

Acres vs. Cows-Comparing Financial Measures

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July 1999

Which financial measures should Wisconsin dairy graziers focus on – those divided by acres or those divided by cows? My answers to this question are:

1. Both measures can be quite useful.
2. Neither measure tells the whole story by itself.
3. The single financial performance measure that reveals more about the financial performance of any business than any other measure is rate of return on farm assets (ROROA) and its sibling, rate of return on farm assets (ROROE).
4. Several measures are needed to accurately judge the financial performance of any business, but under Wisconsin conditions, dividing by cows is usually more useful than dividing by acres.

In every day discussions, the terms “dollars per acre” and “dollars per cow” are used. Since I think most people who use these terms really are thinking about net income, I am using the more precise terms of net farm income from operations per acre (NFIFO/acre) and net farm income from operations per cow (NFIFO/cow). The concept of NFIFO includes non-cash as well as cash income and expenses. The inclusion of non-cash items may be outside of the intentions of some users of the terms “dollars per acre” and “dollars per cow”, but including the non-cash items gets us closer to the bottom line.

No single measurement, not even ROROA or ROROE, provides enough information to properly judge the financial performance of any business without additional information. But ROROA and ROROE will provide more useful information about the financial performance of any business than any other single measure because both are three-dimensional measurements. All other financial performance measures are one or two-dimensional at best. If you want to determine the capacity of a box, you need to know three dimensions – length, width, and height. If you want to calculate the financial performance of a business, you also need to look at three dimensions of profitability. These three dimensions are income generation, investment control, and operating cost control.

Back to the issue of whether it is more valid to divide by acres or cows when measuring profitability, there are good reasons why the focus is on acres in New Zealand and on cows in Wisconsin.

The most useful financial measurements zero in on the factor that most limits profitability of the business. In New Zealand, this most limiting resource is feed in the form of pasture. New Zealand cows eat very little that they don't graze from pasture because any other feed source in New Zealand is expensive and difficult to get. If you want to maximize total profit in New Zealand from dairy cows, you need to maximize profit per acre.

Feed, whether in the form of pasture or otherwise, need not be a limiting constraint in Wisconsin. This is because land and feed are both more abundant and cheaper in Wisconsin than in New Zealand.

The number of cows that can be managed well on a farm then becomes a more limiting constraint than feed supply for dairy farms in Wisconsin, the upper Midwest, and many other places.

Another reason that the Wisconsin and US dairy industries have focused on NFIFO/cow rather than dollars of NFIFO/acre is that dairy farmers directly sell milk, not grass or legumes. Since they only sell the product of the acre (forage) after the cow has added value to it, NFIFO/acre is at least one step farther away from the financial bottom line than NFIFO/cow.

Comparing Measures

Most farm families are more interested in the amount of money available for family living purposes than in any other measure. Most of the graziers in the Wisconsin Dairy Grazing Profit Analysis have generated enough money for family living purposes to satisfy the grazing family, even though there is a large range in this amount from farm to farm. Consequently, more objective measures like ROROA etc. are needed for making comparisons.

NFIFO/acre and NFIFO/cow are compared in table one below with ROROA (the single best financial measure) by ranking three years of financial performance of 21 Wisconsin dairy graziers who provided comprehensive financial data for the Wisconsin Dairy Grazing Profit Analysis.

The following explanations will help understand table one. The grazier ranked number one based on ROROA also ranked number one when NFIFO/cow was used to rank all graziers. That grazier ranked number three when NFIFO/acre was used for ranking purposes.

Table 1. Comparative Ranking of Graziers in the Wisconsin Dairy Grazing Analysis between Three Measures of Financial Performance.

ROROA	NFIFO/Cow	NFIFO/Acre
1	1	3
2	6	12
3	4	1
4	5	10
5	7	5
6	16	14
7	12	17
8	8	8
9	11	2
10	16	9
11	2	6
12	15	13
13	10	11
14	18	15
15	9	18
16	20	19
17	14	7
18	3	4
19	13	16
20	19	20
21	21	21

The ROROA rankings were based on the simple average ROROA of each of the three years for all 21 graziers.

The NFIFO/cow ranking above is based on a weighted average of three years of NFIFO values for each participant. The NFIFO/cow values for each year was based on the average number of cow equivalents or the number of lactation equivalents in the herd per year. The DHI method of calculating the number of cow equivalents or the number of lactation equivalents is the most appropriate way to determine the right number of “cows” to divide by.

The NFIFO/acre was calculated a bit differently. Graziers supplied detailed information about all the acres they owned, rented and used for all purposes (pasture, mechanically harvested forage, grain, non-farm use). It obviously doesn't make sense to include acres of woods, marsh and other non-crop or non-pasture land in the calculation. Especially since Wisconsin graziers attempt to grow much less grain than is the case with traditional Wisconsin dairy farmers, it also makes sense to omit acres devoted to grain. Therefore NFIFO/acre in this comparison really means NFIFO per forage acre harvested. Any forage acre that was grazed or mechanically harvested at least once was included as one forage acre. If a physical acre was grazed and mechanically harvested (or either) more than once, it still counted as one forage acre. An acre of a crop such as corn silage or oatlage also counted as one forage acre. Acreage figures were not carefully updated for 1996 or 1997. The preliminary 1998 update shows that a few graziers increased their acres but more had the same number of acres in 1998 as in 1995. The weighted three-year average NFIFO was divided by the number of 1995 forage acres for each grazier for the ranking above.

The ranking comparison above clearly shows that each measure leads to a different ranking order. There is more “agreement” close to the top and bottom rankings than in between. This suggests that each measure leads to somewhat different interpretations. It also suggests that no single measurement tells all.

Correlating Measures

It is difficult to determine whether the ranking based on NFIFO/acre or NFIFO/cow is more similar to the ROROA ranking just by looking at the rankings in table one.

To more rigorously compare the similarity of the three measures, the statistical tool called correlation was used. Some of the correlation results are reported in table two.

Correlation indicates the similarity between two sets of numbers. If we think of correlation values in terms of percentages, they range from -100% to 0% to 100%. A correlation of zero means no similarity. The closer to -100% or 100% the correlation value, the more similar the two sets of numbers are and the more likely that one could have an impact on the other. Correlation values can be negative as indicated by the brackets around some of the numbers in table two. When the correlation is positive, it means the two sets of numbers move in the same direction. The value of minus 45% for average debt per cow suggests that as the debt per cow increases, ROROA decreases.

NFIFO/cow and NFIFO/acre are quite highly correlated with each other with values ranging from 51.7% to 72.2%, depending on the year.

But using ROROA as the single best measure of financial performance and correlating other measures with it, NFIFO/cow is more highly correlated with ROROA than any of the other

measures, with values that range from 60% to 86.4% to 77.4%, over the three years. NFIFO/acre is a close second with values that range from 66.3% to 81.8% to 64.6% in comparable years.

Other correlation values (from highest to lowest) between ROROA and other measures are listed below in table 2.

Table 2. Correlating ROROA With Other Financial Measures.

<u>Range in Three Years</u>	<u>Description</u>
60 – 86.4%	NFIFO/Cow
64.6 – 81.8%	NFIFO/Acre
38 – 71.5%	NFIFO
10 – 64.1%	Lbs. Of Milk Sold per Cow
9 – 61.3%	Average Income per Cow
4 – 55.3%	Average Milk Price
(2.2) – (51.9)%	Average Investment per Cow
(9) – (45)%	Average Debt per Cow
1.2 – 47%	Gross Income
(13.4) – 39.2%	Cash Expense per Cow
(9.2) – 40.2%	Total Cash Expense
(1.1) – (36.9)%	Total Debt
(37) – 33.9	Number of Cows
(23.9) – 23.8%	Total Investment
(15.5) – (42.4)%	\$ Cash Expense per \$ Cash Income

Notice that correlations between measures on a per unit basis are usually more similar to ROROA than the gross version. In other words, NFIFO/cow and per acre are both more highly correlated to ROROA than total dollars of NFIFO and ROROA.

What isn't totally obvious from the statistical analysis is that the graziers in the study with the highest NFIFO/acre also purchase and feed large amounts of supplemental feed. In other words, in Wisconsin conditions, the NFIFO/acre may be influenced as much or more by how effectively managers use purchased feed as it is by how effectively managers use their land.

When comparing the correlations between ROROA and the measures that only measure one component of profitability, correlations are higher for the measures of income generation than for measures of operation cost control and investment/debt control. This suggests that differences in the ability to generate income causes more of the differences in profitability between the most and least profitable graziers than is caused by operating cost control and the control of investment/debt.

To summarize the issue of “cows vs. acres” in Wisconsin, it's important to recognize that there are hundreds of potential financial performances that can be used. An experienced financial analyst will routinely use about a dozen of these measures to do an overall evaluation of performance and then may use several others for a closer review. One of the reasons that not all measures are used in all cases is that many of the measures are similar to another measure in its ability to help one understand the financial performance of a business. ROROA and ROROE are clearly the two most useful single available measures of financial performance. Yet if an experienced financial analyst were required to measure the financial performance of a business based on only two measures of their choice, they would pick either ROROA or ROROE plus a different measure.

The experienced financial analyst would pick either ROROA or ROROE instead of both because a third measure could provide more additional information than ROROA and ROROE add to each other.

A similar relationship exists between NFIFO/cow and NFIFO/acre. The amount of different information one adds to the other is likely to be less than the different information provided by a well-selected third measure.

For anyone doing financial analysis of dairy farms in Wisconsin, I recommend measures that divide by cows as a better choice than measures that divide by acres because:

1. The product of the cow rather than the product of the acre is sold directly.
2. The number of cows to be managed in a Wis. operation is a more limiting factor than feed supply.
3. There is much more data available in this part of the world geared to dividing by cows than by acres, and the whole industry is much more familiar with this version. Reason three is only valid because reasons one and two are true.

Using a lot of extra measures does not diminish information and understanding. It just takes extra time and effort that may be out of proportion to the extra information gained. You can do an effective Wisconsin dairy farm analysis without focusing on acres. However, if you really want to maximize your understanding of financial performance, use all the measures you can find and divide by acres in addition to dividing by cows.