

# **IDENTIFYING BOTTLENECKS IN YOUR BUSINESS**

Wayne A. Knoblauch  
Professor

and

Linda D. Putnam  
Extension Support Specialist

Dyson School of Applied Economics and Management  
Cornell University

## **Introduction**

Before a recommendation can be made regarding where a dairy farm business can improve, it must first be determined what the business is striving to accomplish. A mission statement is very helpful in this respect as a mission statement will describe why the farm exists. An example mission statement is “Our mission is to produce and market high quality milk in sufficient quantities to provide a good standard of living for our family. The business should also be sufficiently profitable to provide above average compensation for employees and long term security for our family”. The above mission statement will not be right for all farms and mission statements will change over time as the age of the operator increases and family situation changes. An analysis of a farm business is most useful to the manager when the mission is known and thereby conveys to the evaluator what the business wants to accomplish.

The objectives of the farm are also of value to the evaluator because they more specifically state business direction. Objectives are general, challenging and untimed directions for the business. Example objectives might be to build net worth, increase profits and allow more time for personal and family activities.

Operating a profitable dairy farm business requires that the factors of production such as land, labor and capital be combined and managed to achieve a value of production that is greater than the cost of production. There are numerous ways to accomplish a profit in dairying; striving for high output per cow but with corresponding costs, low output per cow but with low costs or high output per cow with low costs. The latter category, high output with low costs is a characteristic of most of the highly profitable dairy farms.

## **Evaluating a Dairy Farm Business**

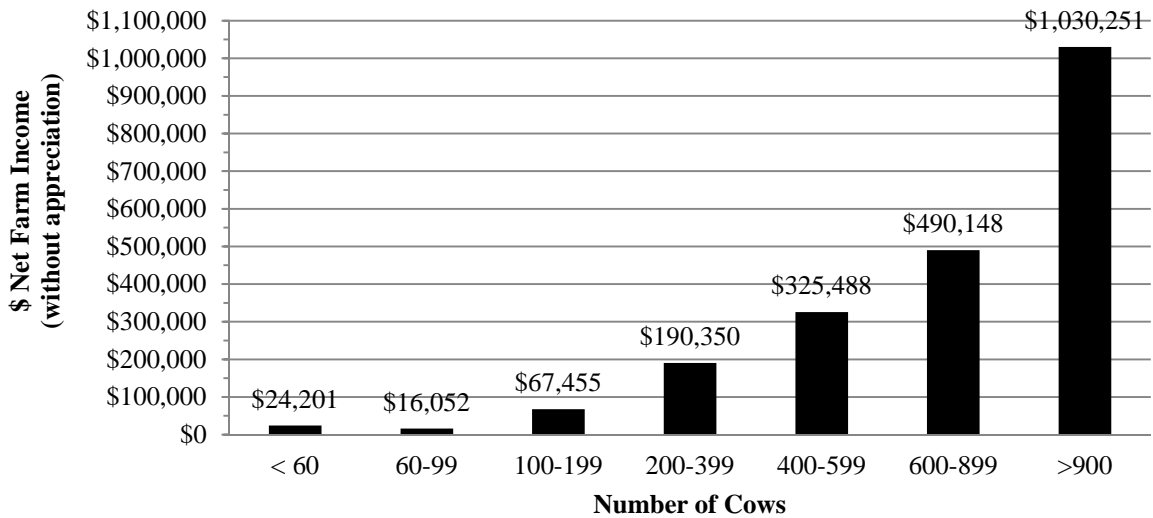
Evaluating a business to determine areas for improvement can be accomplished in the most simple terms by ascertaining if the business has 1) an adequate herd size, 2) excellent rates of production, 3) high labor efficiency, 4) stringent cost control and 5) strong financial position. Again, the evaluation should be set within the context of the mission and objectives of the farm family.

## Farm Size

The question to be answered when examining the size of a dairy farm is “Is size of the farm sufficient to meet the family mission and objectives”? Or if the objective of the family is to increase profitability, is the size of the business a limiting factor?

There is a strong and well established relationship between farm size and farm income on well managed farms. Net farm income without appreciation generally increases as size of herd increases, ranging from about \$16,000 on farms with 60 to 99 cows to over \$1,030,000 on farms with more than 900 cows. See Figure 1.

**Figure 1. NET FARM INCOME (WITHOUT APPRECIATION) BY HERD SIZE  
204 New York Dairy Farms, 2010**



Source: Dairy Farm Management Business Summary, New York State, 2010.

In 1918, George F. Warren made an insightful observation regarding the relationship between farm size and income. “Not only are average incomes much larger on larger farms, but the chances of making a good profit are much better. However, no farm is large enough to ensure a profit.”

## Rate of Production

Achieving high rates of milk production per cow does not guarantee a profit, but on average, farms with higher rates of production do achieve higher incomes. As pounds of milk sold per cow increase, net farm income, net farm income per cow and labor and management income per operator generally increase. See Table 1.

Profitability measured as net farm income per cow rather than per farm removes the influence of herd size and also shows a positive relationship with milk sold per cow. Net farm income per cow fluctuates on farms with up to 22,000 pounds milk sold per cow. There is an upward trend in net farm income per cow when milk output increases over 22,000 pounds per cow. Fourteen of the 33 farms that achieved \$1,000 or more of net farm income per cow sold more than 26,000 pounds of milk per cow.

**Table 1. MILK SOLD PER COW AND FARM INCOME MEASURES  
204 New York Dairy Farms, 2010**

| Pounds of Milk Sold Per Cow | Number of Farms | Average Number of Cows | Net Farm Income without Appreciation | Net Farm Income Per Cow | Labor & Management Income Per Operator |
|-----------------------------|-----------------|------------------------|--------------------------------------|-------------------------|--|
| Under 16,000                | 18              | 162                    | \$72,970                             | \$451                   | \$14,811                               |
| 16,000 to 17,999            | 20              | 148                    | 41,659                               | 282                     | -3,901                                 |
| 18,000 to 19,999            | 15              | 117                    | 54,870                               | 467                     | 5,017                                  |
| 20,000 to 21,999            | 30              | 219                    | 137,234                              | 626                     | 17,213                                 |
| 22,000 to 23,999            | 36              | 503                    | 225,914                              | 449                     | 51,518                                 |
| 24,000 to 25,999            | 40              | 716                    | 448,328                              | 626                     | 131,726                                |
| 26,000 & over               | 45              | 861                    | 743,325                              | 863                     | 250,338                                |

Source: Dairy Farm Management Business Summary, New York State, 2010.

### Labor Efficiency

Labor efficiency is a measure of the amount of work done, on average, by one full time equivalent worker. A full time equivalent worker is considered to represent 230 hours of work per month. The labor efficiency measure used here is pounds of milk sold per worker. As can be seen from Table 2, as pounds of milk sold per worker increases, so does net farm income and labor and management income per operator.

**Table 2. MILK SOLD PER WORKER AND NET FARM INCOME  
204 New York Dairy Farms, 2010**

| Pounds of Milk Sold Per Worker | Number of Farms | Number of Cows | Pounds Milk Sold Per Cow | Net Farm Income (without appreciation) | Labor & Management Income Per Operator |
|--------------------------------|-----------------|----------------|--------------------------|--|--|
| Under 500,000                  | 24              | 67             | 15,643                   | \$3,383                                | \$-26,615                              |
| 500,000 to 699,999             | 43              | 140            | 20,027                   | 75,306                                 | 8,479                                  |
| 700,000 to 899,999             | 29              | 235            | 22,668                   | 98,272                                 | 6,835                                  |
| 900,000 to 1,099,999           | 50              | 546            | 24,114                   | 299,803                                | 83,062                                 |
| 1,100,000 & over               | 58              | 1,000          | 25,620                   | 783,500                                | 243,684                                |

Source: Dairy Farm Management Business Summary, New York State, 2010.

In a stanchion barn, labor efficiency should be 600,000 pounds of milk sold per worker or higher. Small freestall barns should achieve 800,000 pounds per worker or higher and large freestall barns over 1,000,000 pounds of milk sold per worker.

## Cost Control

Cost control is very important in operating a profitable dairy farm. If the three major costs in operating a business are under control, some of the smaller expense categories can be slightly higher and not seriously impact overall profit. The three largest cost categories on a dairy farm are purchased feed, hired labor, and milk marketing expense; with machinery repairs a close fourth. In this analysis, purchased feed and crop production expense per hundredweight of milk and machinery costs will be discussed. Hired labor was discussed under the category of labor efficiency.

Purchased feed and crop expense per hundredweight of milk is one of the most useful feed cost measures because it accounts for some of the variations in feeding and cropping programs, and milk production between herds. It includes all purchased feeds used on the farm, and it includes crop expenses that are associated with feed production.

On the average, farms with purchased feed and crop expenses exceeding \$6.50 per hundredweight of milk sold reported below average farm profits. Farms reporting less than \$6.50 per hundredweight showed above average profits. However, reducing feed and crop expenses does not necessarily lead to higher profits particularly when milk output per cow falls below average. See Table 3.

**Table 3. PURCHASED FEED AND CROP EXPENSE PER HUNDREDWEIGHT OF MILK AND FARM INCOME MEASURES  
204 New York Dairy Farms, 2010**

| Feed & Crop Expense Per Cwt. of Milk | Number of Farms | Number of Cows | Forage Dry Matter Harvested Per Cow | Pounds Milk Per Cow | Net Farm Income Without Appreciation | Labor & Management Income Per Operator |
|--------------------------------------|-----------------|----------------|-------------------------------------|---------------------|--------------------------------------|--|
| \$7.50 or more                       | 36              | 194            | 7.2                                 | 20,139              | \$57,308                             | \$3,103                                |
| 7.00 to 7.49                         | 19              | 657            | 7.9                                 | 25,185              | 278,556                              | 52,773                                 |
| 6.50 to 6.99                         | 36              | 512            | 7.6                                 | 23,930              | 249,095                              | 57,433                                 |
| 6.00 to 6.49                         | 50              | 558            | 8.9                                 | 25,640              | 378,838                              | 117,031                                |
| 5.50 to 6.00                         | 35              | 570            | 8.1                                 | 24,422              | 479,057                              | 173,201                                |
| Less than 5.50                       | 28              | 499            | 8.7                                 | 24,715              | 520,373                              | 170,532                                |

Source: Dairy Farm Management Business Summary, New York State, 2010.

Most machinery costs are associated with crop production and should be analyzed with the crop enterprise. Total machinery expenses include the major fixed costs (interest and depreciation), as well as the accrual operating costs. Machinery costs have not been allocated to individual crops, but they are calculated per total tillable acre. See Table 4.

Controlling machinery costs can have a significant impact on profitability. Machinery costs should be evaluated along with labor efficiency. If machinery costs are high, as a result of use of labor saving technologies, then a high labor efficiency must result to offset the high machinery costs.

**Table 4. ACCRUAL MACHINERY EXPENSES  
204 New York Dairy Farms, 2010**

| Machinery<br>Expense Item              | Average 204 Farms |                      | Average Top 10% Farms* |                      |
|--|-------------------|----------------------|------------------------|----------------------|
|  | Total<br>Expenses | Per Tillable<br>Acre | Total<br>Expenses      | Per Tillable<br>Acre |
| Fuel, oil & grease                     | \$ 77,362         | \$78.38              | \$ 113,943             | \$77.88              |
| Machinery repairs & vehicle<br>expense | 95,391            | 96.65                | 142,408                | 97.34                |
| Machine hire, rent & lease             | 43,316            | 43.89                | 78,084                 | 53.37                |
| Interest (5%)                          | 38,367            | 38.87                | 51,924                 | 35.49                |
| Depreciation                           | <u>94,106</u>     | <u>95.35</u>         | <u>90,459</u>          | <u>61.83</u>         |
| Total                                  | \$348,542         | \$353.14             | \$476,818              | \$325.91             |

\*Average of 20 farms with highest rates of return to all capital (without appreciation).

Source: Dairy Farm Management Business Summary, New York State, 2010.

## Financial Position

Farm debt per cow should be below \$3,500. Businesses that have been in operation for many years without an increase in herd size should have a very low debt per cow, below \$1,000. Total farm investment per cow (market value) should be less than \$9,000 and for large dairy farms \$8,000 or less. See Table 7.

## Farm Business Charts

For a complete analysis of the business, a farm business chart can be very useful. The Farm Business Chart is a tool which can be used in analyzing a business by drawing a line through the figure in each column which represents the current level of management performance. The figure at the top of each column is the average of the top 10 percent of the 204 farms for that factor. The other figures in each column are the average for the second 10 percent, third 10 percent, etc. Each column of the chart is independent of the others. The farms which are in the top 10 percent for one factor would not necessarily be the same farms which make up the 10 percent for any other factor. See Tables 5 and 6.

The cost control factors are ranked from low to high, but the lowest cost is not necessarily the most profitable. In some cases, the “best” management position is somewhere near the middle or average. Many things affect the level of costs, and must be taken into account when analyzing the factors.

**Table 5. FARM BUSINESS CHART FOR FARM MANAGEMENT COOPERATORS  
204 New York Dairy Farms, 2010**

| Size of Business     |                             |                         | Rates of Production             |                              |                                    | Labor Efficiency |                             |
|----------------------|-----------------------------|-------------------------|---------------------------------|------------------------------|------------------------------------|------------------|-----------------------------|
| Worker Equivalent    | No. of Cows                 | Pounds Milk Sold        | Pounds Milk Sold Per Cow        | Tons Hay Crop DM/Acre        | Tons Corn Silage Per Acre          | Cows Per Worker  | Pounds Milk Sold Per Worker |
| 34.6                 | 1,715                       | 44,507,767              | 28,024                          | 5.9                          | 27                                 | 65               | 1,496,743                   |
| 21.9                 | 992                         | 25,065,046              | 26,486                          | 4.4                          | 23                                 | 51               | 1,239,084                   |
| 16.5                 | 722                         | 18,382,622              | 25,611                          | 4.0                          | 22                                 | 48               | 1,131,389                   |
| 12.4                 | 548                         | 12,786,314              | 24,763                          | 3.7                          | 20                                 | 44               | 1,052,995                   |
| 8.3                  | 385                         | 8,896,608               | 23,569                          | 3.4                          | 19                                 | 42               | 991,796                     |
| -----                |                             |                         |                                 |                              |                                    |                  |                             |
| 5.7                  | 233                         | 5,098,220               | 22,603                          | 3.1                          | 18                                 | 38               | 888,445                     |
| 4.3                  | 150                         | 2,980,442               | 21,295                          | 2.7                          | 18                                 | 36               | 749,166                     |
| 3.2                  | 105                         | 1,958,629               | 19,859                          | 2.2                          | 17                                 | 32               | 656,722                     |
| 2.4                  | 70                          | 1,322,994               | 17,279                          | 1.9                          | 15                                 | 29               | 530,202                     |
| 1.7                  | 46                          | 824,194                 | 13,227                          | 1.3                          | 11                                 | 21               | 361,659                     |
| -----                |                             |                         |                                 |                              |                                    |                  |                             |
| Cost Control         |                             |                         |                                 |                              |                                    |                  |                             |
| Grain Bought Per Cow | % Grain is of Milk Receipts | Machinery Costs Per Cow | Labor & Machinery Costs Per Cow | Feed & Crop Expenses Per Cow | Feed & Crop Expenses Per Cwt. Milk |                  |                             |
| \$569                | 18%                         | \$427                   | \$1,019                         | \$800                        | \$4.47                             |                  |                             |
| 846                  | 23                          | 561                     | 1,292                           | 1,114                        | 5.53                               |                  |                             |
| 967                  | 26                          | 623                     | 1,394                           | 1,251                        | 5.86                               |                  |                             |
| 1,079                | 27                          | 671                     | 1,478                           | 1,363                        | 6.10                               |                  |                             |
| 1,169                | 29                          | 717                     | 1,531                           | 1,452                        | 6.33                               |                  |                             |
| -----                |                             |                         |                                 |                              |                                    |                  |                             |
| 1,234                | 30                          | 755                     | 1,603                           | 1,518                        | 6.53                               |                  |                             |
| 1,288                | 31                          | 803                     | 1,661                           | 1,595                        | 6.79                               |                  |                             |
| 1,357                | 33                          | 872                     | 1,796                           | 1,677                        | 7.14                               |                  |                             |
| 1,436                | 35                          | 954                     | 1,951                           | 1,782                        | 7.76                               |                  |                             |
| 1,575                | 41                          | 1,164                   | 2,354                           | 2,007                        | 9.55                               |                  |                             |

Source: Dairy Farm Management Business Summary, New York State, 2010.

The next section of the Farm Business Chart provides for comparative analysis of the value and costs of dairy production.

The profitability section shows the variation in farm income by decile and enables a dairy farmer to determine where he or she ranks by using several measures of farm profitability. Remember that each column is independently established and the farms making up the top decile in the first column will not necessarily be on the top of any other column. The dairy farmer who ranks at or near the top of most of these columns is in a very enviable position.

**Table 6. FARM BUSINESS CHART FOR FARM MANAGEMENT COOPERATORS  
204 New York Dairy Farms, 2010**

| Milk Receipts Per Cow                | Milk Receipts Per Cwt. | Operating Cost Milk Production Per Cow | Operating Cost Milk Production Per Cwt. | Total Cost Milk Production Per Cow | Total Cost Milk Production Per Cwt. |              |
|--------------------------------------|------------------------|--|---|------------------------------------|-------------------------------------|--------------|
| \$5,056                              | \$19.76                | \$1,742                                | \$10.09                                 | \$2,903                            | \$14.79                             |              |
| 4,718                                | 18.65                  | 2,307                                  | 11.64                                   | 3,547                              | 15.81                               |              |
| 4,520                                | 18.29                  | 2,647                                  | 12.46                                   | 3,786                              | 16.67                               |              |
| 4,370                                | 18.07                  | 2,898                                  | 13.16                                   | 3,958                              | 17.45                               |              |
| 4,189                                | 17.85                  | 3,081                                  | 13.74                                   | 4,116                              | 17.83                               |              |
| -----                                |                        |  |   |                                    |                                     |              |
| 4,013                                | 17.71                  | 3,246                                  | 14.13                                   | 4,265                              | 18.76                               |              |
| 3,778                                | 17.52                  | 3,428                                  | 14.66                                   | 4,442                              | 19.67                               |              |
| 3,491                                | 17.31                  | 3,612                                  | 15.43                                   | 4,625                              | 21.11                               |              |
| 3,125                                | 17.03                  | 3,872                                  | 16.60                                   | 4,863                              | 23.11                               |              |
| 2,402                                | 16.49                  | 4,272                                  | 19.05                                   | 5,330                              | 28.67                               |              |
| -----                                |                        |  |   |                                    |                                     |              |
| Profitability                        |                        |  |   |                                    |                                     |              |
| Net Farm Income Without Appreciation |                        |  | Net Farm Income With Appreciation       |                                    | Labor & Management Income           |              |
| Total                                | Per Cow                | Operations Ratio                       | Total                                   | Per Cow                            | Per Farm                            | Per Operator |
| \$1,585,864                          | \$1,366                | 0.29                                   | \$1,900,618                             | \$1,938                            | \$1,164,968                         | \$608,745    |
| 662,211                              | 1,070                  | 0.23                                   | 829,592                                 | 1,295                              | 422,477                             | 233,448      |
| 437,842                              | 874                    | 0.19                                   | 601,181                                 | 1,098                              | 263,930                             | 126,152      |
| 300,908                              | 754                    | 0.16                                   | 387,604                                 | 936                                | 140,197                             | 71,428       |
| 183,729                              | 653                    | 0.14                                   | 248,959                                 | 798                                | 79,500                              | 42,780       |
| -----                                |                        |  |   |                                    |                                     |              |
| 114,646                              | 542                    | 0.12                                   | 154,252                                 | 695                                | 41,512                              | 25,059       |
| 68,027                               | 409                    | 0.09                                   | 89,447                                  | 556                                | 8,766                               | 6,299        |
| 41,582                               | 278                    | 0.06                                   | 49,752                                  | 391                                | -14,134                             | -9,501       |
| 11,394                               | 97                     | 0.02                                   | 17,122                                  | 137                                | -46,357                             | -35,267      |
| -78,221                              | -466                   | -0.14                                  | -60,960                                 | -421                               | -166,013                            | -110,938     |

Source: Dairy Farm Management Business Summary, New York State, 2010.

The farm financial analysis chart, Table 7, is designed just like the farm business chart shown in Tables 5 and 6 and may be used to measure the financial health of the farm business.

**Table 7. FINANCIAL ANALYSIS CHART  
204 New York Dairy Farms, 2010**

| Liquidity/Repayment           |                                    |                          |                     |  |              |  |               |
|-------------------------------|------------------------------------|--------------------------|---------------------|--|--------------|--|---------------|
| Planned Debt Payments Per Cow | Available For Debt Service Per Cow | Cash Flow Coverage Ratio | Debt Coverage Ratio | Debt Payments as Percent of Milk Sales | Debt Per Cow | Working Capital as % of Total Expenses | Current Ratio |
| \$43                          | \$1,196                            | 7.39                     | 12.09               | 3%                                     | \$ 161       | 65%                                    | 32.07         |
| 236                           | 861                                | 2.17                     | 3.43                | 6                                      | 1,038        | 36                                     | 4.79          |
| 332                           | 741                                | 1.65                     | 2.33                | 8                                      | 1,871        | 28                                     | 3.30          |
| 448                           | 661                                | 1.42                     | 1.89                | 10                                     | 2,417        | 22                                     | 2.63          |
| 548                           | 595                                | 1.22                     | 1.59                | 12                                     | 2,904        | 18                                     | 2.18          |
| 632                           | 511                                | 1.05                     | 1.27                | 14                                     | 3,392        | 14                                     | 1.85          |
| 742                           | 433                                | 0.85                     | 1.00                | 15                                     | 3,900        | 11                                     | 1.50          |
| 858                           | 348                                | 0.73                     | 0.72                | 17                                     | 4,395        | 7                                      | 1.19          |
| 1,006                         | 206                                | 0.43                     | 0.23                | 20                                     | 5,065        | -2                                     | 0.85          |
| 1,601                         | -178                               | -0.59                    | -0.50               | 31                                     | 6,936        | -19                                    | 0.35          |

| Solvency        |                |                        |           | Operational Ratios      |                        |                            |
|-----------------|----------------|------------------------|-----------|-------------------------|------------------------|----------------------------|
| Leverage Ratio* | Percent Equity | Debt/Asset Ratio       |           | Operating Expense Ratio | Interest Expense Ratio | Depreciation Expense Ratio |
|                 |                | Current & Intermediate | Long Term |                         |                        |                            |
| 0.01            | 99%            | 0.02                   | 0.00      | 0.63                    | 0.00                   | 0.02                       |
| 0.12            | 90             | 0.10                   | 0.00      | 0.68                    | 0.01                   | 0.04                       |
| 0.23            | 82             | 0.18                   | 0.01      | 0.72                    | 0.01                   | 0.05                       |
| 0.30            | 78             | 0.25                   | 0.10      | 0.75                    | 0.02                   | 0.05                       |
| 0.44            | 72             | 0.31                   | 0.21      | 0.77                    | 0.02                   | 0.06                       |
| 0.61            | 63             | 0.37                   | 0.33      | 0.79                    | 0.03                   | 0.07                       |
| 0.72            | 59             | 0.42                   | 0.44      | 0.81                    | 0.04                   | 0.07                       |
| 0.87            | 54             | 0.50                   | 0.53      | 0.84                    | 0.04                   | 0.09                       |
| 1.17            | 47             | 0.60                   | 0.63      | 0.88                    | 0.05                   | 0.10                       |
| 3.03            | 33             | 0.79                   | 0.95      | 1.01                    | 0.09                   | 0.15                       |

\*Dollars of debt per dollar of equity, computed by dividing total liabilities by total equity.

Continued on next page.

**Table 7. Continued**

| Asset Turnover (ratio) | Efficiency (Capital)           |                              |                           | Change in Net Worth With Appreciation | Profitability                                |              |
|------------------------|--------------------------------|------------------------------|---------------------------|---------------------------------------|--|--------------|
|                        | Real Estate Investment Per Cow | Machinery Investment Per Cow | Total Farm Assets Per Cow |                                       | Percent Rate of Return With Appreciation on: |              |
|                        |                                |                              |                           |                                       | Equity                                       | Investment** |
| 0.82                   | \$1,796                        | \$616                        | \$5,927                   | \$1,559,343                           | 31%  | 19%          |
| 0.68                   | 2,600                          | 996                          | 7,238                     | 647,486                               | 17   | 12           |
| 0.62                   | 3,022                          | 1,324                        | 8,088                     | 436,905                               | 13   | 9            |
| 0.55                   | 3,332                          | 1,528                        | 8,673                     | 271,545                               | 10   | 8            |
| 0.52                   | 3,755                          | 1,719                        | 9,280                     | 163,158                               | 8  | 6            |
| 0.48                   | 4,207                          | 1,892                        | 9,915                     | 77,763                                | 5  | 5            |
| 0.44                   | 4,755                          | 2,109                        | 10,545                    | 37,984                                | 3  | 3            |
| 0.39                   | 5,643                          | 2,282                        | 11,585                    | 16,650                                | 0  | 1            |
| 0.31                   | 6,902                          | 2,710                        | 13,138                    | -4,658                                | -6   | -2           |
| 0.21                   | 11,328                         | 4,163                        | 18,676                    | -136,008                              | -42  | -10          |

\*\*Return on all farm capital (no deduction for interest paid) divided by total farm assets.

Source: Dairy Farm Management Business Summary, New York State, 2010.

### Conclusion

The saying “You can’t manage what you can’t measure” is equally valid in dairy farm management as it is in an industrial or commercial business. Effective managers measure the most important factors for success in their business, compare the values with the performance of similar businesses and set annual goals for improvement. The most effective goals are SMART. That is, they are Specific, Measurable, Attainable, Rewarding and Timed. Annually setting goals and then measuring progress towards goals is an important component of management. Research has shown that goals that are written are much more likely to be achieved than are goals that are only verbalized or goals that are not shared.

Evaluating a dairy farm business is not something to do once in a lifetime, but rather progress should be measured annually and new goals set for the following year. If a farm is not moving forward while other farms are, then the farm is moving backward relative to the industry. Performing an annual analysis and setting goals for the future is an excellent process to use in moving your business forward.