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Ag Econ 341

# **Agricultural Economics**

**Financial Characteristics of North Dakota Farms 1992-1994**

**Andrew Swenson and Cole Gustafson**

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DEPARTMENT OF AGRICULTURAL ECONOMICS  
AGRICULTURAL EXPERIMENT STATION  
NORTH DAKOTA STATE UNIVERSITY  
FARGO, NORTH DAKOTA 58105

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**Andrew Swenson and Cole Gustafson**

Department of Agricultural Economics  
North Dakota State University  
Fargo, ND 58105

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## **Abstract**

End-of-year financial data from 700 farms enrolled in North Dakota Farm Business Management Education Program for the years 1992 to 1994 are analyzed according to 16 financial standards. All median profitability measures, median term debt coverage, term debt and capital margin, and median net farm income as a percent of gross revenue are lower in 1994 than in 1993. The median for all 16 financial measures deteriorated for 1994 in the south central and west regions due to lower livestock profitability. Financial performance of the north central region improved each of the three years.

Keywords: financial measures, financial performance, farm, profitability, liquidity, solvency

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## INTRODUCTION

Financial statements such as the balance sheet and income statement provide a structured format to summarize financial information so it is more manageable for decision making. It is helpful to further simplify or summarize information contained in financial statements into key measures of financial performance. However, the calculation of a financial measure can be fruitless unless there is a meaningful basis of comparison to evaluate the number. Two methods of comparison are:

- ❶ **Past performance.** The progress of a business can be monitored by construction of financial measures on a periodic basis and comparing present to past performance.
- ❷ **Industry benchmarks.** The average or median of a financial measure from several similar businesses provides a good point of reference. Currently, there is not a nationwide database of farm records. However, there are statewide farm record programs in some states, such as North Dakota. Each farm has its own unique aspects, so the most appropriate comparison would be farms that have similar enterprises and resources.

Whatever method of comparison is used, it is imperative that the procedures for construction of financial statements and performance measures are consistent over time and between farms to insure an "apples-to-apples" comparison. Different methods of accounting and financial statement construction have been used in agriculture. There are differences of opinion on whether the benefit from more detailed record keeping and financial analysis is worth the extra time and effort required. Unfortunately, different record keeping methods, application of accounting terminology, and financial statement formats can cause confusion.

The Farm Financial Standards Task Force (FFSTF) was formed by the American Bankers Association in 1989 to develop standards for construction of financial statements and measures of financial performance in agriculture. In 1991, the task force provided recommendations for financial statement

construction and the calculation of 16 measures of financial performance. These recommendations were adopted, in most part, by the North Dakota Farm Business Management Education Program and are the basis for the benchmarks presented in this publication.

The purpose of this study is to provide information to producers, lenders, educators, and others on the financial performance of a sample of North Dakota farms. The data are from financial summaries of farms participating in the North Dakota Farm Management Education program. Median and upper and lower quartiles of 16 financial performance measures are presented for all farms in the data set and for groupings of farms by characteristic such as farm type, farm size, and age of producer. The results can be used by producers and lenders to evaluate the financial performance of a farm. Also, aggregate performance trends can be identified and relationships between farm characteristics and financial measures can be analyzed. However, because of the small number of farms in this study, the results should be used cautiously and only be considered guidelines.

## SOURCE OF DATA

More than 700 farms are enrolled in the North Dakota Farm Business Management Education program. Instructors educate and assist producers in record keeping and review data for completeness and accuracy. Instructors use the Finpack farm financial management software program to generate financial summaries. From 1992 through 1994, the financial summaries of over 500 farms each year were considered usable for this study. Table 1 shows the distribution of farms by characteristic for 1994.

Most farms were represented in all three years (1992-1994) of this study. There normally is a small turnover of participants in farm management education programs, and some programs have ceased and others have started during this time frame.

The farms in this study are larger and the age of the farm operators younger than the state average. In

1994, only 33% of the 32,000 farms in North Dakota had gross receipts greater than \$100,000, whereas 76% of the 536 farms in this study exceed that sales volume (median gross sales was \$162,427). The average age of farm operators in this study is 41 compared to 50 for the state average. The farms in the study are more representative of operations that provide the primary or only source of net family income. The state average includes all farms with gross sales greater than \$1,000.

## DEFINITION OF FINANCIAL MEASURES

Sixteen measures of financial performance were calculated for each farm in this study. The recommendations of the farm financial standards task for calculating the ratios were followed as closely as possible.

The farm financial standards task force stated that a more meaningful comparison between farms is achieved with market valuation of assets, but due to fluctuations in market values the cost method (acquisition cost less accumulated depreciation) is superior for comparisons over time for an individual farm operation. In fact, a dual column balance sheet is recommended: one column to value assets by the cost approach and a second column for market valuation of assets.

The valuation method used for current assets of farms in this study depended on what was most relevant and reliable. For example, current market value was used for grain and market livestock inventories, but prepaid expenses and supplies were listed at purchase cost.

Non-current asset valuation was:

- Machinery valued at cost minus accumulated depreciation. Depreciation was straight line over estimated life of machine.
- Purchased breeding livestock was valued at cost. Raised replacement animals were valued at a conservative market value when they enter the breeding herd. This value remains constant until the animal leaves the herd.
- Generally, land was valued at cost. However, when

a farmer enrolls in the farm business program there may be a one time revaluing of land to a conservative market value.

Assets and liabilities not associated with the farm business are excluded from the calculation of farm financial performance measures. Accrued liabilities were included on the balance sheets but deferred tax liabilities were not.

The calculations of all financial measures, unless otherwise noted, are accrual adjusted. Examples are:

- gross farm revenue is gross cash revenue plus the changes in crop and market livestock inventories and accounts receivable;
- interest expense is cash interest plus the change in accrued interest.

## LIQUIDITY

### Current Ratio

Computation: Current assets divided by current liabilities.

Interpretation: This ratio measures the extent current assets will cover liabilities that are due during the next 12 months. The higher the ratio the more cushion the business has to meet short-run obligations without disrupting normal business operations. The current ratio's limitation as a measure of liquidity is that it does not match the timing of financial obligations with the liquidation of current assets, nor does it consider any new debt incurred or assets that may be generated during the 12 months after the balance sheet date.

### Working Capital

Computation: Current assets minus current liabilities.

Interpretation: This measure shows the dollar amount that current assets can or cannot cover current liabilities. The amount of working capital necessary to provide an adequate cushion for meeting debt obligations must be related to the size of the business.



Working capital as a measure of liquidity has similar limitations as the current ratio.

## **SOLVENCY**

### **Debt-to-Asset**

Computation: Total liabilities divided by total assets.

Interpretation: This ratio shows the proportion of assets owed to creditors. The lower the debt-to-asset ratio the higher the solvency of the business. Solvency is a measure of risk exposure. As solvency decreases, the owner has less equity relative to debt, the ability to procure additional financing may decrease, and the business's ability to survive adverse outcomes is diminished. However, solvency should be viewed in connection with profitability. A low solvency position may be desirable if debt capital provides returns in excess of its cost.

### **Equity-to-Asset**

Computation: Owner equity divided by total assets.

Interpretation: This ratio shows the portion of total assets represented by owner equity. It is another way of expressing solvency.

### **Debt-to-Equity**

Computation: Total liabilities divided by owner equity

Interpretation: This ratio shows the extent to which debt capital is combined with equity capital. It is another way of expressing solvency.

## **PROFITABILITY**

### **Rate of Return on Assets (ROA)**

Computation: Net farm income plus interest expense minus a charge for unpaid operator labor and management, divided by average total assets.

Interpretation: This ratio measures the pre-tax rate of return on farm assets and is used to evaluate whether

assets are employed profitably in the business. Two important factors affecting this measure are valuation of assets and the charge for unpaid operator labor and management. A \$20,000 charge was used per full time operator.

### **Rate of Return on Equity (ROE)**

Computation: Net farm income minus a charge for unpaid operator labor and management, divided by average owner equity.

Interpretation: This ratio measures the pre-tax rate of return on equity capital employed in the business. Two important factors affecting this measure are valuation of assets and the charge for unpaid operator labor and management. A \$20,000 charge was used per full time operator. This ratio should be evaluated carefully and used in conjunction with other ratios when analyzing a farm business. If ROE is greater than ROA, debt capital is being employed profitably—it is earning more than it costs in interest. A high ratio may indicate an undercapitalized or highly leveraged business, and low ratio may indicate a more conservative, high equity business.

### **Operating Profit Margin**

Computation: Net farm income plus interest expense minus a charge for unpaid operator labor and management, divided by the value of farm production. Value of farm production is gross farm revenue less purchase of market livestock and feed.

Interpretation: This ratio measures net farm income per dollar of farm production. It is a pre-tax measure of profit margin from the employment of assets. An important factor is the charge for unpaid operator labor and management. A \$20,000 charge was used per full time operator. There is a relationship between operating profit margin, asset turnover rate, and ROA. Operating profit margin multiplied by asset turnover rate equals ROA.

### **Net Farm Income**

Computation: Net farm revenue is total revenue earned minus the costs incurred to generate those

revenues. It is cash revenue less cash expense and depreciation plus capital adjustments (gain or loss from sale of capital assets). Accrual adjustments for changes in inventories are included to properly match revenues and expenses to the time period for which net farm income is being measured.

Interpretation: Net farm revenue is the return to the operator for unpaid labor and management and equity capital used in the farm business. Net farm revenue is an absolute amount and it is difficult to assign a standard to all farms because of differences in the amount of unpaid operator labor and equity used.

## **REPAYMENT CAPACITY**

### **Term Debt Coverage Ratio**

Calculation: Net farm income plus depreciation and other capital adjustments plus nonfarm income plus scheduled interest on term debt minus family living expense and income taxes, divided by scheduled term debt principal and interest payments.

Interpretation: This ratio measures the capacity of the borrower to cover all term debt payments. The greater the ratio is over 1, the greater the margin to cover term debt payments. The business may have sufficient earnings but the timing of cashflows may not be adequate to make the payments on a timely basis. Also, the ratio does not contain any provision for replacement of capital assets.

### **Capital Replacement and Term Debt Repayment Margin**

Calculation: Net farm income plus depreciation and other capital adjustments plus nonfarm income minus family living expense, income taxes, and scheduled term debt principal payments.

Interpretation: This is a measure of the business's ability to make payments on term debt. A positive margin indicates the amount available, after making term debt payments, for acquiring capital assets or servicing additional debt. The capital replacement and term debt repayment margin is a dollar amount, so it

is impossible to establish a standard for all farm business.

## **FINANCIAL EFFICIENCY**

### **Asset Turnover**

Calculation: Value of farm production divided by average total assets. Value of farm production is gross farm revenue less purchase of market livestock and feed.

Interpretation: This is a measure of how efficiently assets are used in the business. The higher the number, the more production is created per dollar of assets. Asset turnover can vary significantly by type of farm and by asset base. For example, dairy and hog farms will typically have higher asset turnovers than cow-calf or cash grain operations. Asset turnover will probably be higher if capital assets, such as machinery and land, are rented instead of owned.

### **Operating Expense Ratio**

Calculation: Total expense less interest and depreciation and capital adjustment divided by gross farm revenue.

Interpretation: This ratio measures how efficiently operating expenses are managed to generate gross farm revenue. The operating expense ratio will typically vary by farm type.

### **Depreciation Expense Ratio**

Calculation: Depreciation and capital adjustments divided by gross farm revenue.

Interpretation: This ratio expresses depreciation and capital adjustment relative to gross farm revenue. It will vary by farm type and from year to year. Caution must be used when evaluating this ratio. It does not comply with the farm financial standards because the Finpack program, used to generate the farm financial summaries, calculates depreciation and capital adjustment as one number (ending inventory plus capital sales less the sum of beginning inventory and

capital purchases). Therefore depreciation cannot be isolated.

### **Interest Expense Ratio**

Calculation: Interest expense divided by gross farm revenue.

Interpretation: This ratio shows the portion of gross farm revenue necessary to cover interest expense. It is often used as a measure of financial risk.

### **Net Farm Income Ratio**

Calculation: Net farm income divided by gross farm revenue.

Interpretation: This is a measure of how efficient the farm business is at generating net income from gross revenue. It is the portion of gross farm revenue left after operating expense, depreciation and capital adjustment, and interest expense have been removed.

## **INTERPRETATION OF RESULTS**

Each financial measure was calculated for each farm and sorted in order from strongest to weakest. The **median** is the midpoint value of the financial measure: one-half of the farms in the category had a higher value and one-half had a lower value than the median. The **upper quartile** is the value that was exceeded by one-fourth of the farms, and the **lower quartile** is the value that was exceeded by three-fourths of the farms. (Another definition of lower quartile is the value for which one-quarter of the farms in the category had a weaker value.)

Individual farm operators and lenders can use the tables as a measure of comparison if their financial measures are calculated similarly. For example, a farm operator 30 years of age may compare his/her profitability and financial efficiency with those of other young operators. Or a lender may compare the solvency and repayment capacity of producers who rent all their cropland. The tables also can be used to look at relationships and trends. What is the relationship between age of farmer and rate of return

on equity? How has operating profit margin of livestock farms changed over time?

Caution must be used when analyzing the tables because of the small number of farms and because one characteristic does not completely categorize a farm. A small number of farms increases the possibility that results may not be representative of a farm category. In this study, for 1994, there are only 88 farms from the west region, 47 mixed enterprise farms, and 69 farms in the negative net farm income category. Also for 1994, certain tables had fewer farms than indicated in Table 1. Seventy-seven farms were omitted from the current liabilities and liquidity analysis because term debt was not separated into current and non-current portions; 113 farms were omitted from the repayment capacity analysis because of insufficient detail for scheduled term debt payments.

There are some strong correlations between two or more classifications so it is difficult to associate a financial measure with an individual farm characteristic. For example, most of the full tenant farms in the cropland tenure classification are from the east, and the east has the highest proportion, relative to other regions, of farms in the crop enterprise and in the less than 1,200 acres categories. Is a median return on assets of 8.3% for farms in the east associated more with geographic location, tenancy, farm type or farm size?

One ratio is not sufficient to make conclusions about the overall financial performance of a farm business. For example a farm with \$200,000 of sales may have a debt-to-asset ratio of 70%, which is worse than the lower quartile value of 62% for farms in the \$100,000 to \$250,000 sales category. However, other factors such as profitability, land tenure, total assets, and age of operator should also be considered.

Last, a farm can be adversely affected by extraordinary circumstances. Profitability in the low quartile may not be reflective of management capability if the farm had localized bad weather that was not experienced by many other producers in the farm category.



## **FARM CLASSIFICATION AND HIGHLIGHTS**

## ALL FARMS

### Highlights

- The median measures for current and total assets and for current and total liabilities have increased each year from 1992 to 1994.
- The median current ratio was 1.4 in 1994—one-fourth of all farms had a current ratio less than .9, and one-fourth of all farms had a current ratio higher than 2.7.
- The median debt-to-asset for all farms was nearly 50%. Upper and lower quartiles were 31.2% and 65.5%, respectively.
- Median return on assets and return on equity were 6.4% and 5.8% respectively.
- All median profitability measures in 1994 were lower than in 1993, primarily because of lower livestock profitability.
- Average farm net farm income of \$42,478 was nearly \$10,000 greater than the median, indicating large net farm income farms skewed the average.
- One fourth of the farms had a net farm income greater than \$62,723 and one-fourth of the farms had a net farm income less than \$10,914 in 1994.
- Median term debt coverage was 130% and term debt and capital repayment margin was \$7,069 for 1994; both were less than in 1993.
- Median net farm income as a percent of gross revenues was 21.7% in 1994, down from 26.6% in 1993.

## **REGION**

Farms were classified in one of four geographic regions in North Dakota, based on the location of their Farm Business Management program. However farms enrolled in the Bismarck program are classified as "west" or "south central" according to which side of the Missouri river the farm is located. Participants in the "east" region are predominately from the Red River Valley. The southern areas of both the "east" and the "west" regions are better represented than the northern areas.

Locations of North Dakota Farm Business Management programs that participated in the 1994 summaries were:

East: Grafton, Kindred and Wahpeton

North Central: Bottineau, Devils Lake, Minot, and Rugby

South Central: Bismarck, Carrington, Enderlin, Harvey, Jamestown, Napoleon and Oakes

West: Bismarck, Dickinson, Glen Ullin and Stanley.

### **Highlights:**

- Average size of farm increased from east (about 1,250 total acres of which 1,200 acres were cropland), to west (2,300 total acres, 1,100 acres cropland). Farms in north central and south central regions averaged about 1,350 crop acres and 400 pasture acres.
- Percent of crop land owned was highest in the west and lowest in the east.
- The east had the highest gross sales per farm and greatest proportion of crop farms.
- Farms in the east region (Red River Valley) had the largest investment and the largest debt, both in terms of current and total assets and liabilities.
- The north central region had the lowest assets and much lower liabilities than the other regions.
- Overall, the north central region had the best financial performance. This region had the strongest liquidity and solvency measures which have improved each of the three years (1992-1994), the strongest repayment capacity, and the best operating expense and net farm income efficiency measures.
- In 1994, median net farm income was \$40,170, \$41,375, \$18,568 and \$28,738 in the east, north central, south central and west regions, respectively. This was a large increase in the east and a large decrease in the south central and west, compared to 1993.
- In the south central and west regions, the median of all 16 financial measures deteriorated in 1994.

## FARM ENTERPRISE

Farms were classified as "crop" if 60% or more of total sales were from crops, and "livestock" if livestock sales accounted for 60% or more of total sales. The remaining farms were classified as "mixed."

### Highlights:

- Nearly 70% of the farms were in the crop enterprise category.
- The proportion of farms that were livestock or mixed was greatest in the west and south central. Fifty-five percent of the west farms were livestock.
- Crop farms had the highest current assets and current liabilities each year (1992-94), but total assets and liabilities were more similar between crop and livestock farms.
- Mixed farms tend to have the smallest total investment and liabilities.
- Profitability measures of crop and livestock farms were similar in 1993. In 1994, crop farms maintained profitability, but there was a precipitous drop in the profitability of livestock farms.
- Livestock farms showed a sharp drop in repayment capacity in 1994.
- In 1994, livestock farms had the worst financial efficiency measures.
- The median asset turnover ratio of the crop farm category is consistently higher than for livestock or mixed farms.



## FARM SALES

Farms were classified in one of three cash farm sales categories. Farm sales include cash receipts from crop and livestock sales, government payments, and other farm income.

The categories were:     less than \$ 100,000  
                              \$100,000 to \$249,999  
                              \$250,000 or over

### Highlights

- Both the low and the high farm sales categories contained about 25% of the farms. About 50% of the farms had between \$100,000 and 250,000 in farm sales.
- Median farm sales in 1994 was \$162,427, the average was \$200,294.
- Four of 10 farms in the east region and only one in 10 farms in the north central regio, had farm sales in excess of \$250,000.
- The amount of current and total assets and current and total liabilities was directly correlated to farm gross sales.
- Median current ratio was similar between farm sales categories, but working capital increased with farm sales.
- The median debt-to-asset of farms with \$100,000 to \$250,000 gross sales was better than the median of farms with less than \$100,000 gross sales and farms with more than \$250,000 gross sales.
- Profitability measures were consistently the lowest for the smallest gross sales category of farms.
- Net farm income increased with gross sales, but farms with with less than \$100,000 gross sales had the highest net farm income in relation to gross income.
- In 1994, repayment capacity was directly related to farm sales.
- The median operating expense percent increased and net farm income percent generally decreased as farm gross sales category increased.

## FARM SIZE

Both crop and pasture acres were included in determining farm size.

Farm size categories were:       1,200 acres or less  
                                          1,201 acres or more

### Highlights

- Farm size increased from east to west.
- The amount of current and total assets and current and total liabilities was directly related to farm acreage.
- Median current ratio was slightly better, 1.5 compared to 1.4 for the larger farms, and working capital increased with farm size.
- Profitability measures were consistently the lowest for farms in the less than 1,200 acres category.
- Median net farm income was about twice as high for the larger farms from 1992-1994. In 1994, net farm income was \$41,122 for farms greater than 1,200 acres and \$19,509 for farms less than 1,200 acres.
- Repayment capacity was directly related to farm acreage.

## CROPLAND TENURE

This is a classification of the portion of cropland that is rented. Four categories were used.

Full tenant  
1-20 percent owned  
21-40 percent owned  
41 percent or over owned

### Highlights:

- Ownership of cropland was greatest in the west and least in the east. One-third of the farms in the east owned no cropland.
- There was a direct relationship between percent of crop land owned and total assets.
- Farms that control land through ownership instead of through renting tend to have better current ratios.
- Farms that own a large proportion of their land tend to have better solvency than those that rent all or most of their cropland.
- Farms that own a small portion of their land (1 to 40%) have higher net farm income and rate of returns on capital than farms with no land ownership or high (greater than 40%) land ownership.
- Farms that had between 1 and 40% of land ownership tended to have better repayment capacities than either farms with all rented land or farms with high (greater than 40%) land ownership.
- Farms with a greater proportion of land rented have lower land assets and greater asset turnover ratios but higher operating expense ratios due to land rent outlay and lower interest expense ratios because of lower land debt.

## NET FARM INCOME

Four levels of net farm income were used to group farms.

Negative  
\$0 - \$19,999  
\$20,000 - \$39,999  
\$40,000 or more

### Highlights

- Over 40 percent of the farms had net farm income greater than \$40,000 while 13 percent had negative returns to operator labor, management and equity.
- Median net farm income was \$32,523 in 1994, down nearly \$10,000 from 1993.
- Median total assets and median total liabilities were higher for the farms in the highest and the lowest net farm income categories than they were for the middle two net farm income categories. This indicates that large capitalized farms tended to be either very profitable or unprofitable.
- Solvency, liquidity, repayment capacity, and financial efficiency were strongly correlated with net farm income.
- Median ROA and ROE for farmers with net farm income greater than \$40,000 was 13.2% and 18.2%, respectively. These high numbers can partially be explained by conservative valuation of assets and unpaid operator labor and management.

## DEBT-TO-ASSET RATIO

Three ranges of debt-to-asset ratio were used to group farms.

- 0 - 40 percent
- 41 - 70 percent
- 71 percent or more

### Highlights:

- Forty-five percent of the farms had a debt-to-asset ratio in the 40 to 70% range, and 36% of farms had less than 40% debt.
- Farms in the lowest debt-to-asset category had the highest median total assets and the lowest median liabilities.
- Farms in the 0 to 40% debt/asset group had very strong financial performance with median current ratio of 3.1, median operating profit of 22.8%, median net farm income of \$42,715 and median operating expense of 58.1%.
- There is a strong inverse relationship between level of debt and liquidity, repayment capacity, net farm income, and financial efficiency. As debt increases, these measures deteriorate.
- Rate of returns on assets and equity was similar for the farms in the 0-40% and 41-70% debt groups, but was much less for farms with greater than 70% debt.

## FARMER AGE

Three groups were used to classify farms by age of operator:

34 years or more  
35 - 44 years  
45 years or older

### Highlights:

- The greatest portion of farmers were between 35 and 45 years old; 26 percent of the farmers were less than 35 years and 31 percent were older than 45 years.
- Total assets and to a lesser degree total liabilities were directly related to the age of operator.
- Median current ratio was similar between age of operator categories, about 1.4.
- Young farmers have a higher percent debt-to-asset. Farmers less than 35 years old had a median debt-to-asset of 55.9 percent compared to 44.4 percent for farmers older than 45.
- The group of farm operators less than 35 years old had the best median rate of return on assets, 9.2%, and rate of return on equity, 11.1%, and the oldest group of farmers had the lowest.
- The middle age group (35 to 44 years) has had the highest median net farm income each year, 1992-1994.
- There was an inverse relationship between age of farmer and repayment capacity, asset turnover rate, ROA, ROE, interest expense ratio and net farm income ratio. This indicates that although older farmers in the study have more assets and less debt-to-assets, young farmers are employing assets more efficiently to generate net farm income.

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