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The Economics of Grass-based Dairying

Livestock Business Guide

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Introduction

A grazing dairy herd is wonderful to watch — green meadows filled with cows, harvesting the sun's energy in the form of grass, turning it into milk. Whereas the conventional dairy emphasizes confinement feeding, the grass-based dairy allows the animals themselves to harvest as much of their feed as possible. Depending on location, this approach can significantly reduce the activities and expenses of cutting, storing, and feeding

Table of Contents

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harvested forages. The use of equipment will thus become a forage-management issue rather than a need-to-produce-feed issue.

Grazing can have other positive economic and evironmental effects, as well. For example, establishment of permanent pasture minimizes a farm's loss of soil and nutrients to erosion and runoff, and grazing animals deposit most of their manure directly on the pasture, thereby reducing labor and capital expense of manure application.

Because they function differently from conventional dairies, grazing dairies require some different management skills. The grazing manager must be attuned to pasture ecology, mainly through daily observation of *animal performance* and *forage growth*. Good management will require daily decisions about how to meet the needs of both the animals and the pasture at the same time. In some cases, a grazing dairy may decide to milk cows seasonally, creating periods when all the cows are dried off, allowing time for other management activities during this period of low demand on the manager.

Farmers contemplating a move from conventional to grass-based dairying should seriously evaluate their goals, both professional and personal. Grazing will not magically solve the problems of a poorly performing conventional dairy; poor management skills are not eliminated by simply transforming the business operation. Also remember that farming is both your business and your family's lifestyle. A grazing dairy is just one option for using your skills (and learning new ones), achieving your business goals, and meeting your family's needs.

COMPARED WITH DAIRY FARMERS WHO EMPLOY CONFINEMENT OPERATIONS, FARMERS WHO PRACTICE ROTATIONAL GRAZING WERE MORE LIKELY TO SAY THAT THEIR FAMILY'S QUALITY OF LIFE HAD IMPROVED OVER THE PAST FIVE YEARS.
– FINDING FROM A UW-MADISON SURVEY ON ROTATIONAL GRAZING PRACTICES

The Economics of the Dairy Business

The economic side of farming is too often treated as an afterthought by many farmers. In fact, economics should be a top priority, for without economic resources, the entire operation will quickly grind to a halt. Most farmers see their main jobs as feeding, milking, working with animals, and so on. While any one of these tasks may be at the top of the list on any given day, the farmer's primary responsibility is to manage the overall business of milk production. It is therefore incumbent on the farmer as *farm manager* to understand the financial aspects of the business and how management decisions influence the long-term financial stability of the operation.

While this document will attempt to cover the basics, it is in a manager's best interest to seek out local resources to assist with financial planning. In many cases, local Extension offices may have access to Extension farm management agents or be able to refer you to other local experts. Banks that do business with farmers and others involved in agriculture may also be able to help with financial analysis. Whether you are planning a transition to a grass-based dairy or starting from scratch, time spent putting a financial plan together can give you a tremendous amount of information, point out the key management issues you need to focus on, and provide insight on what may or may not be possible given your goals.

Financial Measures

Many dairies focus on pounds of milk produced per cow to evaluate their success; others advocate basing the evaluation on unit cost of production (UCOP). The argument for UCOP is that the margin on every unit of output will determine whether an operation is successful. Low-cost producers tend to endure the swings in the marketplace more successfully over the long term than higher-cost producers. However, in some cases, producers who look only at the UCOP figure to gauge their success may not be seeing the

whole picture with regard to long-term financial health. The cost of production is important in any business, but it must be put into perspective since it does not address income generation.

Kriegl (1999) advocates putting three factors into perspective when evaluating the financial success of an operation: control of investment or debt; control of operating expense; and income generation. Successful managers strive to optimize the relationships among these three items. Kreigl also concludes that graziers tend to over-focus on cost control and investment, while non-graziers tend to over-focus on income generation (Kreigl, 2001b). While no single number will ever tell the whole financial picture, the one figure that conveys the most information about an operation's financial performance is the rate of return on farm assets (ROA). ROA summarizes Kreigl's three factors into one stand-alone figure that can be used to assess farm financial performance.

> **"We're in the business of converting grass into milk and without good financial records we don't know how well we have managed the business or the impact of any changes that have been put in place."**
> – Gary Burley, seasonal grazier, New York

Rate of return on assets measures the extent to which the farm generates a profit from its use of land, labor, management, and capital. The manager wants an ROA that exceeds the lending rates on the assets. Ultimately, ROA should be taken together with other financial data to better understand the farming operation and explain how the year went financially. By looking at detailed financial reports at least yearly, managers can get a better notion of where things are headed, see where improvements should be implemented, and monitor the results of their efforts. It is more productive to make informed decisions over time than to make uninformed decisions in an instant. Ultimately, the farm manager should be able to not only remember the rolling herd average and point out the top-performing cow, but also know the costs to produce a hundredweight of milk, the operating profit margin, and the rate of return on equity.

Detailed financial information can be put to multiple uses by an astute manager. "Benchmarking" is one such use. Many universities and financial service companies publish financial benchmarks related to the performance of various types of farms in a state or region. These can be used by farm managers as standards to compare against their own farm's performance, to gauge their level of competitiveness within the industry, and to set goals for the next year. Detailed financial information will also help in arranging loans and other financial agreements — for instance, in demonstrating to lenders that the farm has assets available to attach as collateral. Many managers find that detailed financial analysis can also supply a history of the operation, reveal what the results of change have been, and show how wealth has accumulated or eroded.

To provide the variety of information needed for good decision-making, more than the checkbook balance and the schedule F are required. The farm manager who conducts an annual inventory of assets, and maintains a complete record of cash activity during the year, is a long way down the road toward meaningful financial analysis. While financial records may seem intimidating, realize that assistance is available, in many cases locally from the Extension Service or Farm Credit agencies. Farm managers should also become acquainted with the key financial measures as cited by the Farm Financial Standards Council. Some of the important financial measures will be briefly discussed in this text; however, for a better understanding, other sources of information should be sought out.

Comparison of "Conventional" and Grass-based Dairies

In many ways, grass-based dairy operations are similar to conventional ones. Cows must still be milked, bred, and calved; and stockmanship is still the most critical component in the system. Researchers recently surveyed Wisconsin dairy operations (Ostrum and Smith, 2000), including those using management-intensive rotational grazing (MIRG), where cows are moved to new pastures at least once a week; those using non-intensive grazing, where cows are moved less frequently; and confinement operations, where all forages are brought to the cows. They found that MIRG operations required nearly the same amount of labor per cow milked as confinement operations: 3.03 and 2.87 hours/ cow, respectively. The real difference in labor between the two types of operations was in the amount of non-family labor used per week, with the confinement operations using 30.2 hours per week, versus only 5.0 hours per week for the MIRG operations.

> A UW-Madison survey has shown that about 23 percent of Wisconsin's dairy farmers used management-intensive rotational grazing in 2000, more than triple the 7 percent that used rotational grazing in 1993.

Looking at the use of technology among the three groups, it appears that the MIRG group utilized less technology to maximize output — technologies such as regular veterinary service, production testing, total mixed rations (TMR), rBST, and milking parlors. However, when adjusted for size of operation, MIRG operations were using these technologies at the same level or higher than their contemporaries. The MIRG operations differed most significantly in their lower rate of TMR use — because of the larger contribution made by pasture to the feed requirements — and their greater use of milking parlors compared to other dairies of their size, reflecting a selective use of technology to improve profitability.

In comparing grass-based and conventional dairy farms, Kriegl (2001a) found that graziers fit into two groups. Non-transitional operations were set up from the beginning as low-capital grazing dairies, while transitional or high-capital grazing operations had enough buildings, equipment, and land to farm conventionally (and in some cases had operated as conventional farms at some point). Between these two grazing groups, the non-transitional graziers owned and harvested fewer acres, rented more ground dedicated to pasture forages, and were less likely to grow grain or harvest forage mechanically. The non-transitional and transitional graziers harvested 3.3 and 2.34 forage acres per cow, respectively, in 1998, with most operations purchasing some if not all of their grain. The non-transitional graziers employed a larger proportion of the land (four times more) for pasture and milked 26% fewer cows than did the transitional graziers. In terms of net farm income from operations per cow (NFIFO/cow) — a measure to compare financial performance between businesses of different sizes, which includes income minus all cash expenses, interest, depreciation, and hired labor costs — non-transitional graziers had higher NFIFO/cow in 1995 and 1998, but not in 1996 and 1997. In all four years studied, the NFIFO/cow for both types of grazing operations was higher than for conventional dairy operations in Wisconsin. The NFIFO/cow was found to vary widely across all types of grazing operations, from a low of - $460 to a high of $2,973.

Non-transitional graziers had the lowest investment/cow costs when compared to either transitional graziers or conventional dairies, while transitional graziers and conventional dairies were similar in investment/cow. Kreigl also reported that during the four years, non-transitional graziers had lower debt per cow than either of the other two types of farms. In terms of the basic cost per hundredweight (cwt) equivalent of milk sold — the sum of all cash and non-cash costs except interest, depreciation, labor, and management — graziers that were non-seasonal, used DHI, or were transitional, tended to have lower basic costs than their

> **"Transition was forced upon us after a barn fire in the fall of 1994 that destroyed all our stored forage, so we planted cool-season grasses and started grazing; the cows milked well and looked in better condition, so we just stuck with it."**
> – Don Mayer, dairy grazier, Arkansas

opposites in the study. Only the seasonal, non-transitional, non-DHI group had higher basic costs than conventional operations. Kreigl concluded that graziers with higher NFIFO/cow also had lower basic costs per cwt equivalent of milk sold. This study suggests that there is more to controlling operating costs than just *not spending money*; what money is spent on is more important than how much is spent.

The Kriegl survey also looked at two "low-input" practices among graziers: seasonal calving and non-use of DHI. These two practices are often promoted as ways of improving profitability because of their low-input nature. Among the non-transitional farms, those that used DHI, were not fully seasonal, and were not certified organic, had a higher NFIFO/cow than the graziers who followed the low-input practices. The four-year averages revealed that NFIFO/cow nearly doubled when either one of these low-input practices was not utilized. The same trends were seen among transitional graziers, although the differences were not as large. Kriegl concluded that the graziers in the study using at least one of the two low-input strategies were less competitive.

Some other general conclusions from this Wisconsin study were:

- MIRG operations are economically competitive with conventional Wisconsin dairy farms.
- MIRG is not a reduced-management system; it is a different-management system.
- A "traditional, small Wisconsin dairy farm" with average or better management has a good chance of improving its financial performance by the judicious adoption of an MIRG system.
- The graziers who are most successful financially are those who focus on optimizing the three factors of profit: income generation, operating expense control, and investment control.
- Wisconsin graziers tend to emphasize operating cost and investment control out of proportion with income generation, just as traditional Wisconsin dairy farmers tend to emphasize income generation out of proportion with operating cost and investment control. Spending money carefully helps profitability more than simply not spending.
- Low input is not the same as low cost per unit of output. Graziers with the lowest cost per cwt of milk sold used large quantities of inputs such as fertilizer and grain as long as the income they generated from those inputs was greater than the cost.
- Only one seasonal herd in the study generated enough income in all five years to provide a sufficient living for a typical Wisconsin dairy family. That particular seasonal herd had about twice as many cows as some of the non-seasonal herds that generated as many or more dollars.
- There is no single measurement that tells enough about a business that a manager could use it alone to make important decisions or comparisons without additional information.

Nott et al. (2000) reported on a Finpack financial analysis of a subset of 15 grazing dairies in Wisconsin and Michigan that ranged in size from 23 to 60 cows. When the farms were divided into groups based on farm income, the average milk production for farms in the lower 40 percent was 13,341 lbs per cow, while milk production for farms in the higher

40 percent was 17,306 lbs per cow. This resulted in a large difference in gross cash farm income between the two groups. However, the cash expenses per cow were lower for the higher-producing herds. The average cash expense per cow of the lower 40-percent group and the higher 40-percent group were $1815/cow and $1511/cow, respectively. This gives further support to our previous conclusion that it's not how much one spends but how it is spent that may make the difference.

If we compare the smaller grazing herds from the previous study by Nott to all Michigan dairies of between 20 and 75.9 cows (Nott, 2000) in 1999, we find that with regard to capital assets, grazing dairies tend to have more invested in machinery and equipment, buildings, and other capital assets on a per-cow basis than do conventional dairies. The higher level of capital investment for the grazing dairies in this study may be the result of conventional dairy operations switching to grazing, and not because grazing dairies require a higher capital investment than conventional dairies of the same size. The only category where conventional small dairies have a higher capital investment per cow is in breeding livestock. If we evaluate the financial efficiency ratios for these same two groups, however, the graziers hold an edge in every category. The grazing dairies have a higher asset turnover rate and net farm income ratio, while also having a lower operating expense ratio, lower depreciation expense ratio, and lower interest expense ratio, compared to conventional farms of similar size in 1999.

In New York, Conneman et al. (2001) found that in 2000, the average net farm income per cow without appreciation averaged $450. When 30 intensive-grazing dairy farms were divided into 17 above-average and 13 below-average farms, based on net farm income per cow without appreciation, there were large differences for several standard measures of dairy production. The above-average farms produced 4,267 pounds more milk sold per cow (19,075 and 14,808 pounds of milk sold per cow for above-average and below-average farms, respectively). The operating cost of producing milk per cwt, and the total cost of production per cwt, was slightly more than $3 per cwt higher for the below-average farms. Operating costs per cwt were $11.64 and $8.59, while total cost of production per cwt was $17.23 and $13.71 for below- and above-average farms, respectively.

Another case study (Winsten, 2000) evaluating six dairy farms utilizing seasonal calving and management-intensive grazing, concluded that a dairy herd of 75 to 150 cows on 100 to 300 acres could be economically viable and operated with minimal labor.

Land Requirements for Grazing Dairies

Most graziers will continue to harvest some forage, either from excess pasture production or from traditional hay crop operations. The harvest from excess pasture production can be utilized as supplemental feed or when pasture is unavailable. Kriegl (2001a), in the survey of Wisconsin graziers, reported that the majority of farms harvested 2.74 acres of forage per cow. In Michigan, Nott (2000) reported that on 11 intensively grazed dairies, the average acreage used for cropping and forage production was 3.9 acres per cow. New York researchers (Conneman, 2001) found little difference between more profitable and less profitable grazing dairy farms with regard to the number of acres per cow. Both utilized approximately 2.55 tillable acres per cow and 1.57 forage acres per cow.

On the six farms that Winsten (2000) surveyed, average crop and pasture acres ranged from 1.77 to 4.2 per cow-in-milk. On three of the farms that had less than 3 acres per cow-in-milk, milk production was depressed, compared to farms with 3 or more acres per cow-in-milk. Using simple averages, milk production was 3,667 pounds less per cow when a farm had less than 3 acres per cow-in-milk of crop and pasture ground available for forage production. While purchased feed could be used to make up the difference in milk production, the six farms surveyed all had purchased-feed costs per cow-in-milk that were very similar, despite large differences in

milk production. Therefore, we might conclude that the foraging ability of the cow and the access to this forage are critical components of milk production.

Supplementation of Grazing Cattle

Researchers at the University of Vermont have found that when pasture is well managed, cows can consume up to 3 percent of their body weight in forage dry matter per day (Anon., 1996). In most cases, maximizing milk production from forage requires some supplementation with grain to provide a better balance of protein and energy. At the Southwest Center of the Missouri Agricultural Experiment Station, grain supplementation is adjusted to match forage availability (Anon., 2001a). When forage is of high quality, the supplement is mainly corn and soy hulls plus minerals; as summer approaches and forage quality declines, soybean meal is added to the supplement. Grain is fed at a maximum rate of 16 pounds per head per day. The cost of supplemental feed and hay at the Southwest Center is $3.92 per cwt milk, or $561 per cow per year.

> **"In 2000, we experimented and removed all supplemental grain; conception rates slipped 10%, body condition deteriorated, and overall cow health was poorer; so in 2001, we put supplement back in the ration."**
> **–** Gary Burley, dairyman, New York

A research review by Muller (1997), reported that in several cases in Wisconsin and Pennsylvania, unsupplemented cows had lower milk production and lost body condition when compared to supplemented cows. In both cases, cows consumed over three percent of their body weight in forage dry matter. New Zealand studies from the same review reported that intake from high-quality pastures may provide sufficient nutrients to maintain 35 to 50 pounds of milk daily with no supplemental energy. In most situations, energy is the most limiting nutritional component for profitable milk production and normal reproductive performance when using pasture as the main source of forage. Research has demonstrated milk production responses of ½ to 1½ pounds of milk for every pound of grain fed, with 1 pound of milk per pound of grain the average response. The response is greatest with the first 5 to 10 pounds of supplemental feed and diminishes beyond that.

The need for additional energy in a dairy cow's diet is related to the non-fiber carbohydrate (NFC) content of forages typically found in pastures. The NFC in pasture forage is typically low: between 15 and 20 percent on a dry matter basis. High-producing cows need about 35 percent NFC. With the NFC content of grains being relatively high (50–70%), the amount of grain fed to cows in a pasture-based system can have a positive long-term effect on overall energy balance, milk production, reproduction, body weight, and condition.

The message is that as long as the financial margins on supplemental grain feeding are positive, there are additional gains to be made by feeding supplements to high-producing cows. In a technical bulletin for Irish graziers, Peyraud (2001) reported that a summary of grazing supplementation research indicated that, above 33 pounds of milk, cows grazing on pasture were able to produce only 65 percent of expected milk yield. The difference between expected and actual milk production indicated that there was a shortfall in energy input from forage alone to meet the milk production requirements.

The same review reported that research since 1990 has shown a large positive response to supplementation, probably because of the increasing genetic merit of the cow for milk production. When feeding supplements, be aware that they can have an effect on milk components. Generally, as milk yield rises with increased supplementation, protein content will also rise, and milk fat will decline; however, the response is variable. In a study of 76 New York grazing dairies, Grace (1998)

reported that the more-profitable operations fed more supplemental grain than the less-profitable ones. The more-profitable operations fed an average of 17.4 pounds of grain, while the less-profitable ones fed an average of only 12.6 pounds of grain.

Seasonal Dairies

In some cases, graziers will manage the herd so that all the cows are dry at the same time, typically for a short, two-month period when pastures are limited or when supplemental feeding would be prohibitively costly for lactating cows. The challenge with a seasonal operation is getting cows to calve at about the same time, in a relatively narrow calving interval so that they are dry over the same period each year. It also means selling productive cows that do not conform to calving period. A seasonal calving approach may increase the number of cull cows compared to a year-round milking operation. Selling functional milk cows may generate more income than selling a cull cow for beef, but the loss of a capital asset can have a negative impact on the bottom line. This is especially true if there is not another cow available to replace her milk production, or if considerable resources have been put into developing the milk cow, only to have someone else harvest the return. Winsten and Petrucci (2000), in a study of 6 seasonal dairies, reported that culls for beef ranged from 10 to 20 percent per farm, with an additional 10 to 20 percent of cows being culled for reasons related to the seasonal calving period on the farms.

Because the goal of seasonality is to maximize production from pasture forages, it is essential that the dry period coincide with the time of year when pastures are typically poorest. In some areas of the U.S., the best time to dry the cows off may be winter; in others, it may be the middle of the summer. The seasonal grazier should also attempt to match the period of maximum forage production with the period of maximum milk production, since to produce milk you need ample amounts of forage. Remember too that milk prices follow a seasonal pattern, being lower in the spring, rising through the summer, and peaking during the winter. Having the dry period and no milk sales at a time of year when prices are highest could have a significant negative impact on overall income.

Seasonal production exaggerates seasonal milk price fluctuations. The low milk prices characteristic of spring must be offset by substantially reducing the cost of production by producing more milk on the cheapest feed possible, mainly the lush spring growth of pasture forages (Miller, 1994). In an analysis of seasonal milk prices in Virginia, Groover (2000) reported that the net difference between seasonal production and year-round production would be only $756 or about 1 percent of gross milk sales based on 1987 to 1997 prices. However, this study assumed that milk production per cow was similar for both conventional and seasonal dairies. The seasonal dairy produced milk for only ten months, with a definite peak in total herd milk production in May; while the conventional herd had production levels that varied little throughout the year. Therefore, the low-price months were compensated for with increased volumes of milk, to help offset potential income loss during the two months of the year with no milk production. Since the study compared conventional dairy operations, if one were to add the lower production levels associated with grazing into the mix, this small difference might grow to be quite large. The Groover study looked only at the impact of milk prices on conventionally operated, seasonal dairies. When Kriegl (2001a) evaluated a subset of graziers in Wisconsin, only one of the fully seasonal farms generated enough income to satisfy family living in each of the five years evaluated.

There are some other issues to consider when evaluating a seasonal operation. The daily workload can change drastically. When cows are dry, the daily labor requirement is low, but during calving season, the labor demand can more than triple. Not only will calving require attention, but milk output will also increase, and shortly thereafter, milk production will peak. This peak may require additional

storage capacity beyond what an average farm with stable, year-round milk production would require. Some capital assets, such as calf rearing facilities, will be used only for a short period, but must be large to accommodate all the calves at once. Finally, as discussed earlier, with seasonal production come seasonal milk checks. Will the farm's cash flow survive the periods of the year with no milk check? This alone warrants analysis to determine whether seasonal production is viable for you. While many consider seasonal dairying a low-input technique, because it requires less harvested forage with the herd being dry during most of the non-grazing season, there are many important points that must be considered before making such a major management change. The conclusion about seasonal dairy operations is that one should carefully consider all the ramifications of making such a transition. While there are many positives, such as changing work demands and the opportunity for a vacation, there may also be some negatives, such as reduced cash flow during the dry months, and under-utilization of capital assets. As stated previously by Kreigl (2001a), NFIFO/cow nearly doubled when graziers did not use seasonal production in Wisconsin during the five-year period studied.

IN CONVERSATION WITH GRAZING DAIRY PRODUCERS, ALMOST ALL STATED THAT THEY ENJOYED THE LIFESTYLE, THE TYPE OF MANAGEMENT, AND THE LOWER STRESS LEVEL THAT CAME WITH GRAZING, AND WOULD NEVER RETURN TO A CONVENTIONAL DAIRY OPERATION.

Labor

Grazing has often been touted as requiring much less labor than conventional dairying. In some cases, this may be true, but in many cases, the labor hours worked by managers and other family members may not be drastically different. Ostrum and Jackson-Smith (2000) reported in a 1993 survey of Wisconsin dairy operations that labor on grazing dairies averaged 102 hours per week, compared to conventional dairy labor forces that worked more than 148 hours per week. The grazing operations reported an average of five hours per week of non-family labor, whereas conventional dairies reported more than 30 hours of labor per week by non-family workers. However, when the data were corrected for farm size and evaluated based on labor hours per cow, the grazing dairies used slightly more labor than the conventional dairies, at 3.03 and 2.87 hours per cow per week, respectively. This trend of more hours per cow milked, but fewer overall hours and less non-family labor, also held true for grazing dairies in a similar 1994 survey report by Jackson-Smith et al. (1996).

In a 1999 comparison of conventional and grazing dairies in Michigan, however, the trend was reversed with regard to hours worked per cow (Nott, 2000). When farms of similar size were compared, conventional farms averaging 98.5 cows per farm and the grazing dairies with 94.4 cows per farm, the annual labor hours per cow were 83.9 and 75.8, respectively. Of interest in this report is that when the grazing group was divided in half by net farm income, the lower-income group averaged 91.2 hours per cow annually, whereas the higher-income group averaged only 69.3 hours per cow annually. The average herd size almost tripled between the two groups, with the lower-income group having an average herd of just 56.8 cows, versus the higher-income group milking an average herd of 132 cows. Even graziers have taken advantage of the economics of scale, realizing that, in certain situations, it takes the same amount of time to complete certain tasks no matter how many cows one has.

Certainly there is a lot of discussion about the labor savings possible with grazing operations. However, in the limited number of reports available with documented evidence, the number of hours worked by various types of dairy operations, based on size, indicates that there are no tremendous labor savings, at least not for the owner/operator. The savings in labor for graziers seems to come from the reduced need for hired labor to assist with mechanical harvest of forages and the feeding

of cows. However, this reduction in hired labor does not necessarily mean a reduction in overall labor or labor costs. Kriegl (2001b) reported on labor costs per cwt of milk — including non-dependant, unpaid, management, and other family labor — for five years in the Wisconsin dairies he studied, and he found that graziers had higher costs than conventional dairies. In one year the difference was as little as $0.15 per cwt of milk produced, in another it was as much as $0.78 per cwt of milk. During the five years, 1995 to 1999, graziers' labor costs exceeded conventional dairies' by an average of $0.57 per cwt of milk. In New York, total labor costs were $3.78 per cwt of milk sold. Hired labor accounts for $1.28 per cwt and the remainder for unpaid family labor and management (Conneman et al., 2001). To milk an average of 93 cows, these same farms had an average of 2.76 workers per farm, of which 1.35 was the operator/manager.

"The daily challenge of managing a grazing system, the cows, the forages, the people, is what makes the job so enjoyable. I don't miss the monotony of a conventional dairy at all."
– Tom Ormond, dairyman, New York

Profitability

The need for good financial management cannot be stressed enough, and the ability to see and evaluate the farm's economic situation is vital to good management. Several reports have documented the financial success of grazing operations. In a five-year financial comparison, Kreigl (2001b) found that graziers outpaced conventional farms in Wisconsin all five years in terms of net farm income from operations per cow (NFIFO/cow). This same five-year study found that graziers had less investment per cow and lower debt per cow, when compared to conventional dairy farms. On average, most graziers also produced less milk per cow, but some grazing operations were at the same level of milk production as their conventional counterparts, thereby dispelling the myth that you cannot get cows to produce milk on grass.

If we compare NFIFO per cwt of milk equivalent during the five years, graziers had the lead each year, with advantages ranging from $1.36 to $1.94. Some of the large differences in basic cash expenses between the two groups were related to chemicals, seeds and plants, and veterinary fees. In all three categories, graziers had less expense, in part because they used grazing resources more than harvested forages to produce milk. However, when comparing feed purchase costs per cwt of milk equivalent, graziers lost some ground and had higher costs for this item than their conventional counterparts.

In two other reports that use financial measures to compare similar-size grazing and conventional dairies in Michigan, both by Nott (2000), graziers again had less total cash expenditure for seed, chemicals, and veterinary services, and slightly greater cash expenses for purchased feed. The grazing operations in Michigan, while not a random group, do offer some interesting observations. While having financial ratios competitive with conventional farms in regard to return on assets, operating profit margin, and asset turnover, the grazing farms also had similar levels of total farm liability. However, the total assets for the grazing operations were less than half those of the conventional farms. Longevity of the business, transitional phase, and pre-existing debt could all be contributing factors to this large difference. What is most evident is that great variation exists among operations. When operations are sorted according to net farm income, there are large differences even within types of operations for most of the important financial benchmarks. Again, this lends evidence that management, and how management uses available resources, can have a large impact on farm performance and ultimately on profitability.

Earlier, return on assets (ROA) was proposed as a critical measure if one were to look only at a single number to evaluate an operation, but there are other measures that can be used for daily decision making. Income per cow is one such figure; it has been proposed by Sipiorski (1998) to be the number-one financial indicator

for dairy managers. On most operations, milk is 85 percent of income, and a profitable goal is $3000 of milk sales per cow per year. In Wisconsin (Kriegl, 2001a), graziers had cash income per cow ranging from a high of $4061 to a low of $913. What was interesting in this study is that the high-capital producers generated approximately $600 more income per cow in each of the four years of the study, than did to the low-capital farms. In evaluating six seasonal dairies across the country, Winsten and Petrucci (2000) found that net farm income per cow was generally less than $1000 per cow per year, with $600 to $700 being the average. When comparing pasture-based and conventional dairies in Missouri in 1998, Hamilton et al. (2000) reported $2265 and $2411 total income per cow, respectively. The pasture-based operations, while generating less income, also had fewer expenses per cow and were therefore able to generate a higher operating margin per cow. In New York (Conneman et al., 2001), on intensive grazing dairies, net farm income per cow without appreciation averaged $310 on 65 farms. On these same New York farms, there was a trend toward net farm income per cow increasing with increased levels of milk production.

The next key financial indicator that Sipiorski proposes is the operating expense ratio—the total production cost, minus depreciation and interest, divided by gross income. This number should be between 60 and 70 percent. Michigan results from 1999 had ratios of 67.6 percent and 63.1 percent for grazing operations and conventional farms, respectively (Nott, 2000). In Conneman's review (2001) on New York dairies, similar values can be found. When evaluating 17 above–average farms, the operating expense ratio was 67%, while the 13 below–average farms had levels at 81%.

Another key is the current ratio. This number is important in evaluating the ability of the business to cover short-term cash flow. Farms would like to have $2 of current assets to cover every $1 in current liabilities, including current portions of intermediate and long-term debt. The larger this number the better, within reason. Ideally, any number above two is what most lenders and financial consultants consider a strong position. Grazing operations in Michigan had current ratios of 1.70 for the entire group; however, the producers with higher net farm incomes had current ratios of 1.92, while farms with lower net farm incomes had a current ratio of 1.30 (Nott, 2000). The lower ratio indicates that some of these farms may have difficulty keeping short-term cash flow current. The same scenario was repeated in New York dairies (Conneman et al., 2001), with above-average farms increasing their current ratio from 1.47 in 1999 to 1.69 in 2000. The below-average farms decreased their current ratios; in fact, the ratio on these farms slipped below 1.0, indicating a potential cash flow problem in the near future.

FARMERS REPLY TO THE QUESTION: "WHAT FINANCIAL NUMBERS DO YOU CONSIDER THE MOST IMPORTANT TO YOUR OPERATION?"

BILL PATTERSON, VA – **"THE TWO NUMBERS WE LOOK AT THE MOST ARE TOTAL NET FARM INCOME AND THE INCOME-EXPENSE RATIO."**

DON MAYER, AR – **"NET RETURN AND NET INCOME PER COW, WITH A TARGET OF $750 NET INCOME PER COW."**

GARY BURLEY, NY – **"RETURN ON EQUITY AND COST OF PRODUCTION PER CWT OF MILK."**

DAVE FORGEY, IN – **"NET FARM INCOME IS IMPORTANT BUT WE LOOK CLOSELY AT ROA AND IN 2000 THAT NUMBER WAS 11.32%."**

One financial figure that most dairymen probably know off the tops of their heads is the price received per cwt of milk. The challenge is to know what the cost of producing that cwt of milk really is, so that on a daily basis we can make decisions to ensure a positive margin between the two. The calculation of this number is more than simply the cash expenses divided by the total cwts of milk produced. The expenses must be adjusted for accounts payable, prepaid expenses, family living costs, taxes, and depreciation. Then other farm income items, such as cull cows, inventory adjustments, valuation adjustments, and government payments must be subtracted to get adjusted expenses. The adjusted expenses can then be divided by the cwts of milk produced to get a true cost of production. Obviously, the lower the number the better.

Debt per cow is another important consideration; it has been suggested that debt per cow be no greater than $3000 per cow (Sipiorski, 1998). In Michigan, graziers reported an average debt per cow of $2308 in 1999 (Nott, 2000), while in Wisconsin, graziers reported $1964 debt per cow in the same year (Kreigl, 2001a). New York graziers had an average $2149 debt per cow on 65 dairies in 2000, with a subset of 17 above–average farms having lower debt per cow of $1475, and 13 below–average farms had a higher debt per cow of $2341 (Conneman et al., 2001).

Other Profitability Factors

Some others items that have been found to enhance profitability, or at least differ on more–profitable versus less–profitable grazing dairies, is the availability of water. In addition, Jim Grace (1998) found that among New York graziers, farms that were more profitable produced over 4,000 pounds more milk, with an operating cost per cwt of almost $4 less. This resulted in a net farm income per cow that was $870 different, $729 and negative $141 for high-profit dairies versus low-profit dairies, respectively. More grain was fed to the high-profit herds versus the low-profit herds. In addition, more pasture had been reseeded in the past ten years for the high-profit herds versus the low-profit herds.

> **"I think that one of the important things about rotational grazing is that every day of the grazing season you should be turning a cow into a pasture that's about 8 inches tall, of consistent, high density, so that every mouthful that cow takes every day of her life is the same. You say, 'Well, how do I do that? Grass is growing all the time.' And that's the management strategy of rotational grazing. You need to set up a rotation early in the season, to where every paddock is maturing at a different day."**
> -Dave Forgey, grazing dairy farmer, Indiana

The most interesting point in this report is the impact of water availability on milk production and profitability. Sixty-seven percent of the more-profitable farms had water available in every paddock, versus only 22 percent of the less-profitable farms. The two-thirds of high-profit farms that offered water in every paddock produced 3,000 more pounds of milk than high-profit farms that didn't offer water, resulting in $246 more net farm income per cow, and lower operating cost per cwt milk. The difference between the high-profit farms offering water and low-profit farms not offering water was even greater for the same criteria. High-profit herds with water, produced about 5,500 pounds more milk, had a positive net farm income per cow, and produced milk for $4.69 less per cwt, while the low-profit, no-water herds had a loss of $174 per cow. Among the more-profitable farms, those that rotated cows onto fresh pasture after each milking produced 4,000 pounds more milk per cow than those that rotated onto fresh pasture only once a day.

Earlier discussion pointed out the importance of ROA as a financial indicator. In a comparison of correlations between ROA and other components of profitability, correlations were higher for measures related to income generation than for measures related to either

operation cost control or investment/debt control in Wisconsin grazing operations. The study concluded that the inability to generate income caused more of the difference in profitability between the most– and least–profitable graziers than did considerations of operating cost control or control of investment/debt (Kreigl, 1999).

While none of these indicators alone will guarantee success or failure, when taken collectively they can help managers to assess accurately the direction the business is headed, and thereby make better decisions regarding future directions and emphases.

Summary

In the dairy business, management skill is what will ultimately decide the outcome. That skill requires a keen sense of biology, attention to accounting, and analytical prowess to get the result that was planned. The grazing dairy manager requires no less skill simply because the farm may not have the latest line of 4WD tractors or the largest combine. Graziers have to do the same daily balancing act that occurs on most farms — after all, when dealing with a biological system, everything is subject to change.

> **"The critical factors of our success are planning ahead, staying focused, and continually seeking out educational opportunities to learn new things."**
> – Gary Burley, dairyman grazing 400 cows seasonally, New York

Having an understanding of accounting, or working with someone trustworthy who knows cash accounting very well, can be of great assistance to the grazier. Successful farm managers need a keen understanding of the farm's finances to ensure that the farm prospers. The job of managing a dairy operation is no different from running a retail or manufacturing business, except that the work goes on every day, in all types of weather, all year long. If the farm manager is going to be competitive, meet obligations to creditors, raise a family, and have opportunity to enjoy the effort invested, sound financial management is critical.

> **"We concentrate on being effective versus efficient, and if we're doing it right, 100 cows is only part time."**
> – Bruce Rivington, dairy grazier, New York

To emphasize a point made earlier: several studies have found that the "lowest cost" producer is not necessarily the most profitable. The farms that generated higher returns with the dollars invested—in other words, those with the greatest *financial efficiency* – tended to make the most profit. *Rather than cutting all expenses, focus on cutting the right expenses*. Cadwallander (1998) found that the top third of grazing dairies, based on net farm income, had higher expenses for feed than the bottom third, but spent less on interest. The top third shipped more milk, got a higher price per cwt, and had lower cash expenses per cwt than the bottom third of farms. The most important feature was that profitability was enhanced by putting emphasis on milk. Debt can go down and net worth can increase as long as money is put into things that have a direct impact on making milk.

As stated earlier, no single number can tell you everything, and no single production practice can guarantee positive results. Rather, the intelligent use of the various tools available is what determines the overall success or failure of the system. Operating a grazing dairy is only one means to an end, but if you want to be successful, financial management is not only a tool to have in the box, it's a tool that needs to be used.

The management of grass-based dairy operations is different from that of conventional dairies. Grazing should not be considered as an option to make up for poor management of a conventional dairy. Relative

to time spent managing conventional row crops, graziers spend more of their time monitoring and managing grass. While many successful graziers do grow corn silage and other crops for harvest or feed when pasture may be unavailable or limited, their focus is still on maximizing forage production *for harvest by cows*. Grazing managers spend more time observing and planning the next step to take than do many conventional dairy managers, whose time is spent primarily on operating machinery, making repairs, and feeding cows. Most graziers, as their experience and knowledge of the productivity of available resources expands, will increase the grazing season to maximize the number of days the cows are meeting their intake needs on pasture.

Other Sources of Information

To take a virtual farm tour of a grazing dairy operation, visit Dave Forgey's dairy operation in Indiana by stopping by the farm web site at **http://www.carlnet.org/~forgraze/**

Purdue Pasture Management guide: **http://www.agry.purdue.edu/ext/forages/rotational/pastures/pasture.html**

Great Lakes Grazing Network: **http://www.glgn.org/**

Grassfarmer.com, a comprehensive information site on grass-based farming systems from American Farmland Trust: **http://grassfarmer.com/**

The University of Wisconsin Center for Dairy Profitability: **http://cdp.wisc.edu/**

Pro-Dairy at Cornell University: **http://www.ansci.cornell.edu/prodairy/index.html**

Owenlea Farms, home of F.W. Owens, grazing Holsteins in Ohio: **http://www.bright.net/~fwo/index.html**

Measuring & Analyzing Farm Financial Performance: **http://www.agecon.purdue.edu/extensio/finance/**

Business Management Concepts: **http://www.ag.ohio-state.edu/~mgtexcel/**

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