


Pastures of plenty

Financial performance of Wisconsin grazing dairy farms



Prepared by
Tom Kriegl, UW-Madison Center for Dairy Profitability
Edited by
Ruth McNair, UW-Madison Center for Integrated Agricultural
Systems

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Summary

Background

Over the past ten years, many farmers have implemented managed grazing on their livestock and dairy farms. Farmers using managed grazing move animals to fresh pasture on a regular basis and manage the pastures to maximize the quality and quantity of feed. Farmers divide pastures by fencing them into smaller units called ‘paddocks.’ After grazing, the paddocks are rested so the plants can recover and regrow before being regrazed. Animals on a managed grazing farm derive a major portion of their feed from pasture during the grazing season.

In contrast, many other farms use continuous grazing, where animals graze the same pastures over a long period of time. While animals benefit from fresh air and exercise, these pastures do not provide much quality feed.

In Wisconsin, a growing percentage of dairy farmers are using managed grazing. Survey research from the Program on Agricultural Technology Studies (PATS) at UW-Madison shows that in 1993, 7 percent of Wisconsin dairy farmers used managed grazing; in 1995, 14 percent; in 1999, 22 percent; and in 2003, 23 percent. These farmers vary in their approach to grazing: one-third of the respondents using managed grazing in 1999 moved their milking cows to fresh pasture once a day or more; another third moved cows every two to six days; and the remaining third moved cows weekly.

Beginning farmers are much more likely to use managed grazing than other dairy farmers. A 1996 PATS survey showed that nearly 30 percent of new dairy farmers used managed grazing, almost twice the 14-15 percent rate for dairy farmers as a whole at that time. Additionally, nearly 46 percent of new farmers indicated that they planned to use improved pastures to obtain feed for their milking herd in the future.

A managed grazing system is usually less expensive to set up than a confinement dairy. Since the cows harvest a portion of their feed and spread their own manure while grazing, less equipment is needed for feed and manure handling compared to confinement farms. Cows tend to live longer on managed grazing farms, meaning less money is spent on replacement animals. There is also more income potential from selling heifers.

Typically, farms using managed grazing produce less milk per cow than confinement farms. However, a series of economic studies in Wisconsin and elsewhere show that, for many dairy farmers, the savings they realize from using managed grazing more than offsets the loss in milk revenues due to lower production. **These studies show that grazing farms are economically competitive with confinement operations.** This report details some of the principal findings of this economic research.

Study descriptions

Tom Kriegl of the UW-Madison Center for Dairy Profitability has been analyzing financial performance of graziers with the Wisconsin Grazing Dairy Profitability Analysis every year since 1995. In the first year, data from 19 farms were summarized; that number rose to 31 in 2002. In 2000, a USDA Initiative for Future Agriculture and Food Systems grant expanded that research to a regional study covering finances on managed grazing dairy farms in the Great Lakes states, plus Iowa and Missouri. Data from 92 grazing farms were summarized in that study in 2000; 126 in 2001; and 103 in 2002. Farmers participating in these financial surveys must earn 85% or more of their gross income from milk sales or 90% from dairy livestock sales plus milk sales. To be considered a grazer, a farmer must harvest over 30% of seasonal forage needs by grazing and must provide fresh pasture at least once every three days.

Standardization of data handling and analysis procedures relied heavily on the Farm Financial Standards Guidelines (revised December, 1997). The computer program Agricultural Financial Advisor (AgFA) was used to analyze the data.

Key findings

Kriegel reports several key points in his analysis:

- In Wisconsin and New York, graziers had more NFIFO* per cow and per hundredweight equivalent (CWT EQ**) than their confinement counterparts in these states. In addition, Wisconsin graziers had more NFIFO per cow and per CWT EQ than graziers in most other states providing data.
- Farms using managed grazing consistently showed higher net farm incomes from operations (NFIFO) per CWT EQ and lower costs per CWT EQ than traditional and large modern confinement farms in Wisconsin.
- Farmers who switch from confinement dairy farming to managed grazing need not suffer financial hardship during the transition.

And comparisons between grazing farms show that:

- The average most profitable grazing farm in Wisconsin produced slightly more milk per cow

and had slightly lower costs per cow and higher income per cow than the average least profitable grazing farm. The average most profitable grazing group had a better handle on most categories of costs, did a better job of generating income, and had lower interest, depreciation, and labor and management expenses.

- The average grazing dairy farm with under 100 cows had more NFIFO per cow and per CWT EQ than those with over 100 cows. Lower labor costs account for much of this advantage.
- Graziers are making a variety of strategies work for them. Some graziers use a seasonal calving strategy, some are certified organic, and some use milking parlors. No single approach seems to be the right or only way to manage a grazing dairy farm.



*NFIFO (net farm income from operations): the income after all costs except unpaid opportunity costs have been accounted for. NFIFO represents returns to unpaid labor and unpaid management, and unpaid equity (owned) capital invested in the business. **NFIFO is the amount of income a family could ‘consume’ from business earnings in a given year without reducing business cost basis net worth.**

CWT EQ (hundredweight equivalent): **an indexing procedure which focuses on the primary product that is sold and standardizes farms in terms of milk price and many other variables for analysis purposes. The use of an equivalent unit is the most meaningful measure when calculating the cost of producing milk, because dairy farm businesses have multiple sources of income. The measure is calculated by summing the income from the sale of all products produced on the dairy farm and dividing by the national average milk price to calculate the equivalent number of hundredweights sold. The equivalent hundredweights are then divided into the expenses to calculate the cost per CWT EQ. (See *Cost of Production Versus Cost of Production*, Dr. Gary Frank, UW Center for Dairy Profitability, 1997.)

Grazing and confinement dairy farms in Wisconsin

Researchers used standardized data to compare the financial performance of grazing and confinement dairy herds in both Wisconsin and New York. The results from New York were very similar to the Wisconsin results discussed below, although the Wisconsin grazing farms and confinement farms were more profitable than their counterparts in New York.

Grazing farms produced less milk per cow, and, with smaller herds, less milk per farm than confinement dairy farms. However, allocated costs, which include all costs except the opportunity cost of unpaid labor, management, and equity, were 15 percent lower per hundredweight equivalent (CWT EQ) for grazing farms than confinement farms in Wisconsin in 2002 and 18 percent lower in 2001. (See the definitions of cost types on page 5.) Grazing farms in Wisconsin had a greater total Net Farm Income from Operations (NFIFO) than confinement farms in 2002, but not in 2001. See the footnote on page 2 for complete definitions of CWT EQ and NFIFO.

Table 1 on page 4 shows that in both 2001 and 2002, grazing operations had the advantage for NFIFO per cow and per CWT EQ. This was also true in 2000. Wisconsin graziers had higher NFIFO per cow and per CWT EQ than graziers in most states.

One noteworthy point of this data is that many of the larger confinement farms rely on hired labor, while

many grazing farms rely on unpaid family labor. This gives a very real financial advantage to the grazing operations. But does labor account for the entire advantage? Kriegl gained additional insight into the data by looking at how the farms would compare if all labor and management were unpaid. In this scenario, the Wisconsin grazing farms still maintain an advantage over confinement farms in NFIFO per cow and per CWT EQ, so labor isn't the only factor. Kriegl found that the graziers in this study spread their NFIFO per CWT EQ advantage among many cost factors.

Another limitation with this data is the low number of participating graziers in Wisconsin. How representative is this group of all Wisconsin graziers? Data from a larger group of graziers in the Great Lakes states are shown in the far right hand columns of Table 1. The Great Lakes data, with its larger number of participants, show results similar to the Wisconsin graziers, so we can infer the Wisconsin numbers are indeed representative.

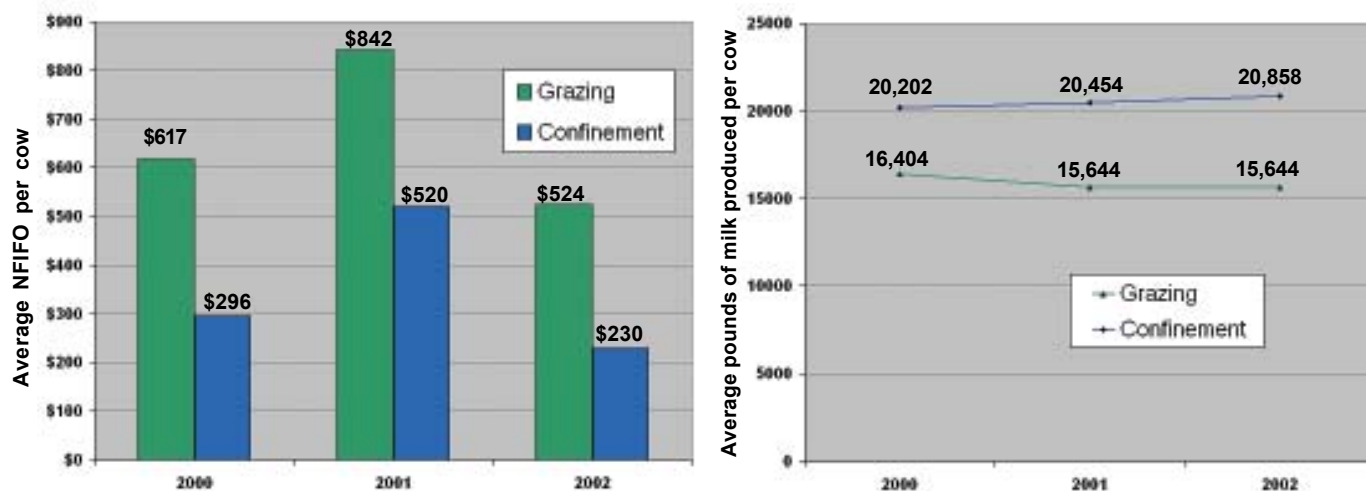
During the first four years of the Wisconsin analysis, data from the same 19 farms were summarized each year. Eight of those farms have participated in all years of the study. For the second four years of the Wisconsin analysis, additional farms were added to the data set. The results obtained in the first four years were very similar to the results obtained in the second four years. This also indicates that the data is representative.

The graziers' control of operating expense, investment and debt more than offset their disadvantage in income and production per farm and production per cow. Figure 1 on page 4 shows that the average Wisconsin grazier was more profitable per cow than their average confinement counterpart in 2000, 2001 and 2002 despite lower milk production per cow.



Key Finding: During three years of study, Wisconsin graziers consistently showed a higher NFIFO per cow than confinement farmers despite lower milk production per cow.

Figure 1. Per cow net farm income from operations (NFIFO) and milk production on grazing and confinement farms in Wisconsin



Source: *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, May 2002, April 2003 and April 2004.

Table 1. Measures for grazing and confinement farms in Wisconsin and grazing farms from the Great Lakes, 2001 and 2002

| | Wisconsin | | | | Great Lakes | |
|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | Grazing | | Confinement | | Grazing | |
| | 2001 | 2002 | 2001 | 2002 | 2001 | 2002 |
| Number of herds studied | 27 | 31 | 627 | 581 | 126 | 103 |
| Avg. number of cows in herd | 62 | 61 | 106 | 117 | 84 | 86 |
| Avg. lbs. milk per cow | 15,644* | 15,644* | 20,454 | 20,858 | 15,426 | 15,332 |
| Avg. basic cost per CWT EQ | \$7.68 | \$7.23 | \$9.03 | \$7.91 | \$8.60 | \$7.74 |
| Avg. non-basic cost per CWT EQ | \$2.78 | \$2.39 | \$3.74 | \$3.39 | \$3.08 | \$2.71 |
| Avg. allocated cost/CWT EQ | \$10.46 | \$9.62 | \$12.77 | \$11.30 | \$11.68 | \$10.45 |
| Avg. NFIFO per cow if all labor and management were unpaid | \$933 | \$651 | \$897 | \$641 | \$866 | \$620 |
| Avg. NFIFO per CWT EQ if all labor and management were unpaid | \$5.02 | \$3.14 | \$3.75 | \$2.36 | \$4.39 | \$2.80 |
| Avg. NFIFO per farm | \$52,466 | \$31,928 | \$54,579 | \$26,963 | \$54,283 | \$32,354 |
| Avg. NFIFO per cow | \$842 | \$524 | \$520 | \$230 | \$643 | \$376 |
| Avg. NFIFO per CWT EQ | \$4.48 | \$2.53 | \$2.17 | \$0.85 | \$3.26 | \$1.70 |

Source: *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, April 2004.

* By coincidence, these numbers are the same.

Grazing, traditional and large modern confinement farms

A comparison of three farm types in Wisconsin confirms the results from other studies of grazing farms' financial performance: grazing farms have the highest NFIFO per CWT EQ and the lowest basic costs of all farm types (see Figure 2 and Table 2 on page 6). Kriegl and Gary Frank used eight years of data from Wisconsin dairy farms to compare performance on three types of farms. These were: **managed grazing** farms, where an attempt is made to harvest a significant portion of the herds' forage needs via grazing and labor is provided mainly by the farm family; **traditional confinement** farms, with 50 to 75 cows in a stanchion barn, using stored feed and mainly family labor; and **large modern confinement** farms, which have 250 or more cows, rely heavily on hired labor and stored feed, and use parlors for milking and free stall buildings for housing.

Nineteen to 31 managed grazing farms and 34-57 large modern confinement farms were included in this study, compared to 180 traditional confinement farms. However, despite the small sample size, these farms appear representative of their respective farm types based on grazing data from states in the Northeast U.S. which show similar results. Also, the consistency between farm types and magnitude of the differences are compelling. The 2002 results are consistent with results of each year since data collection and standardization began.

Labor costs are handled differently on grazing and traditional confinement farms than on large modern confinement farms. It is common on grazing and traditional confinement farms for family members to "draw their pay" from what is left over after all other expenses are paid. In contrast, owners/managers of large farm corporations more commonly draw their salaries before the NFIFO is calculated. The smaller farms are also less likely to hire labor. In Table 2, the row titled 'Average NFIFO per CWT EQ if all labor and management were unpaid' addresses this situation. No paid wages or benefits to family or hired labor are subtracted from income, so the net income to pay all

wages and family living is comparable for all farm types. Even in this scenario, the managed grazing group remains highest for NFIFO per CWT EQ.

As expected, the large modern confinement dairy farms with their high cow numbers usually take in the highest level of total NFIFO per farm. The average grazing farm is similar in size to the average traditional confinement farm but provides more total NFIFO. The NFIFO per CWT EQ was consistently highest on the managed grazing farms, followed by the traditional confinement farms, with large modern confinement farms last.

When comparing the systems by three major cost categories (basic, non-basic and allocated), grazing farms consistently had the lowest costs per CWT EQ, followed by traditional confinement farms. (**Basic costs** are all the cash and non-cash costs except the opportunity costs, interest, depreciation, paid labor, and paid management. **Non-basic costs** are interest, non-livestock depreciation, paid labor and paid management. **Allocated costs** are the combination of basic and non-basic costs and do not include the opportunity cost of unpaid labor and management.) Large modern confinement farms usually had the highest cost levels per CWT in all cost categories.

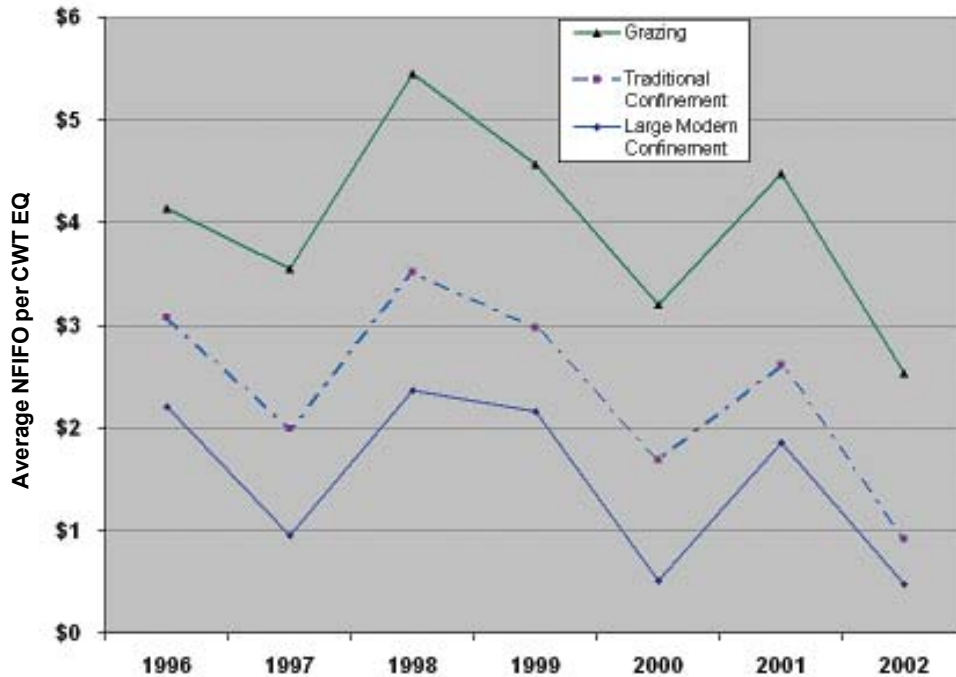
While total costs are not emphasized in the source documents, the author notes that graziers also had an advantage at that level in most years.

Table 2 confirms the multi-state data: **NFIFO per CWT EQ on managed grazing farms is consistently higher and the three main categories of costs per CWT EQ are consistently lower than on other types of dairy farms, even though managed grazing farms produce less milk per cow on average than other types of dairy farms.**

This was true in 2002 and in all previous years of the study (Figure 2). The graziers were more profitable in spite of—not because of—lower pounds of milk sold per cow.

Key Finding: During seven years of study, Wisconsin grazing dairy farms consistently showed a higher NFIFO per CWT EQ than traditional or large modern confinement dairy farms.

Figure 2. Average net farm income from operations (NFIFO) per CWT EQ on three farm types in Wisconsin



Source: *An Eight-Year Economic Look at Wisconsin Dairy Systems*, Tom Kriegl and Gary Frank, June 2004.

Table 2. Comparing financial performance of three farm types in Wisconsin, 2002

| | Managed grazing | Traditional confinement | Large modern confinement |
|---|-----------------|-------------------------|--------------------------|
| Avg. lbs. of milk per cow | 15,644 | 19,490 | 22,403 |
| Avg. basic cost per CWT EQ | \$7.48 | \$7.69 | \$8.18 |
| Avg. non-basic cost per CWT EQ | \$2.39 | \$3.55 | \$3.50 |
| Avg. allocated cost per CWT EQ | \$9.87 | \$11.24 | \$11.68 |
| Avg. NFIFO per farm | \$31,928 | \$15,564 | \$59,616 |
| Avg. NFIFO per cow if all labor and management were unpaid | \$649 | \$565 | \$655 |
| Avg. NFIFO per CWT EQ if all labor and management were unpaid | \$3.14 | \$2.12 | \$2.34 |
| Avg. NFIFO per cow | \$524 | \$245 | \$131 |
| Avg. NFIFO per CWT EQ | \$2.53 | \$0.91 | \$0.47 |
| Multiple year data* | | | |
| Simple avg. NFIFO per CWT EQ | \$3.96 | \$2.39 | \$1.50 |
| Range in number of herds | 19-31 | 180-216 | 34-57 |
| Range in avg. number of cows/herd | 50-71 | 62-63 | 443-471 |

Source: *An Eight-Year Economic Look at Wisconsin Dairy Systems*, Tom Kriegl and Gary Frank, June 2004.

* The multi-year data is available starting in 1995 for grazing farms. Data for TC and LMC farms was not fully sorted into the two size groups until 1996 and by labor compensation type until 1997.

Transitioning to grazing from traditional dairy farming

“We’ve found that dairy farms using managed grazing can provide a satisfactory income level on a farm that one family can operate,” Kriegl says. What’s more, transitioning from a traditional dairy farm to a managed grazing operation requires very little additional investment. “Someone who invests in a well-planned grazing operation will likely be able to recover most or all of their investment if a few years later they decide to switch systems or quit farming,” Kriegl adds. In contrast, if a farmer invests in a new confinement system and decides to switch or quit in a few years, he or she would be lucky to recover half of what was invested.

Because of the minimal additional investment for switching to managed grazing, making a transition need not create financial hardship for a farm family.

Do some dairy farms stand a better chance than others of making a successful switch to grazing? Kriegl identified eight key characteristics that make an existing dairy farm a good candidate for switching:

- A desire to achieve economic viability on a farm small enough to be handled by one family’s labor.
- Average or better management ability, since grazing is a different management system compared to traditional dairy farming, not a reduced management system.
- A willingness to change and try new things.
- The absence of much unproductive debt. A switch to dairy grazing will not save a dairy farm burdened with a high debt load.
- The desire to avoid a new major investment.
- Acceptance of a farming operation that minimizes the use of equipment.
- Income generation is not the weakest link in the current operation (the average grazer loses some ground in production and gross income per cow when switching).
- An intention to keep farming for more than one or two years. For farmers who have already decided to quit soon, developing an exit strategy may be more productive than learning a new management system.

Key Finding: Switching to managed grazing from a traditional dairy set-up need not cause financial hardship for the farm family.



Most profitable half and least profitable half of dairy farms

“Even before the Wisconsin Grazing Dairy Analysis, we knew that some graziers succeed while others fail,” Kriegl says. “We knew the same was true for conventional farms.” In order to find out what the more financially successful dairy farmers were doing, Kriegl sorted the Wisconsin graziers’ and confinement operators’ financial information into halves. (Kriegl also carried out this comparison for Great Lakes graziers). The top half had higher net farm income from operations, as measured by NFIFO per CWT EQ sold, compared to the bottom half (see Table 3 on page 10).

Most and least profitable grazing farms

The average most profitable grazer in Wisconsin in 2002 had fewer cows, produced less milk per cow, had lower allocated costs per CWT EQ, and had about twice as much NFIFO per cow and per CWT EQ than the average least profitable grazer. They also received a higher average milk price than the least profitable group. No single reason explains this milk price differential. The most profitable group had a better handle on most categories of costs than the least profitable group.

(See definitions of three cost types on page 5.) The most profitable group spent less on interest, labor and management, and depreciation (included in non-basic costs) than the least profitable group. The most profitable group had \$0.96/CWT EQ lower basic costs; \$1.21/CWT EQ lower non-basic costs, and \$2.17/CWT EQ lower allocated costs.

Most and least profitable confinement farms

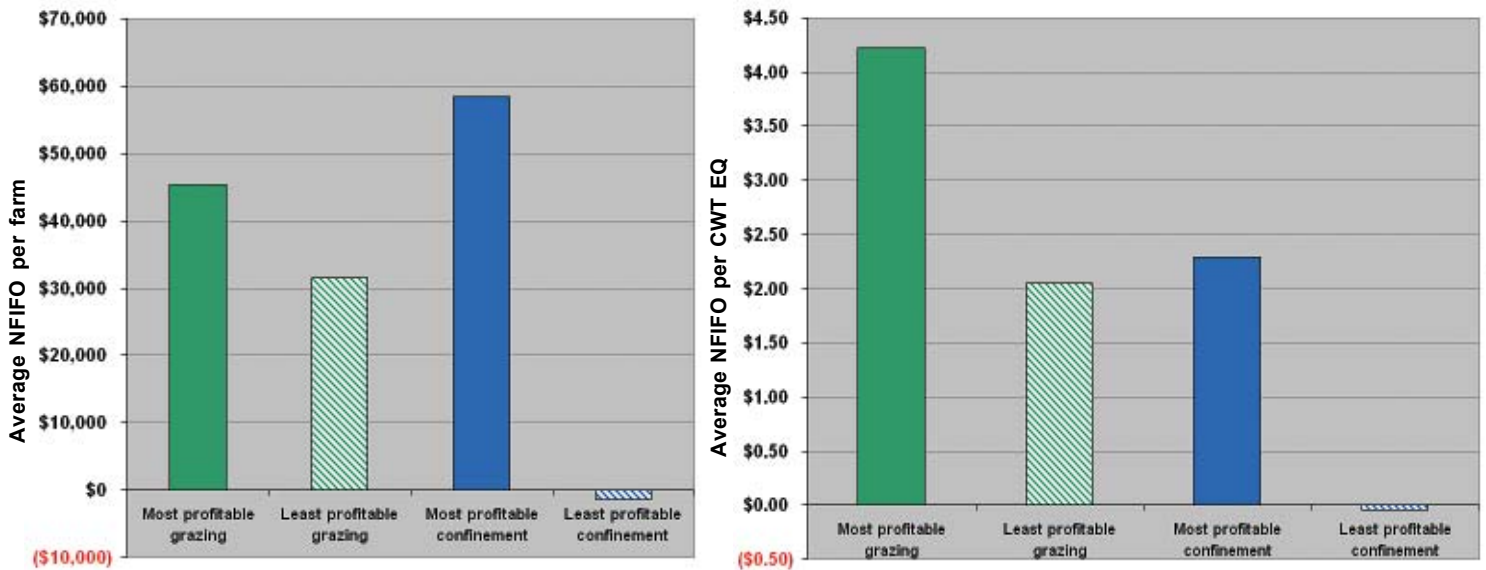
The most profitable confinement group had fewer cows, sold about 5 percent less milk per cow, had much more total NFIFO, NFIFO per cow and per CWT EQ, and had \$2.33 lower allocated costs than the least profitable confinement group. The least profitable confinement group had a negative NFIFO. Even when NFIFO was recalculated as if all labor and management were unpaid, the top group had about twice as much NFIFO per cow and more than twice as much NFIFO per CWT EQ when compared to the least profitable confinement group.

Looking at individual cost categories, the most profitable confinement group had small advantages over the least profitable confinement group in many categories. The most profitable confinement group had \$0.70/CWT EQ lower purchased feed costs, \$0.31/CWT EQ lower interest costs, and \$0.67/CWT EQ lower non-dependent labor costs. The most profitable confinement group had a milk price that averaged \$0.35/cwt lower than the least profitable confinement group. The most profitable



Key Finding: Many farm families would be satisfied if they consistently achieved the financial performance of the average most profitable grazing or confinement farms, as well as the average least profitable grazing farms.

Figure 3. Average net farm income from operations (NFIFO) per farm and per CWT EQ for most and least profitable halves of grazing and confinement farms in Wisconsin, 2002



Source: Data for this comparison was sorted specifically for this report and was derived from *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, April 2004, and *Milk Production Costs in 2002 on Selected Wisconsin Dairy Farms*, Gary Frank and Jenny Vanderlin, July 2003.

confinement group had \$1.39/CWT EQ lower basic costs, \$0.94/CWT EQ lower non-basic costs, and \$2.33/CWT EQ lower allocated costs than the least profitable confinement group.

Most profitable grazing and confinement farms

How do the confinement and grazing systems compare by most and least profitable farms? The most profitable confinement group had the highest NFIFO per farm, followed by the most and least profitable grazing groups. The least profitable confinement farms had a negative NFIFO per farm (Figure 3 above). The most profitable grazing group had slightly more than half as many cows, sold about 73 percent as much milk per cow and generated about 77 percent as much NFIFO as the most

profitable confinement group. However, the average most profitable grazer had \$247/cow and \$1.93/CWT EQ higher NFIFO than the average most profitable confinement herd operator. The most profitable grazing group had a \$0.88/cwt higher milk price than the most profitable confinement group.

The average most profitable grazer had \$0.65/CWT EQ lower basic costs and \$1.28/CWT EQ lower non-basic costs compared to the average most profitable confinement operator. When NFIFO was recalculated as if all labor and management were unpaid, the confinement group gained a slight advantage over the graziers in NFIFO/cow but not per CWT EQ. However, all labor is not unpaid.

Least profitable grazing and confinement farms

The average least profitable grazer had less than half as many cows, sold about 77 percent as much milk and generated much more NFIFO than the average least profitable confinement operator. The average least profitable grazer had a \$0.51/cwt lower milk price compared to the average least profitable confinement operator. The average least profitable grazer had \$1.08/CWT EQ lower basic costs, \$1.01/CWT EQ lower non-basic costs, and \$2.09/CWT EQ lower allocated costs compared to the average least profitable confinement operator.

Kriegl offers these insights on the most and least profitable comparison for grazing and confinement farms:

1. The most profitable group's performance was *much* better than the least profitable group's performance regardless of system.

2. Graziers generate more NFIFO per cow and per CWT EQ than their confinement counterparts.
3. Smaller herds tend to generate more NFIFO per cow and per CWT EQ than larger herds in both systems.
4. Many farm families would be satisfied if they consistently achieved the performance of either most profitable group or that of the least profitable grazing group.
5. The financial performance of the average least profitable confinement group is unacceptable to most farm families.
6. A milk price advantage didn't guarantee a NFIFO per farm, cow or CWT EQ advantage.

Table 3. The most and least profitable Wisconsin graziers and confinement operators sorted by NFIFO per CWT EQ, 2002

| | Grazing | | Confinement | |
|---|-----------------|------------------|-----------------|------------------|
| | Most profitable | Least profitable | Most profitable | Least profitable |
| Number of herds | 15 | 15 | 295 | 288 |
| Avg. number of cows per herd | 51 | 70 | 91 | 154 |
| Avg. lbs. of milk per cow | 14,976 | 16,400 | 20,434 | 21,316 |
| Avg. lbs. of milk per herd | 767,387 | 1,152,406 | 1,866,362 | 3,273,948 |
| Avg. basic cost per CWT EQ | \$6.40 | \$7.36 | \$7.05 | \$8.44 |
| Avg. non-basic cost per CWT EQ | \$1.53 | \$2.74 | \$2.81 | \$3.75 |
| Avg. allocated cost per CWT EQ | \$7.93 | \$10.10 | \$9.86 | \$12.19 |
| Avg. NFIFO per cow if all labor and management were unpaid | \$926 | \$626 | \$975 | \$461 |
| Avg. NFIFO per CWT EQ if all labor and management were unpaid | \$4.41 | \$2.86 | \$3.49 | \$1.73 |
| Avg. NFIFO per farm | \$45,453 | \$31,472 | \$58,459 | (\$1,467) |
| Avg. NFIFO per cow | \$887 | \$448 | \$640 | (\$10) |
| Avg. NFIFO per CWT EQ | \$4.22 | \$2.05 | \$2.29 | (\$0.04) |

Source: Data for this comparison was sorted specifically for this report and was derived from *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, April 2004, and *Milk Production Costs in 2002 on Selected Wisconsin Dairy Farms*, Gary Frank and Jenny Vanderlin, July 2003.

Grazing farms with fewer than 100 versus 100 or more cows

The average “large” grazing dairy herd in the Great Lakes region in 2002 had nearly three times as many cows, produced about ten percent less milk per cow, and had a higher NFIFO per farm but a lower NFIFO per cow and per CWT EQ than the average smaller grazing herd (see Figure 4 and Table 4 on page 12). Larger herds have a higher cost per CWT EQ for purchased feed, rent, repairs, other expenses, and depreciation of purchased livestock.

In many other comparisons of large to small herds across states and dairy systems, smaller herds tend to generate more NFIFO per cow and per CWT EQ than larger herds do.

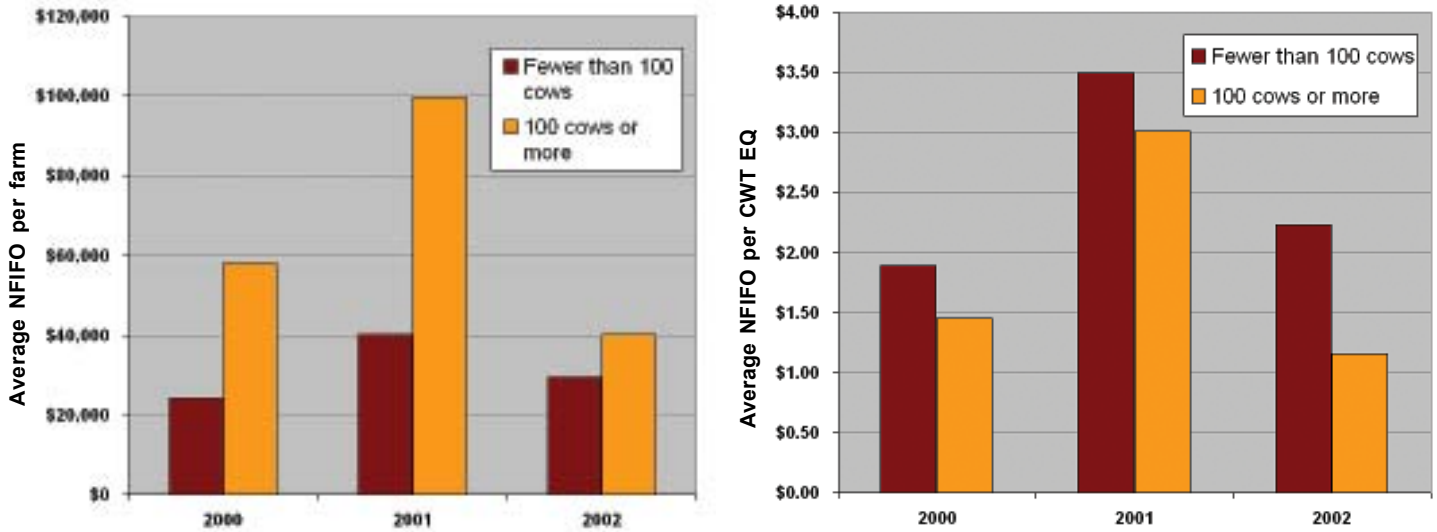
When comparing smaller herds to larger herds, smaller herds typically have an advantage in each of the major cost categories (basic, non-basic and allocated).

The cost of paid labor is \$0.76 per CWT EQ higher on larger farms, providing much of the smaller farms’ advantage in profitability. If all labor and management were unpaid, the smaller herds would still have a higher NFIFO per CWT EQ. This comparison was similar for 2000 through 2002, but the smaller herds had a slightly smaller NFIFO per CWT EQ advantage in 2001.



Key Finding: Great Lakes grazing dairy farms with 100 cows or more had higher NFIFO per farm but lower NFIFO per cow and CWT EQ than those with fewer than 100 cows.

Figure 4. Net farm income from operations (NFIFO) per farm and per CWT EQ on small and large grazing dairy farms, Great Lakes States



Source: *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, May 2002, April 2003 and April 2004.

Table 4. Profitability on grazing dairy farms in the Great Lakes with fewer than 100 cows and 100 cows or more, 2002

| | Fewer than 100 cows | 100 cows or more |
|---|---------------------|------------------|
| Number of herds | 75 | 28 |
| Avg. number of cows per herd | 57 | 164 |
| Avg. lbs. of milk per cow | 16,418 | 14,318 |
| Avg. lbs. of milk per herd | 936,493 | 2,341,760 |
| Avg. basic cost per CWT EQ | \$7.63 | \$7.86 |
| Avg. non-basic cost per CWT EQ | \$2.29 | \$3.13 |
| Avg. allocated cost per CWT EQ | \$9.92 | \$10.99 |
| Avg. NFIFO per cow if all labor and management were unpaid | \$683 | \$560 |
| Avg. NFIFO per CWT EQ if all labor and management were unpaid | \$2.96 | \$2.65 |
| Avg. NFIFO per farm | \$29,465 | \$40,095 |
| Avg. NFIFO per cow | \$516 | \$245 |
| Avg. NFIFO per CWT EQ | \$2.23 | \$1.16 |

Source: *Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, April 2004.

Differences between grazing farms: seasonal calving

There are as many variations of managed grazing as there are farms using it. Some farms are certified organic and some are incorporating crossbreeding into their herds. And managed grazing techniques aren't just for dairy farms—they've been adapted for all types of livestock. Kriegl has begun to compare the performance on farms with many variations.

One variation Kriegl has studied is calving strategy. Some grazing farmers have found it easier to schedule their labor if all of their cows calve at one time of year rather than over the entire year. This strategy is called 'seasonal calving,' and it allows farmers to focus on specific tasks at specific times. On seasonal farms, calves are typically born in spring, cows are re-bred in the summer, and no cows are milked during a period of time during the winter (usually a few weeks). In New Zealand this is a common strategy. To be classified as a seasonal herd in Kriegl's study, all the cows in the herd must be dry at the same time at least one day each calendar year. Seasonal herds participating in Kriegl's study are larger and produce less milk per cow than non-seasonal herds. Less than 15 percent of the herds that Kriegl has studied so far practice seasonal calving.

Comparing the two groups, Kriegl found that graziers who practice non-seasonal calving had better financial performance than graziers who used seasonal calving in all but two years of comparisons from 1995 to 2002. Only in 1995 and in 2001 did seasonal calving herds achieve higher NFIFO per cow and CWT EQ.

Why was the relative performance of seasonal herds better in 1995 and 2001? Most of the participating seasonal herds in 1995 were entering their first year

of seasonal production with a herd of cattle and/or springing heifers that were on an appropriate calving schedule. It is easier to be seasonal in the first year if one begins with a herd selected to calve in a specific time frame than to keep the herd on that timetable in following years. In 2001, the milk price pattern was ideal for spring seasonal herds, with high spring prices and low winter prices.

Can a seasonal dairy farm be profitable? "Yes," says Kriegl. "There are seasonal graziers in the Upper Midwest that are generating solid financial returns while meeting family labor goals. But the average manager of a seasonal system should not expect to consistently match the financial performance of the average non-seasonal operation."

So far in these financial studies, the best performance of seasonal graziers has not matched the best performance of graziers who are not seasonal. But graziers using a seasonal calving strategy often do so to meet non-economic as well as economic goals. Kriegl plans to continue to study seasonal grazing dairy farms in the future.



Key Finding: Graziers are making a variety of strategies work for them.

After analyzing several years of financial data from dairy farms using managed grazing in Wisconsin and the Great Lakes region, Kriegl offers these conclusions:

- 1. Managed grazing is economically competitive, probably at all sizes.** In contrast to large modern confinement systems, a grazing system can provide a family with a satisfactory income from an operation that a single family can operate with their own labor and management. Graziers in the studies compare quite favorably financially with conventional Wisconsin dairy farmers.
- 2. Grazing farms are more economically flexible than confinement farms because of two factors.** First, the initial investment for a grazing system tends to be much less than for a confinement system. Second, land and cattle make up a much higher percentage of assets on grazing farms than on confinement farms. Land and cattle typically retain their value better than the equipment and machinery that make up a higher percentage of assets on a confinement farm.
- 3. The graziers who are most financially successful are those who focus on all three factors of profit:** income generation, operating expense control, and investment/debt control. Optimizing all three, rather than focusing on one factor, results in the best performance.
- 4. A traditional small Wisconsin dairy farm with average or better management has a good chance of improving its financial performance by judicious adoption of a managed grazing system.** Farmers need not go through a period of financial hardship when they switch to grazing (although some do).
- 5. Low input is not the same as low cost per unit of output.** The graziers with the lowest cost per hundredweight of milk sold use relatively large quantities of inputs—but the income generated by those inputs is greater than their cost.
- 6. Managed grazing can be employed with or without other practices and technologies** such as seasonal calving, milking parlors, Total Mixed Rations, and so on.
- 7. There is no single measurement that tells enough about a farm business to make substantive comparisons or decisions without additional information from other measures.** Several measures are needed to accurately judge the financial performance of any farm business.

Resources

For more information on the publications referenced in this report, visit the UW-Madison Center for Dairy Profitability website at <http://www.cdp.wisc.edu>

Survey information on the adoption of managed grazing in Wisconsin is available from the UW-Madison Program on Agricultural Technology Studies at <http://www.pats.wisc.edu>

Other useful websites about managed grazing include the American Farmland Trust at <http://www.grassfarmer.org>, GrassWorks at <http://www.grassworks.org> and the UW-Madison Center for Integrated Agricultural Systems at <http://www.cias.wisc.edu>

Questions and answers about background and methods

Since its initial printing, *Pastures of Plenty* has generated a lot of interest and a variety of questions. In this section, author Tom Kriegl clarifies some of the choices made in selecting financial measures and the meaning behind the measurements.

What are the sources of the data in *Pastures of Plenty*?

Pastures of Plenty is based on the data from the *Great Lakes Grazing Network report Dairy Grazing Farms Financial Summary: Regional/Multi-State Interpretation of Small Farm Data*, Tom Kriegl, et al, April 2004, and the report *An Eight-Year Economic Look at Wisconsin Dairy Systems*, Tom Kriegl and Gary Frank, June 2004. Both use the Agriculture Financial Advisor (AgFA[®]) program developed by Dr. Gary Frank, Randy Gregory, and the University of Wisconsin's Farm Management Education Team.

AgFA[®] now has 600 to 1000 farm years of Wisconsin dairy farm data, and 19 to 43 farm years of Wisconsin grazing dairy farm data, per year from 1995 to 2005. Summaries of data collected since *Pastures of Plenty* was first printed adds support to the message in *Pastures of Plenty*.

The AgFA[®] financial measures report for many comparison groups in the *Dairy Grazing Farms Financial Summary* can be found at the CDP website: <http://www.cdp.wisc.edu>. I look at many measures to reach my conclusions, but don't routinely discuss all of them in every presentation of results.

How is labor accounted for in *Pastures of Plenty*?

Three types of labor and management are identified on the farms in the source reports for *Pastures of Plenty*. They are: wages for labor and management paid to dependents (dependent compensation is paid on some farms for tax management purposes); non-

dependent paid labor and management; and unpaid opportunity cost of labor and management. Unpaid opportunity costs are excluded when NFIFO is calculated via the method prescribed by the Farm Financial Standards Council (FFSC), as it is in *Pastures of Plenty*. Opportunity costs are defined as the best alternative returns that could be earned by the operator's labor, management and equity capital.

Beyond the control of researchers, all data sets containing more than a few farms' financial data will have farms that pay dependent labor and farms that don't pay dependent labor, even if both have the same number of hours of dependent labor. One way of examining the data to help see the impact of this labor expense on financial performance is to calculate NFIFO in the standard way, and then recalculate NFIFO again as if all labor and management were unpaid. This is a useful, although not common, analysis method in agriculture.

On many smaller traditional confinement and managed grazing farms, none of the labor or management is paid. On some large modern confinement farms, all the labor and management is paid. Therefore, using the FFSC method of calculating NFIFO and deducting only paid labor and management provides an advantage to the smaller traditional confinement and managed grazing farms when comparing financial performance.

One way to reduce that advantage is to calculate a "NFIFO plus all paid labor and management" value. In other words, make a calculation of NFIFO assuming ALL labor and management is unpaid. This has been done in the source studies and *Pastures of Plenty* in two steps.

The first step was to recalculate NFIFO for each year as if wages and benefits paid to dependents of the

owner(s) were unpaid. This step was taken because dependents (spouse and children) are not paid a competitive wage in all farm businesses. Therefore, not including wages and benefits paid to dependents starts to make the comparison of NFIFO per CWT EQ more impartial when comparing large versus small farms.

In the second step, the paid non-dependent labor compensation is also treated as if it were unpaid. Hence the measure called “NFIFO if all labor were unpaid.”

How do you deal with the opportunity cost of unpaid labor, management and equity capital?

In large companies such as publicly traded companies, there are NO opportunity costs of **unpaid** labor, management and equity capital, because all work and management is performed by paid employees, and dividends are paid to the stockholders who own the equity. For most Wisconsin dairy farms with unpaid labor, management, and equity capital, those unpaid contributions are supplied by one person or one family.

The calculation of the value of unpaid labor is a **very arbitrary calculation** in businesses that have unpaid labor, management and equity capital—so much so that the FFSC guidelines more or less say there is no good way to do it. This point is made not to argue that it shouldn't be done, but to argue that its calculation and interpretation should be done with much judgment. There is no fair way to estimate the value of unpaid labor and management across groups of farms of various sizes that have unpaid labor, management, and equity capital.

Despite these difficulties, all of the Wisconsin and Great Lakes Grazing Network grazing data has been analyzed via the AgFA[®] computer program which

automatically does a total cost calculation that includes all the above listed labor costs including the opportunity cost of unpaid labor, management and equity capital. Of course, these opportunity costs are based on assumptions about the value of unpaid labor, management, and equity capital. The *Dairy Grazing Farms Financial Summary*, one of the source documents for *Pastures of Plenty*, includes the total cost data generated by AgFA[®]. Total costs are not shown in *Pastures of Plenty*.

Given the challenges connected with estimating opportunity costs, perhaps their best use for businesses that have unpaid labor, management, and equity capital is on an individual basis to help those business owners better understand the economic price they pay for the choice they make in using those unpaid resources.

Do the results unfairly show an advantage to farms that rely more on unpaid family labor as opposed to those that rely on hired labor?

Few other studies have addressed labor costs as comprehensively as they have been addressed in the source studies underlying *Pastures of Plenty*. Extra steps were taken to make the comparison fair to larger confinement systems.

A higher percent of total labor used on the larger confinement farms is hired than on grazing farms. So, to see the effect of labor on profitability, I calculated NFIFO per cow and per CWT EQ the standard way and also as if all paid labor were unpaid, as described above. If all labor were unpaid, the NFIFO advantage that grazing farms have over confinement farms narrows, but the advantage remains in most comparisons. This shows that differences in labor costs explain some, but not all, of grazing farms' NFIFO advantage. (See Table 1 on page 4.) NFIFO calculated in the appropriate way (in which paid labor is an expense) is emphasized in bold in the tables. All of the tables in *Pasture of Plenty* include two

rows that show FIFO per cow and CWT EQ if all labor and management were unpaid to illustrate this comparison.

How are assets valued in *Pastures of Plenty*?

The data in *Pastures of Plenty* relies mainly on the historic cost (also known as cost or tax basis) method of valuing assets, but there are other methods, some of which are reflected in the source documents.

AgFA[®] (the computer program that analyzes the data) routinely calculates several financial performance measures in two tracks. One track (called the cost track in AgFA[®]) uses the cost or tax basis for asset values plus tax depreciation. This is the method used in most of the business world, because it is vital to a mathematically disciplined accounting system that enables one to track every penny used by the business from its beginning to its end, or within any other period of its existence. Therefore the cost or tax basis is vital to the mathematical relationship between the three major financial documents (balance sheet, earnings statement and cash flow) of a business. Tax basis of assets starts with the price paid for an asset and then decreases the asset value by the amount of tax depreciation (including section 179 expenses) taken. Every dollar of tax depreciation taken in a year decreases FIFO by the same amount in the same year. This is how the cost of purchased, non-current assets is prorated over their useful life.

The other track uses current market values (CMV) of assets and economic depreciation. This second track (called economic track in AgFA[®]) is a more conservative modification of the CMV method that is overused in agriculture. The CMV method of valuing assets relies upon someone's best guess of asset values on the balance sheet date. Depreciation occurs in the CMV method only if the balance sheet preparer guessed that the CMV of assets declined. One cannot establish any mathematical discipline between the three major financial documents when using the

CMV method. Therefore, accounting errors are far less detectable when using the CMV method.

The economic track in AgFA[®] instills some discipline into the CMV method by including economic depreciation, although it doesn't provide nearly as much discipline as is achieved with the cost or tax basis of assets. Economic depreciation is an arbitrary calculation made to try to account for the cost of capital items in the business. It usually is calculated as a percent of CMV each year.

Double track balance sheets are used in *Dairy Grazing Farms Financial Summary*, using the previously described cost and economic tracks. Each method has positives and negatives. Big advantages of the cost method include that, as part of a highly disciplined method, accounting errors can be eliminated and measures of operating profit are not distorted by paper changes in asset unit values.

Unfortunately, relying too heavily on CMV balance sheets convinced many farm families and their lenders into overestimating the financial health of many family farms in the 1960s, 70s and 80s. These overestimates contributed to many uninformed decisions with painful results. The CMV methods are more useful for such tasks as making decisions about insurance coverage and for estimating the size of an estate. The CMV will often enable a farmer to persuade a lender to loan more money. A manager that is so committed to maximizing profitability from all their farm resources that they would leave or enter any business whenever they think the change will increase their wealth should use the CMV method along with the cost method. Both the cost and current market values are needed for estate planning, planning a farm business transfer or arrangement, and estimating the tax consequences of many major business decisions.

Why don't you use Rate of Return on Assets?

In fact, I use both Rate of Return on Assets (ROROA) and Rate of Return on Equity (ROROE) extensively in the *Dairy Grazing Farms Financial Summary*. A better question might be why I don't emphasize these measures. No single measure tells the whole story, although some measures tell a larger part of the story than others do. One should calculate and review many financial measures when making important financial judgments and decisions. AgFA[®] and many other programs do this automatically.

ROROA and ROROE are two of the most comprehensive, useful and important measures of financial performance because they measure a combined impact of what I call the three factors of profitability. These three factors of profitability are:

1. income generation;
2. control of operating expense; and
3. control of investment/debt.

Most financial measures focus on less than all three factors of profitability. However, because of their comprehensiveness, ROROA and ROROE are not always calculated accurately or in the same way from farm to farm or from study to study. When ROROA and ROROE values from different sources are compared, it is important to make sure that they were calculated in the same way. Were the assets valued according to their tax basis, their current market value, or by some other asset valuation method? If we are using the current market values of assets, are we allowing gains in asset values to increase the return to assets and equity even though these gains are paper gains? If we are using current market values of assets, are we also using contingent liabilities when calculating ROROA and ROROE? Another problem with using ROROA and ROROE is, once again, it requires that one assign an arbitrary value to the opportunity cost of unpaid labor and management. The opportunity cost of labor is usually based on the farm families' estimates of hours of unpaid labor, and some estimate of what that amount of labor is worth. Arbitrary judgments about

opportunity costs for unpaid labor have a much greater impact on the calculation of ROROA and ROROE than on the calculation of NFIFO for businesses that have substantial unpaid opportunity costs.

The accurate and consistent calculation of NFIFO is less subject to most of the above described sources of inconsistency, because the calculation of ROROA and ROROE requires extra steps beyond the calculation of NFIFO. Consequently, NFIFO is much more often calculated accurately or in the same way from farm to farm and from study to study. And since the accurate and consistent calculation of ROROA and ROROE cannot happen without the accurate and consistent calculation of NFIFO, if the NFIFO is inaccurate or inconsistent, the ROROA and ROROE from the same source will be even more inaccurate and inconsistent.

In addition, NFIFO fully considers the impact of two factors of profitability and considers much of the impact of the third factor of profitability. Consequently, after ROROE and ROROA, NFIFO is one of the most comprehensive financial measures.

Why use allocated costs instead of total costs?

The source reports for *Pastures of Plenty* put costs into several categories which include basic, non-basic, allocated, and total costs. Again, it is more valuable to compare several cost categories than to use just one. In ten years of comparisons, graziers typically had an advantage in each of these cost categories. See page 5 of *Pastures of Plenty* for more cost definitions.

The allocated cost category does get more attention than the others because it is quite comprehensive, including all costs except the more arbitrary unpaid opportunity cost of labor, management, and equity capital.

Allocated cost also equals total income (not total cost) minus NFIFO. NFIFO can be smaller, larger or

equal to the combined opportunity cost of unpaid labor, management, and equity capital supplied by the owning family. Since opportunity cost is not consciously calculated by everyone, allocated cost is often used by non-economists as a default proxy for total cost.

Why do you use CWT EQ instead of CWT sold?

Dr. Gary Frank of the Center for Dairy Profitability developed the CWT EQ method because he recognized that one cannot do an apples-to-apples comparison of any two farm groups, or even years, on the same farm using CWT sold. In addition, the CWT sold method only considers the impact of one factor of profitability (income generation). CWT EQ fully considers the impact of two factors of profitability (income generation and control of operating expenses) and partially considers the impact of the third factor of profitability (control of investment and debt).

The CWT sold method uses the physical quantity of a CWT of milk to index costs. The CWT EQ method uses the dollar value of a CWT of milk to index costs. This method is similar to calculating the cost of earning a dollar of revenue commonly used in the business world.

Dairy farms have numerous sources of income: milk, cull cows, calves, Commodity Credit Corporation (CCC) milk assessment refunds, cooperative dividends, property tax credits on income taxes, crop-related government payments, etc. And milk, cull cows and calves are joint products—a farmer can't produce one without the others. This large number of income sources and joint products makes using an equivalent unit essential for a consistent method of comparing costs between farms. In addition, on most dairy farms, the cost of producing crops sold for cash cannot be separated from the cost of producing the crops fed to the dairy herd. A farm's total income (including cash sales of crops and

changes in the value of feed and cattle inventories) must be included when calculating equivalent units.

The use of an equivalent unit is the most meaningful comparable measure when calculating the cost of producing milk, because dairy farm businesses have multiple sources of income. The measure is calculated by summing the income from the sale of all products produced on the dairy farm and dividing by the price of milk.

The output measure for an individual farm is calculated with the following formula:

$$\frac{\text{Total Farm Income from all Sources}}{\text{Average Price Received per Hundredweight of Milk Sold by that Farm}}$$

However, when studying a group of farms or comparing farms that may be receiving different milk prices, all producers should use the same price. Therefore the formula should be:

$$\frac{\text{Total Farm Income from all Sources}}{\text{U.S. All Milk Price per Hundredweight (for the year in question)}}$$

The U.S. All Milk Price per Hundredweight for 2003 was \$12.50.

Note: If the income from non-dairy enterprises exceed 30 percent of total income, additional calculations to separate out the non-dairy enterprises' costs are required. (Including farms with large amounts of non-dairy income is even more problematic when using CWT sold.)