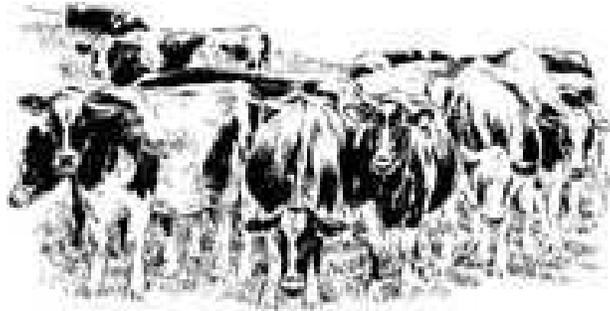


A UW-RIVER FALLS, UW-EXTENSION, AND CENTER FOR DAIRY PROFITABILITY REPORT

**Comparing High Profit, Medium Profit and Low Profit**  
**2003 Wisconsin AgFA Dairy Farms**

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## **I. ACKNOWLEDGEMENTS**

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## **II. INTRODUCTION**

This report presents the findings of a financial performance analysis of Wisconsin AgFA dairy farms for 2003. The farms were divided into three profitability categories—*High Profit Farms*, *Medium Profit Farms* and *Low Profit Farms*. The purpose of this report is threefold. The author hopes that this report:

- 1) generates a better understanding about the differences between profitable and less profitable Wisconsin AgFA dairy farms;
- 2) helps farm managers and other dairy industry stakeholders to understand how modest improvements can dramatically improve the financial performance of dairy farms; and,
- 3) serves as an impetus for dairy farm managers to make management decisions that will improve their quality of life and financial competitiveness.

## **III. DATA AND METHODS**

Data for this research was supplied by the UW-Extension's and the Center for Dairy Profitability's Agricultural Financial Advisor (AgFA) dataset. This financial dataset contains the financial statements, financial performance measures, and select production variables for participating Wisconsin dairy farms. After removing one farm from the dataset due to an apparent inputting error, there were 652 dairy farms in the sample.

The 652 farms were first ranked by Rate of Return on Assets (ROROA):

$$\text{ROROA} = \frac{(\text{Net Farm Income from Operations} + \text{Interest} - \text{Unpaid Labor and Management})}{(\text{Average Farm Assets})}$$

The ROROA was selected because it charges for unpaid labor, unlike the various Net Farm Income (NFI) and Net Farm Income from Operations (NFIO) measures. This allows farms with different unpaid labor levels to be compared more fairly. It was also selected over the very important Rate of Return to Equity

(ROROE) measure because the ROROA includes both the returns to equity (Net Farm Income From Operations) and debt holders (Interest). This makes the ROROA less affected by the differences in the relative equity level among farms.<sup>2</sup> Although the ROROA is often subject to problems associated with asset valuation extremes, this is less of a problem with this particular dataset due to its large sample size and suggested protocols for asset valuation.

The farms were placed into three profitability categories based upon their ROROA. The top 100 ROROA farms were placed into the *High Profit Farms* group. The 100 farms with the lowest ROROA were placed into the *Low Profit Farms* group. The remaining 452 farms were placed into the *Medium Profit Farms* group.

Each group of farms was then subjected to a DuPont Analysis. The DuPont Analysis links the ROROA to two other financial measures: the asset turnover (ATO), and the operating profit margin (OPM), using the following formula:

$$\text{ROROA} = \text{ATO} * \text{OPM}$$

Where:

$$\text{ATO} = (\text{Sales}^3) / (\text{Average Farm Assets})$$

And:

$$\text{OPM} = (\text{NFIO} + \text{Interest} - \text{Unpaid Labor and Management}) / (\text{Sales}).$$

The DuPont Analysis shows whether a farm's relative profitability (ROROA) is due to strengths or weaknesses in its assets' ability to generate sales (ATO) and/or its ability to profitably produce goods for sale (OPM). Sales and asset measures—such as the milk price received, milk shipped per cow, herd size, assets per cow—can be examined if the ATO is relatively strong or weak. Cost factors can be analyzed if a strong or weak ROROA seems to be due to OPM issues. The financial and production measure differences between the *High Profit Farms* and *Medium Profit Farms* as well as the *High Profit Farms* and *Low Profit Farms* were significantly different at a 95 percent confidence level, unless otherwise noted.

In the final aspect of this analysis, the effect of modest improvements in select performance variables on overall farm profitability were determined and reported for the *Medium Profit Farms*. This analysis was not conducted for the *Low Profit Farms*; nevertheless, it is assumed that the *Low Profit Farms* would enjoy financial improvements by enacting the same changes.

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<sup>2</sup> The ROROE equals (NFIO – Unpaid Labor and Management) / (Equity). Equity is calculated by subtracting average farm liabilities from average farm assets. Thus, two farms with similar asset, NFIO, and unpaid labor and management levels but different debt loads may have very different ROROE values.

<sup>3</sup> Sales is also commonly referred to as either Total Farm Income, Gross Farm Income, or Gross Farm Revenue in many farm financial recordkeeping systems.

#### IV. RESULTS AND CONCLUSIONS

##### IV-a. DuPont Analysis Results

The results of the 2003 DuPont Analysis are shown in Table 1. The average ROROA in 2003 was 12.4 percent for the *High Profit Farms*, 4.2 percent for the *Medium Profit Farms* and -5.04 percent for the *Low Profit Farms*. This means that for every dollar the farm owner and lender had invested in the typical *High Profit Farm*, they received roughly 12 cents in profit. The *Medium Profit Farms* experienced 4 cents of profit for every dollar invested in assets, and the *Low Profit Farms* lost 5 cents for every dollar invested in assets.

**Table 1. 2003 DuPont Analysis Comparison of High Profit, Medium Profit and Low Profit Farm Groups**

| DuPont Analysis Measure |         | High Profit Group (100 Farms) | Medium Profit Group (453 Farms) | Low Profit Group (100 Farms) |
|-------------------------|---------|-------------------------------|---------------------------------|------------------------------|
| ROROA                   | Average | 12.1 %                        | 4.1 %                           | -5.04 %                      |
|                         | Range   | 8.9 to 55.4 %                 | -0.9 to 8.9 %                   | -119.5 to -0.9 %             |
| ATO                     | Average | 0.52                          | 0.37                            | 0.34                         |
|                         | Range   | 0.15 to 2.53                  | 0.13 to 1.15                    | 0.06 to 1.56                 |
| OPM                     | Average | 23.3 %                        | 11.1 %                          | -20.9 %                      |
|                         | Range   | 7.5 to 78.2 %                 | -5.19 to 57.0 %                 | -887.0 to -2.86 %            |

Part of the discrepancy between the three groups' ROROA can be explained by differences in their relative sales efficiency, ATO (Table 1). On average, the *High Profit Farms* achieved an ATO of 0.57. This means that the *High Profit Farms* earned 57 cents in sales for every dollar that the farm owner and lender invested in the dairy farm. This was 15 cents higher than the *Medium Profit Farms* and 18 cents higher than the *Low Profit Farms*.

Another part of the ROROA difference can be explained by differences in the three farm groups' OPM (Table 1). The *High Profit Farms* earned 23 cents for every sales dollar in operating profits, even after accounting for unpaid labor. The *Medium Profit Farms* were still profitable at 11 cents for every dollar in sales, but the *Low Profit Farms* lost 21 cents on every sales dollar generated.

#### IV-b. Factors Affecting ATO

The *High Profit Farms*' ATO was greater than the *Medium* and *Low Profit Farms*' due in part to shipping more milk per cow per year (Table 2). The *High Profit Farms* shipped 1,108 pounds more milk per cow per year<sup>4</sup> (roughly three pounds per cow per day) than the *Medium Profit Farms*, and 3,928 more milk per cow per year (roughly 11 pounds per cow per day) than the *Low Profit Farms*. In addition to being better at producing more shipped milk per cow, the *High Profit Farms*—possibly through better milk

**Table 2. Factors Affecting ATO: Sales-Based Measures**

| Factors Affecting ATO                      |         | High Profit Farms<br>(100 Farms) | Medium Profit Farms<br>(452 Farms) | Low Profit Farms<br>(100 Farms) |
|--|---------|----------------------------------|------------------------------------|---------------------------------|
| Milk Shipped Per Cow<br>Per Year           | Average | 22,514 lbs                       | 21,406 lbs                         | 18,586 lbs                      |
|  | Range   | 13,235 to 30,770 lbs             | 9,479 to 31,434 lbs                | 5,696 to 24,289 lbs             |
| Milk Price Received<br>Per Hundredweight   | Average | \$13.18                          | \$12.87                            | \$12.64                         |
|  | Range   | \$9.55 to \$19.86                | \$6.59 to \$21.40                  | \$5.49 to \$18.80               |
| Milk Income Per Cow                        | Average | \$2,967                          | \$2,755                            | \$2,349                         |
| Milk Income as a<br>Percent of Sales       | Average | 76.5 %                           | 76.8 % <sup>1</sup>                | 82.3 % <sup>2</sup>             |
| Calf Income as a<br>Percent of Sales       | Average | 1.7 %                            | 2.5 %                              | 2.9 %                           |
| Calf Income Per Milk<br>Hundredweight      | Average | \$0.30                           | \$0.42                             | \$0.44 <sup>2</sup>             |
| Calf Income Per Cow                        | Average | \$67.29                          | \$90.40                            | \$82.08                         |
| Cull Income as a<br>Percent of Sales       | Average | 3.5 %                            | 4.2 %                              | 4.9 % <sup>2</sup>              |
| Cull Income Per Milk<br>Hundredweight      | Average | \$0.61                           | \$0.71 <sup>1</sup>                | \$0.75 <sup>2</sup>             |
| Cull Income Per Cow                        | Average | \$137.72                         | \$151.93 <sup>1</sup>              | \$139.47 <sup>2</sup>           |
| Crop Income as a<br>Percent of Sales       | Average | 2.33 %                           | 4.40 %                             | 4.39 %                          |
| Crop Income Per Milk<br>Hundredweight      | Average | \$0.40                           | \$0.74 <sup>1</sup>                | \$0.67 <sup>2</sup>             |
| Crop Income Per Cow                        | Average | \$90.48                          | \$157.74 <sup>1</sup>              | \$125.39 <sup>2</sup>           |
| Crop Income Per Acre                       | Average | \$38.08                          | \$48.74                            | \$41.12 <sup>2</sup>            |
| Government Income as<br>a Percent of Sales | Average | 5.43 %                           | 6.88 %                             | 8.55 %                          |
| Government Income<br>Per Hundredweight     | Average | \$0.94                           | \$1.15                             | \$1.31                          |
| Government Income<br>Per Cow               | Average | \$211.75                         | \$246.70                           | \$244.18                        |
| Government Income<br>Per Acre              | Average | \$88.69                          | \$76.22                            | \$80.07 <sup>2</sup>            |

<sup>1</sup> The difference between the High Profit Farms' and Medium Profit Farms' averages is not statistically significant.

<sup>2</sup> The difference between the High Profit Farms' and Low Profit Farms' averages is not statistically significant.

<sup>4</sup> Milked shipped per cow per year = (Pounds of milked shipped in 2003) / (Average herd size in 2003).

marketing plans, volume premiums, milk components, or milk quality—earned a milk price that was 31 cents per hundredweight higher than the *Medium Profit Farms*’ and 51 cents per hundredweight higher than the *Low Profit Farms*’. The *High Profit Farms* were also less reliant on calf, crop, and government income as compared to the *Medium* and *High Profit Farms* (Table 2). Cull cow income also made up a lower percentage of sales on the *High Profit Farms* than on the *Medium Profit Farms*.

Asset-based factors also affect ATO (Table 3). *High Profit Farms* tended to milk more cows. The *High Profit Farms* averaged 166 cows as compared to the *Medium Profit Farms*’ 116 cow average and the *Low Profit Farms*’ 92 cow average. The *High Profit Farms* also had fewer crop acres per cow than the *Medium* and *Low Profit Farms*.<sup>5</sup> On average, the *High Profit Farms* farmed 26 percent less crop acres per cow than the *Medium Profit Farms* and 22 percent less than the *Low Profit Farms*. The differences in crop acres per cow between the three groups of farms may indicate two things. First, despite the fact that 2003 offered good prices for corn and soybeans<sup>6</sup>, it may indicate that crop enterprises on average are less profitable than milking enterprises on these dairy farms. Second, it may indicate that the *High Profit Farms* are much more efficient at producing crops and simply do not require the same land mass as the less profitable farms.

**Table 3. Factors Affecting ATO: Asset-Based Measures**

| Factors Affecting ATO    |         | High Profit Farms<br>(100 Farms) | Medium Profit Farms<br>(452 Farms) | Low Profit Farms<br>(100 Farms) |
|--------------------------|---------|----------------------------------|------------------------------------|---------------------------------|
| Herd Size                | Average | 166                              | 118                                | 92                              |
|                          | Range   | 11 to 1,838                      | 40 to 1,100                        | 11 to 903                       |
| Total Crop Acres Per Cow | Average | 2.38                             | 3.24                               | 3.05                            |
|                          | Range   | 0.00 to 10.91                    | 0.00 to 23.06                      | 0.00 to 15.90                   |
| Forage Acres Per Cow     | Average | 1.39                             | 1.78                               | 1.61 <sup>1</sup>               |
|                          | Range   | 0.00 to 3.71                     | 0.00 to 4.56                       | 0.00 to 5.09                    |
| Assets per Cow           | Average | \$7,431                          | \$9,591                            | \$8,092 <sup>1</sup>            |
|                          | Range   | \$1,697 to \$21,697              | \$3,025 to \$39,419                | \$1,897 to \$26,195             |

<sup>1</sup> The difference between the High Profit Farms’ and Low Profit Farms’ averages is not statistically significant.

There were two other asset-based measures that may also help explain the difference between the *High* and *Medium Profit Farms*’ ATO, but not the difference in the *High* and *Low Profit Farms*’ ATO. First, the *Medium Profit Farms* on average had more forage acres per cow than the *High Profit Farms* (Table 3). This may indicate that the *Medium Profit Farms* were less efficient at generating forage for their

<sup>5</sup> Crop acres include both grain and forage acres.

<sup>6</sup> According to USDA-NASS data, the average price for corn and soybeans in Wisconsin during 2003 was \$2.35 and \$7.11 respectively. Both of these prices were the highest average annual prices for the period running from 1994 to 2004.

cattle, or that the *High Profit Farms* found it to be more efficient to purchase a portion of their cattle's forage requirements. Second, the *High Profit Farms* had a lower investment per cow than the *Medium Profit Farms*. On average, the assets per cow were \$2,160 lower on the *High Profit Farms* than on the *Medium Profit Farms*. While we have already determined that the *Medium Profit Farms* required more crop acres per cow, other explanations for this difference are possible:

- *High Profit Farms* rent more capital assets;
- *High Profit Farms* hold on to capital assets like tractors for longer time periods;
- *High Profit Farms* purchase more used equipment; and/or
- *High Profit Farms* utilize more custom hire services.

#### **IV-c. Factors Affecting OPM**

The results of a profit and cost efficiency analysis will be presented in this section. Although most profit and cost efficiency analyses typically use per head, per acre or per hundredweight bases (Table 5), this report's analysis primarily emphasizes expressing the profit and costs from a financial efficiency ratio basis, or, in other words, on a percent of sales basis (Table 4). This allows the profit and expense items to be expressed in terms of the sales they helped to create. Costs expressed on a per head or per hundredweight basis are also presented and used for supporting information.

To help illustrate the advantage of expressing profit and cost measures from a financial efficiency ratio perspective, assume that there are two farms, *A* and *B*. They are identical in every way except one. The manager of *Farm A* determined that it was more profitable to buy a byproduct grain and sold a larger proportion of the raised corn. On a per hundredweight or per head basis, the manager of *Farm A* would have higher purchased feed expenses. Nevertheless, the additional purchased feed enabled the manager to make additional profitable sales of corn. As such, *Farm A's* purchased feed expenses from a percent of sales basis should be lower than those of *Farm B's*. Examining the purchased feed as a percentage of sales will indicate if it was more profitable for *Farm A* to buy more purchased feed and sell more grain as compared to *Farm B*. Merely looking at it from a per head or per hundredweight basis would not.

Table 4 shows that the *High Profit Farms* had a NFIO financial efficiency ratio of roughly 23 percent. This indicates that these farms made 23 cents in NFIO for every dollar in sales the farm created. The *Medium Profit Farms* generated 12 cents of NFIO for every dollar of sales. The *Low Profit Farms* lost approximately 15 cents for every sales dollar generated.

By examining the major expense categories of total basic cost, depreciation, interest, and paid labor expense financial efficiency ratios, one can start to see why there is such a difference in the relative profitability between the three farm categories. There were statistically significant differences between all three farm categories with regards to the total basic cost and depreciation expense financial efficiency ratios (Table 4). There was also a statistically significant difference between the *High Profit Farms* and *Low Profit Farms* regarding the interest expense financial efficiency ratio. There was no significance difference between the three farm groups with regard to the paid labor expense ratio.

With regard to total basic cost expenditures, the *High Profit Farms* spent roughly 55 cents of every sales dollar on total basic costs (purchased feed, seed, fertilizer, utilities, etc.). The *Medium* and *Low Profit Farms* required approximately 61 and 80 cents of their sales dollars to pay for total basic cost items. This indicates that the managers of the *Medium* and *Low Profit Farms* were far less adept at generating sales with their basic inputs.

**Table 4. Factors Affecting OPM: Major Profit and Expense Financial Efficiency Ratios**

| Financial Efficiency Ratios Affecting OPM  |         | High Profit Farms<br>(100 Farms) | Medium Profit Farms<br>(452 Farms) | Low Profit Farms<br>(100 Farms) |
|--|---------|----------------------------------|------------------------------------|---------------------------------|
| NFIO as a Percent of Total Farm Income     | Average | 22.97 %                          | 11.59 %                            | -14.93                          |
| Total Basic Cost as a Percent of Sales     | Average | 54.82 %                          | 61.18 %                            | 80.02 %                         |
| Depreciation Expense as a Percent of Sales | Average | 6.45 %                           | 9.93 %                             | 17.18 %                         |
| Interest Expense as a Percent of Sales     | Average | 4.57 %                           | 5.09 % <sup>1</sup>                | 7.20 %                          |
| Paid Labor Expense as a Percent of Sales   | Average | 11.19 %                          | 12.21 % <sup>1</sup>               | 10.53 % <sup>2</sup>            |

<sup>1</sup> The difference between the High Profit Farms' and Medium Profit Farms' averages is not statistically significant.

<sup>2</sup> The difference between the High Profit Farms' and Low Profit Farms' averages is not statistically significant.

**Table 5. Factors Affecting OPM: Select Profit and Expense Measures per Milk Hundredweight, Cow and Acre**

| Factors Affecting OPM |         | High Profit Farms<br>(100 Farms) |         |         | Medium Profit Farms<br>(452 Farms) |                      |                    | Low Profit Farms<br>(100 Farms) |         |                    |
|-----------------------|---------|----------------------------------|---------|---------|------------------------------------|----------------------|--------------------|---------------------------------|---------|--------------------|
|                       |         | \$/cwt                           | \$/cow  | \$/acre | \$/cwt                             | \$/cow               | \$/acre            | \$/cwt                          | \$/cow  | \$/acre            |
| NFIO                  | Average | \$3.96                           | \$891   | \$375   | \$1.94                             | \$416                | \$128 <sup>1</sup> | -\$2.29                         | -\$426  | -\$140             |
| Total Basic Cost      | Average | \$9.45                           | \$2,127 | \$895   | \$10.25                            | \$2,195 <sup>1</sup> | \$678 <sup>1</sup> | \$12.29                         | \$2,284 | \$749 <sup>2</sup> |
| Depreciation Expense  | Average | \$1.11                           | \$250   | \$192   | \$1.66                             | \$356                | \$144              | \$2.64                          | \$490   | \$105 <sup>2</sup> |
| Interest Expense      | Average | \$0.79                           | \$177   | \$75    | \$0.85                             | \$182                | \$56               | \$1.11                          | \$205   | \$67               |
| Paid Labor Expense    | Average | \$1.93                           | \$544   | \$248   | \$2.05 <sup>1</sup>                | \$500 <sup>1</sup>   | \$170 <sup>1</sup> | \$1.62                          | \$405   | \$134              |

<sup>1</sup> The difference between the High Profit Farms' and Medium Profit Farms' averages is not statistically significant.

<sup>2</sup> The difference between the High Profit Farms' and Low Profit Farms' averages is not statistically significant.

Depreciation expenses accounted for roughly 6.5 cents of every sales dollar on the *High Profit Farms*. The *Medium* and *Low Profit Farms* had far more difficulty in spreading out their depreciation expense. On average, 10 cents of every sales dollar on the *Medium Profit Farms* and 17 cents of every sales dollar on the *Low Profit Farms* were required to cover their depreciation expenses. This may indicate that the *High Profit Farms* were better at

- determining when to rent and when to buy depreciable capital assets;
- making their capital assets last longer;
- generating more sales with their depreciable assets; and/or,
- spreading their depreciable assets over more cows or acres.

#### **IV-d. Factors Affecting Total Basic Cost**

With regard to select total basic cost expenses, it cost roughly 19 cents in purchased feed to generate a dollar in sales on the *High Profit Farms* (Table 6). This was statistically equivalent to the purchased feed expense financial efficiency ratio of the *Medium Profit Farms*' and lower than the *Low Profit Farms*'. When looking at the purchased feed expense on a per head basis, the difference between the three groups spent on purchased feed was insignificant. These purchased feed expenses should differ more dramatically, because the *Medium* and *Low Profit Farms* had more crop acres per cow and shipped less milk per cow per year.

The *Medium* and *Low Profit Farms* also spent more on seed, chemical, fertilizer, and lime expenses. The *Medium Profit Farms* spent 6.1 cents of every sales dollar on seed, chemical, fertilizer and lime expenses, while the *Low Profit Farms* spent 6.5 cents of every sales dollar on these inputs. The *High Profitability Farms* spent 4.5 cents of every sales dollar on these expense items. When one combines the facts that there was not any difference in the purchased feed expense per head, but the *Medium* and *Low Profitability Farms* had a higher seed, chemical, fertilizer and lime expense financial efficiency ratio, it may indicate that the *Medium* and *Low Profit Farms* should conduct a thorough analysis of the feed procurement/cropping enterprise.

**Table 6. Factors Affecting Total Basic Costs: Select Expense Financial Efficiency Ratios**

| Financial Efficiency Ratios Affecting Total Basic Cost            |         | High Profit Farms (100 Farms) | Medium Profit Farms (452 Farms) | Low Profit Farms (100 Farms) |
|---|---------|-------------------------------|---------------------------------|------------------------------|
| Purchased Feed as a Percent of Sales                              | Average | 18.96 %                       | 19.15 % <sup>1</sup>            | 22.69 %                      |
| Seed, Chemical, Fertilizer and Lime Expense as a Percent of Sales | Average | 4.48 %                        | 6.13 %                          | 6.52 %                       |
| Repair Expenses as a Percent of Sales                             | Average | 3.61 %                        | 4.83 %                          | 6.00                         |
| Gas, Fuel and Oil Expense as a Percent of Sales                   | Average | 1.68 %                        | 2.17 %                          | 2.29 %                       |
| Custom Hire Expense as a Percent of Sales                         | Average | 3.28 %                        | 3.23 % <sup>1</sup>             | 5.01 %                       |
| Equipment Rental Expense as a Percent of Sales                    | Average | 0.82 %                        | 0.56 %                          | 0.61 % <sup>2</sup>          |
| Other Rental Expense as a Percent of Sales                        | Average | 3.75 %                        | 3.45 % <sup>1</sup>             | 4.73 % <sup>2</sup>          |
| Veterinary Expenses as a Percent of Sales                         | Average | 2.65 %                        | 3.12 %                          | 3.67 %                       |
| Marketing and Hedging Expense as a Percent of Sales               | Average | 0.98 %                        | 1.10 %                          | 1.22 %                       |

<sup>1</sup> The difference between the High Profit Farms' and Medium Profit Farms' averages is not statistically significant.

<sup>2</sup> The difference between the High Profit Farms' and Low Profit Farms' averages is not statistically significant.

Although the amount spent for veterinary expenses did not differ significantly on a per cow basis (Table 7), the *High Profit Farms* spent roughly 2.7 cents of every sales dollar on veterinary expenses (Table 6), as compared to the 3.1 and 3.7 cents per sales dollar spent by the *Medium* and *Low Profit Farms*. Thus, farms like the *Medium* and *Low Profit Farms* may want to consult their veterinarians to discover and implement protocols to improve their farm's herd health program.

**Table 7. Factors Affecting Total Basic Cost: Select Expense Measures per Milk Hundredweight, Cow and Acre**

| Factors Affecting OPM                       |         | High Profit Farms<br>(100 Farms) |        |         | Medium Profit Farms<br>(452 Farms) |                    |                     | Low Profit Farms<br>(100 Farms) |                    |                   |
|---|---------|----------------------------------|--------|---------|------------------------------------|--------------------|---------------------|---------------------------------|--------------------|-------------------|
|   |         | \$/cwt                           | \$/cow | \$/acre | \$/cwt                             | \$/cow             | \$/acre             | \$/cwt                          | \$/cow             | \$/acre           |
| Purchased Feed                              | Average | \$3.27                           | \$736  | NA      | \$3.21 <sup>1</sup>                | \$687 <sup>1</sup> | NA                  | \$3.48                          | \$648 <sup>2</sup> | NA                |
| Veterinary Expenses                         | Average | \$0.46                           | \$103  | NA      | \$0.52                             | \$112 <sup>1</sup> | NA                  | \$0.56                          | \$105 <sup>2</sup> | NA                |
| Marketing and Hedging Expense               | Average | \$0.17                           | \$38   | \$16    | \$0.18                             | \$39 <sup>1</sup>  | \$12 <sup>1</sup>   | \$0.19                          | \$35               | \$11 <sup>2</sup> |
| Seed, Chemical, Fertilizer and Lime Expense | Average | \$0.77                           | \$174  | \$73    | \$1.03                             | \$220              | \$68 <sup>1</sup>   | \$1.00 <sup>2</sup>             | \$186 <sup>2</sup> | \$61 <sup>2</sup> |
| Gas, Fuel and Oil Expense                   | Average | \$0.10                           | \$65   | \$27    | \$0.11 <sup>1</sup>                | \$78               | \$24 <sup>1</sup>   | \$0.09 <sup>2</sup>             | \$65 <sup>2</sup>  | \$21 <sup>2</sup> |
| Custom Hire Expense                         | Average | \$0.56                           | \$127  | \$53    | \$0.54 <sup>1</sup>                | \$116 <sup>1</sup> | \$36 <sup>1</sup>   | \$0.77                          | \$143 <sup>2</sup> | \$47 <sup>2</sup> |
| Equipment Rental Expense                    | Average | \$0.14                           | \$32   | \$13    | \$0.09 <sup>1</sup>                | \$20               | \$6.26 <sup>1</sup> | \$0.09 <sup>2</sup>             | \$17               | \$6 <sup>2</sup>  |
| Other Rental Expense                        | Average | \$0.65                           | \$146  | \$3.75  | \$0.58 <sup>1</sup>                | \$124 <sup>1</sup> | \$3 <sup>1</sup>    | \$0.73 <sup>2</sup>             | \$135 <sup>2</sup> | \$5 <sup>2</sup>  |
| Repair Expenses                             | Average | \$0.62                           | \$140  | \$59    | \$0.81                             | \$173              | \$54 <sup>1</sup>   | \$0.92                          | \$171              | \$56 <sup>2</sup> |

<sup>1</sup> The difference between the High Profit Farms' and Medium Profit Farms' averages is not statistically significant.

<sup>2</sup> The difference between the High Profit Farms' and Low Profit Farms' averages is not statistically significant.

#### IV-e. Other Measures of Financial Performance

Equity is the amount of a business that the owner owns free and clear from creditors. It shows the accumulated amount of wealth that the owner has invested in the business. It is calculated by subtracting a firm's liabilities from its asset value. In order for any business to be sustainable, its operations must generate enough profit to increase its owner's equity position. This section displays the results of an analysis conducted on two financial measures that address this issue: the rate of return on equity, ROROE, and the return to equity from operations, REO.

The ROROE was described on page 2 of this document. Table 8 shows that the *High Profit Farms* earned roughly 17 cents for every dollar in equity in 2003. The *Medium Profit Farms* earned far less than the *High Profit Farms*—3.5 cents for every dollar in equity. The *Low Profit Farms* lost 14 cents for every dollar in equity. The negative ROROE of the *Low Profit Farms*' is especially troubling. If a farm continues to earn a negative ROROE, the farm owner's accumulated wealth begins to erode. This may cause difficulty for the farmer in acquiring new loans, force the farmer to prematurely sell the farm, keep the farm owner from his or her retirement plans, and make it increasingly difficult for the farm owner to pass the farm on to a new generation.

Another method to analyze the ROROE is to compare it to the rate of return on assets, ROROA. If a farm has debt, the ROROE should be larger.<sup>7</sup> If it is not, it usually means that the farm manager is using debt ineffectively.<sup>8</sup> Table 8 shows that the *High Profit Farms*' ROROE is larger than its ROROA. This is not the case for the *Medium* and *Low Profit Farms*.

**Table 8. Rate of Return on Equity, NFIO per Farm and Family Living Expense Measures**

| <b>Financial Measure</b>  | <b>High Profit Farms<br/>(100 Farms)</b> | <b>Medium Profit Farms<br/>(452 Farms)</b> | <b>Low Profit Farms<br/>(100 Farms)</b> |
|---|--|--|---|
| <b>ROROE</b>  | <b>16.7 %</b>                            | <b>3.39 %</b>                              | <b>-14.02 %</b>                         |
| <b>ROROA</b>  | <b>12.1 %</b>                            | <b>4.1 %</b>                               | <b>-5.04 %</b>                          |
| <b>NFIO per Farm</b>  | <b>\$148,361</b>                         | <b>\$49,088</b>                            | <b>-\$39,403</b>                        |
| <b>Family Living and<br/>Income Tax Expenses<br/>Less Non-Farm Income</b> | <b>\$42,783</b>                          | <b>\$32,531</b>                            | <b>\$7,739</b>                          |
| <b>Return to Equity from<br/>Farm Operations</b>                          | <b>\$105,578</b>                         | <b>\$16,557</b>                            | <b>-\$47,142</b>                        |

The REO examines whether a farm can generate enough NFIO in order to cover family living expenses (less non-farm income) and income taxes, and still have a positive amount left over to add to the owner's equity stake. If the REO is negative, the farm owner must dip into savings, sell capital assets, or use the cash freed up from the farm's depreciation expense to pay for any income taxes and the remainder of family living expenses. All three options can be detrimental to future farm financial performance. As seen in Table 8, both the *High* and *Medium Profit Farms* generated enough NFIO to cover the farm's fair share of family living expenses and income taxes. The *Low Profit Farms*, despite having much lower family living expenses, did not generate enough NFIO to cover their family living expenses.

#### **IV-f. The Implications of Financial Performance Improvements in Select Sales-Based Factors**

While finance is useful for determining historic financial performance, it reaches its optimal usefulness when you use the historical financial performance to determine plans for future improvement. In this section, the results of an analysis using the DuPont Model are displayed. In the first part of the analysis, the DuPont Model was used to determine what the *Medium Profit Farms*' ROROA would be if they were able to achieve both the milk price and production per cow of the *High Profit Farms*'. In all of these

<sup>7</sup> If the farm does not have debt, the ROROA will equal the ROROE.

<sup>8</sup> It may also mean that the farm is a beginning farm or that it recently expanded. In either case, large amounts of debt are required.

situations, two results are displayed: one for costless improvements, and another for improvements costing 50 percent of the gain in sales.

**Table 9. The Financial Implications for Medium Profit Farms Regarding Improvements in Select Sales-Based Measures**

| Select Improvement  | Change in Total Cost | New Sales Level Per Farm | New NFIO Per Farm | New ATO | New OPM | New ROROA |
|---|----------------------|--------------------------|-------------------|---------|---------|-----------|
| No Improvement  | \$0                  | \$423,266                | \$49,088          | 0.37    | 11.1 %  | 4.1 %     |
| Scenario 1: Improve Milk Price Received By \$0.31/cwt   | \$0                  | \$431,096                | \$56,918          | 0.38    | 12.6 %  | 4.8 %     |
| Scenario 2: Improve Milk Price Received By \$0.31/cwt   | \$3,915              | \$431,096                | \$53,003          | 0.38    | 11.7 %  | 4.4 %     |
| Scenario 3: Improve Milk Shipped Per Cow Per Year By 1,108 Pounds                                       | \$0                  | \$440,093                | \$65,915          | 0.39    | 14.4 %  | 5.6 %     |
| Scenario 4: Improve Milk Shipped Per Cow Per Year by 1,108 Pounds                                       | \$8,413              | \$440,093                | \$57,501          | 0.39    | 12.4 %  | 4.8 %     |
| Scenario 5: Improve Milk Price Received by \$0.31/cwt and Milk Shipped Per Cow Per Year by 1,108 Pounds | \$0                  | \$447,923                | \$65,915          | 0.40    | 15.9 %  | 6.3 %     |
| Scenario 6: Improve Milk Price Received by \$0.31/cwt and Milk Shipped Per Cow Per Year by 1,108 Pounds | \$12,329             | \$447, 923               | \$61,417          | 0.40    | 13.1 %  | 5.2 %     |

Assume that the *Medium Profit Farms* could increase the milk price received by \$0.31 per hundredweight (to equal the average milk price received by the *High Profit Farms*) by improving their milk components through nutrition, milk quality through better milking protocols, developing and implementing better milk marketing plans or by some other method (Table 9). This \$0.31 per hundredweight increase

would increase the *Medium Profit Farms*' sales by 1.8 percent to \$431,096. If the gains in milk price received were accomplished without any additional costs (Table 9, Scenario 1), the NFIO would increase by roughly 16 percent from \$49,088 per farm to \$56,918 and the ATO would increase to 0.38. The resulting OPM would increase to 12.6 percent. Using the DuPont Analysis Equation ( $ROROA = ATO \times OPM$ ), it can be seen that the \$0.31 per hundredweight costless increase in milk price would increase the *Medium Profit Farms*' ROROA from 4.1 percent to 4.8 percent. If the \$0.31 per hundredweight increase in milk price received cost \$0.155 per hundredweight to achieve (Table 9, Scenario 2), the sales and ATO would still be \$431,096 and 0.38, respectively, as in the first scenario. However, the NFIO would increase by 8 percent to \$53,003. This would result in an OPM of 11.7 percent and an ROROA of 4.4 percent.

Now assume that the farm has found a way, perhaps through better cattle grouping or improved forage quality, to achieve the 22,514 pounds of milk per cow per year shipped by the *High Profit Farms*—an increase in milk shipped of roughly 3 pounds per cow per day (Table 9, Scenario 3). The *Medium Profit Farms*' sales would increase from the current value of \$423,266 to \$440,096, and the ATO would increase from 0.37 to 0.39. Without additional costs, this would result in a NFIO increase of 34 percent to \$65,915. This would correspond to a 14.4 percent OPM and a 5.6 percent ROROA. If the gain in milk cost \$8,413 (50 percent of the increase in sales), the resulting NFIO, OPM and ROROA values would be \$57,501, 12.4 percent and 4.8 percent, respectively (Table 9, Scenario 4).

Achieving both the \$0.31 per hundredweight milk price and the additional 1,108 pounds of milk of the *High Profit Farms*' would enable the *Medium Profit Farms* to increase their sales and ATO to \$447,923 and 0.40, respectively. If these increases happen without incurring additional costs, the NFIO would increase by 34 percent to \$65,915 and the OPM and ROROA would increase to 15.9 percent and 6.3 percent, respectively (Table 9, Scenario 5). If the gains cost the *Medium Profit Farms* \$12,329 (an amount equal to 50 percent of the increase in sales), the resulting NFIO, OPM and ROROA would be \$61,417, 13.1 percent and 5.2 percent, respectively (Table 9, Scenario 6).

#### IV-g. The Implications of Financial Performance Improvements in Select Total Basic Cost Factors

Earlier it was shown that the *Medium Profit Farms*' total basic cost financial efficiency ratios lagged behind those of the *High Profit Farms*. Financial Efficiency Ratios can be improved through increasing the farm's sales without a totally offsetting increase in costs. They can also be improved by decreasing costs without a totally offsetting decrease in revenues. In this section, we will examine the latter method by studying the effects of decreases in the *Medium Profit Farms*' total basic cost financial efficiency ratios. It is assumed that the decrease in expenses will not cause a decrease in sales.

**Table 10. The Financial Implications for Medium Profit Farms Regarding Improvements in Total Basic Costs**

| Improvement   | Total Basic Cost Reduction Per Farm | New Sales Level Per Farm | New NFIO Per Farm | New ATO     | New OPM        | New ROROA    |
|---|-------------------------------------|--------------------------|-------------------|-------------|----------------|--------------|
| <b>Original Values</b>  | <b>\$0</b>                          | <b>\$423,266</b>         | <b>\$49,088</b>   | <b>0.37</b> | <b>11.1 %</b>  | <b>4.1 %</b> |
| <b>Scenario 1:<br/>Reduce Total Basic Cost<br/>Financial Efficiency Ratio<br/>From 61 % to 59.5 %</b> | <b>\$6,349</b>                      | <b>\$423,266</b>         | <b>\$55,437</b>   | <b>0.37</b> | <b>12.47 %</b> | <b>4.6 %</b> |
| <b>Scenario 2:<br/>Reduce Total Basic Cost<br/>Financial Efficiency Ratio<br/>From 61 % to 58 %</b>   | <b>\$12,698</b>                     | <b>\$423,266</b>         | <b>\$61,786</b>   | <b>0.37</b> | <b>13.96 %</b> | <b>5.2 %</b> |
| <b>Scenario 3:<br/>Reduce Total Basic Cost<br/>Financial Efficiency Ratio<br/>From 61 % to 56.5 %</b> | <b>\$19,047</b>                     | <b>\$423,266</b>         | <b>\$68,135</b>   | <b>0.37</b> | <b>15.46 %</b> | <b>5.7 %</b> |
| <b>Scenario 4:<br/>Reduce Total Basic Cost<br/>Financial Efficiency Ratio<br/>From 61 % to 55 %</b>   | <b>\$25,395</b>                     | <b>\$423,266</b>         | <b>\$74,483</b>   | <b>0.37</b> | <b>16.96 %</b> | <b>6.3 %</b> |

In Scenario 1 (Table 10), the total basic cost financial efficiency ratio is lowered from 61 to 59.5 percent by reducing total basic costs by \$6,359 (\$54 per cow) and holding revenues constant. Since sales are not affected, there would be not be any increase in sales or ATO. However, it would increase the NFIO by roughly 13 percent to \$55,437. This would cause the OPM and ROROA to increase to 12.47 percent and 4.6 percent respectively.

As the improvements in the *Medium Profit Farms*' total basic cost financial efficiency ratios increase, the profitability increases. In Scenario 4, the total basic cost financial efficiency ratio reaches the level of the *High Profit Farms*': 55 percent. This cost reduction amounts to \$25,395 per farm or \$215 per cow as compared to the original values. At this level of total basic cost financial efficiency, the NFIO increases to \$74,483 while the OPM and ROROA increases to roughly 17 and 6.3 percent, respectively.

## **Section V. SUMMARY**

The *High Profit Farms* earned a higher average rate of return on assets (ROROA) because they were able to generate a higher asset turnover (ATO) and operating profit margin (OPM). The *High Profit Farms*' ATO was higher due to earning a higher milk price, shipping more milk per cow per year, and milking more cows. They also had a lower assets per cow measure than the *Medium Profit Farms*. The *High Profit Farms* were also able to generate much higher return to equity measures.

The *High Profit Farms*' OPM was higher due to a much lower total basic cost financial efficiency ratio and a lower depreciation expense financial efficiency ratio. Despite the *High Profit Farms*' shipping of more milk per cow and having fewer crop acres per cow than the *Medium* and *Low Profit Farms*, the purchased feed expense per cow did not differ significantly between the three groups.

To improve their financial performance, farms like the *Medium* and *Low Profit Farms* might consider finding and implementing profitable ways to

- improve their milk price;
- increase the amount of milk shipped per cow per year;
- reduce their assets per cow and depreciation expense measures;
- utilize their debt funding more profitably;
- develop a more efficient feed procurement/cropping enterprise; and/or
- improve herd health.

This report also shows that relatively small improvements in sales-based and total basic cost-based factors can dramatically affect farm financial performance.