confinement	814-1130	5	2001-2005	8.47%	13.65%
Virginia Confinement cash basis	122-155	5	2001-2005	5.61%	12.92%

Multiple Year Snapshot of Financial Performance of Several U.S. Dairy Systems from 2006-2010

Sorted by NFIFO as a % of Revenue if all labor were unpaid

Dairy System	Approximate Herd Size	# of Years in Average	Time Period	NFIFO as a % of Revenue	NFIFO as a % of Revenue if all Labor were Unpaid
Wisconsin Graziers	58-67	5	2006-2010	25.90%	29.35%
Wisconsin Organic	70-75	5	2006-2010	22.22%	27.57%
Vermont Organic	60-67	5	2006-2010	19.84%	27.51%
Minnesota Organic with Replacements	69-95	5	2006-2010	19.40%	27.36%
New York Graziers	101-134	5	2006-2010	19.15%	26.84%
Minnesota Graziers with Replacements plus Organic	65-101	5	2006-2010	18.36%	25.00%
Wisconsin Confinement 101-150 cows/herd	126-127	5	2006-2010	14.50%	24.88%
Wisconsin Confinement 76-100 cows/herd	87-88	5	2006-2010	15.09%	24.51%
Wisconsin Confinement 51-75 cows/herd	61-62	5	2006-2010	15.95%	24.48%
Wisconsin Confinement < 50 cows/herd	41-42	5	2006-2010	16.68%	23.96%
New York Confinement	350-489	5	2006-2010	9.89%	23.58%
Wisconsin Confinement 151-250 cows/herd	192-198	5	2006-2010	12.31%	23.33%
Wisconsin Confinement All Sizes	139-176	5	2006-2010	10.61%	21.80%
Minnesota Graziers with Replacements, no Organic	69-87	3	2006-2010*	18.75%	20.72%
Wisconsin Confinement >250 cows/herd	555-644	5	2006-2010	6.94%	19.68%
Minnesota Confinement with Replacements, no graze, no organic	132-156	5	2006-2010	7.84%	17.45%
Washington (GM) Large Confinement	1682-2363	5	2006-2010	8.41%	17.05%
New Mexico (GM) Large Confinement	2226-3164	5	2006-2010	2.17%	12.37%
California, Bakersfield to Fresno (GM) Large Confinement	2578-2708	5	2006-2010	3.20%	11.49%
California, North of Fresno (GM) Large Confinement	1427-1775	5	2006-2010	1.63%	10.71%
Central Texas (GM) Large Confinement	1305-1469	5	2006-2010	1.44%	9.97%
High Plains (GM) Large Confinement	1837-2083	4	2007-2010	0.03%	9.62%
Panhandle (Clovis, NM to Amarillo, TX to Lubbock, TX), (M)	2268-3918	5	2006-2010	-0.40%	9.41%
Kern County, California (M)	2845-3365	5	2006-2010	0.19%	8.99%
Arizona (GM) Large Confinement	2370-3185	5	2006-2010	-0.21%	8.59%
California, South of Bakersfield (GM) Large Confinement	1168-1488	5	2006-2010	-2.01%	7.85%
Idaho (GM) Large Confinement	1709-2002	5	2006-2010	-1.23%	7.46%
California, Southern (M) Large Confinement	1203-1359	5	2006-2010	-4.57%	7.31%
California San Joaquin Valley (M) Large Confinement	2720-3327	5	2006-2010	-3.29%	6.50%

Multiple Year Snapshot of Financial Performance of Several U.S. Dairy Systems from 2011-2014

Sorted by NFIFO as a % of Revenue if all labor were unpaid

Dairy System	Approximate Herd Size	# of Years in Average	Time Period	NFIFO as a % of Revenue	NFIFO as a % of Revenue if all Labor were Unpaid
New York Confinement	531-695	4	2011-2014	17.32%	28.46%
Wisconsin Confinement < 50 cows/herd	41-42	4	2011-2014	17.18%	24.59%
Wisconsin Organic	72-80	4	2011-2014	19.70%	24.34%
Wisconsin Graziers	65-90	4	2011-2014	19.63%	24.26%
Wisconsin Confinement 51-75 cows/herd	63-64	4	2011-2014	16.30%	24.03%
Wisconsin Confinement 76-100 cows/herd	88-90	4	2011-2014	13.93%	22.16%
Washington (GM) Large Confinement	2471-3083	4	2011-2014	14.28%	21.65%
Upper Midwest (GM) Large Confinement	1530-1905	4	2011-2014	11.95%	21.55%
Wisconsin Confinement All Sizes	180-204	4	2011-2014	11.99%	21.23%
Wisconsin Confinement >250 cows/herd	547-588	4	2011-2014	11.12%	20.96%
Central Texas (GM) Large Confinement	915-1433	4	2011-2014	14.21%	20.82%
Idaho (M) Large Confinement	3684-4369	4	2011-2014	12.46%	20.73%
Wisconsin Confinement 151-250 cows/herd	192-197	4	2011-2014	12.02%	20.56%
Wisconsin Confinement 101-150 cows/herd	119-125	4	2011-2014	11.59%	20.47%
California, Bakersfield to Fresno (GM) Large Confinement	2529-2700	4	2011-2014	13.74%	19.76%
Minnesota Confinement All Sizes with Replacements, no graze, no organic	178-195	4	2011-2014	11.31%	19.59%
Texas Panhandle (GM) Large Confinement	915-4129	4	2011-2014	12.69%	19.51%
Minnesota Organic with Replacements	90-97	4	2011-2014	13.23%	19.16%
Pacific Northwest (M) Large Confinement	2643-3378	4	2011-2014	10.89%	19.11%
Arizona (M) Large Confinement	3818-4059	4	2011-2014	10.09%	18.96%
California, All (GM) Large Confinement	1927-2206	4	2011-2014	11.86%	18.60%
Texas Panhandle (M) Large Confinement	2930-3988	4	2011-2014	10.70%	18.51%
California, North of Fresno (GM) Large Confinement	1695-2054	4	2011-2014	10.82%	18.13%
Lower Midwest, High Plains (GM) Large Confinement	1951-3006	4	2011-2014	10.04%	17.79%
Idaho (GM) Large Confinement	1814-2038	4	2011-2014	11.17%	17.10%
Arizona (GM) Large Confinement	1800-2536	4	2011-2014	9.81%	16.46%
Kern County, California (M) Large Confinement	3355-3502	4	2011-2014	9.30%	15.82%
New Mexico (GM) Large Confinement	2134-2992	4	2011-2014	7.25%	15.36%
California, South of Bakersfield (GM) Large Confinement	1351-1629	4	2011-2014	8.22%	14.74%
California San Joaquin Valley (M) Large Confinement	3493-3771	4	2011-2014	7.19%	14.55%
California, Southern (M) Large Confinement	1577-2336	4	2011-2014	5.56%	14.33%
New Mexico (M) Large Confinement	3453-5186	4	2011-2014	5.29%	13.37%