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**Evaluation of North Dakota Farm Business
Management Education Program**

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Evaluation of North Dakota Farm Business Management Education Program

Abstract

Net farm income of participants in the North Dakota Farm Business Management Education Program increased with years of enrollment both in absolute terms and compared to peer group benchmarks. Median net farm income increased \$7,829 and \$14,191 between the first and fifth year of enrollment for all farms in the program and a subset of farms with five consecutive years of records starting with the first year of enrollment, respectively. Net farm income by year of program participation was compared to a benchmark median net farm income for the same geographic region, calendar year, and farm type in an attempt to isolate the affects of management from weather and other exogenous factors. Net farm income as a percent of benchmark increased 17.5 percentage points from first year participation farms to fifth year farms and 28 percentage points for farms for which there were five consecutive years of records starting with the first year of enrollment. Increased net farm income for both groups was accompanied by improved efficiency, increased farm size, and greater net worth.

Keywords: farm management, farm education, farm financial management, net farm income, North Dakota

Evaluation of North Dakota Farm Business Management Education Program

Roger G. Johnson and Andrew L. Swenson*

Introduction

A comprehensive farm management educational program including an analysis of farm records has been operating in North Dakota since 1972. The program is a cooperative arrangement between the State Board for Vocational and Technical Education and local schools or post-secondary institutions. In 1995, 780 farms involving 1,406 enrollees participated through 20 farm management instructors located in 18 schools throughout the state. New participants continue to enter the program while others discontinue enrollment. New enrollees averaged 17.5 percent of total participants for the four years 1992-1995.

Regularly scheduled classes and individual instruction are used to teach financial, enterprise, and marketing management. Participants are taught how to keep complete and accurate records, and a business analysis is prepared annually. Participants pay a tuition to be in the program. Tuition is augmented by state, local, and federal funds to cover total program costs.

The records have been summarized by extension economists at North Dakota State University (1992-95) and the University of Minnesota (1989-91).¹ Farm financial statements and enterprise analysis are generated using a computerized farm financial management program called FINPACK. Annual summaries have been prepared for the state and each of four regions: Red River Valley, North Central, South Central, and Western Missouri Slope (North Dakota State Board for Vocational and Technical Education).

The purpose of the Farm Business Management Education Program is to help farmers to achieve their business and personal goals through management education. Net farm income is the best financial measure of goal achievement because it enables farmers to meet their family living, investment, and debt reduction goals. The study attempted to answer the question, "Does net farm income improve with years of participation in the educational program?"

Net farm income can be improved through improved efficiency, increased size, and increased equity. A related question the study investigated was "How do measures of business efficiency, size, and equity change with years of participation in the program?"

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¹Before 1989 records were summarized by Specialized Data Systems, Madison, Wisconsin.

Study Objectives

The study objectives were to measure the relation of years of program participation to

1. Net farm income
 - a. relative to an appropriate reference group
 - b. absolute level
2. Selected farm characteristics
 - a. efficiency
 - b. size of business
 - c. equity in business

Procedure

Data Set

The data available were seven years of participant record summaries, 1989-1995 inclusive. The years of records available for each farm varied from only one year up to all seven years. The study was limited to farms averaging between \$30,000 and \$630,000 gross cash income. This criteria excluded a few extremely large and some very small farms (2.6 percent of records). Included in the data analyzed were 3,608 annual records from 1,106 farms.

The records were classified into five categories based on location and intensity of livestock production. The number of records by year, enterprise type, and location are summarized in Table 1.

Table 1. North Dakota Farm Business Management Records in Data Set, by Year, Farm Type, and Region

Farm Type & Region	Year							Total
	1989	1990	1991	1992	1993	1994	1995	
Crop and Mixed Enterprise Farms								
Red River Valley	70	71	81	88	94	94	104	602
North Central	102	116	110	110	121	111	120	790
South Central	164	168	149	151	137	154	149	1,072
West	42	39	49	42	46	43	53	314
Livestock Farms	<u>121</u>	<u>106</u>	<u>108</u>	<u>113</u>	<u>123</u>	<u>116</u>	<u>143</u>	<u>830</u>
Total Records	499	500	497	504	521	518	569	3,608

Benchmark Farms

Net farm income in a particular year is influenced by both internal management decisions and the external environment, particularly weather and market prices. External effects depend on the year, farm type, and region. A farmer's management performance can best be evaluated by comparing net farm income with a benchmark. Ideally, the best test would be to compare, over time, performance of farms in the program to similar farms outside the program. This was not possible. However, it is possible to compare groups of farms with the same number of years in the program to benchmark groups made up of all enrolled farms, regardless of years in the program, but with similar location and farm type for a given calendar year. This study used net farm income as a percent of the benchmark group's median net farm income (%NFI) to evaluate a farmer's performance for each year of program participation.

$$\%NFI = \frac{\text{Individual Net Farm Income}}{\text{Benchmark Group Median Net Farm Income}} \times 100$$

Five location and farm type categories were used in this analysis. The first four categories were crop and mixed enterprise farms² based on the regions used in the annual reports (Figure 1). Because livestock farms are affected by different commodity prices and somewhat less by weather conditions, a separate livestock farm benchmark category was established. A farm with livestock sales over 60 percent of combined livestock and crop sales was classified as a livestock farm. The classification was based on the average percent of livestock sales over the years of available records. Due to lack of numbers, only a single state-wide livestock farm category was established.

Figure 1. North Dakota Farm Business Management Education Program Regional Reporting Areas

Net farm income for crop and mixed enterprise farms by farm location and for livestock farms statewide was available for seven years for a total of 35 benchmark groups. The distribution of net farm income often includes a few extremely high values. This results in a mean or average value above the median (the value of the middle item when a group of items are arranged in ascending or descending order of magnitude). Because the median measurement is not affected by extreme values, it is more representative and more stable among years and regions. For these reasons, the median of each benchmark farm group was established as the comparison standard. The 35 net farm income benchmarks are presented in Table 2.

²All farms where livestock represents less than 60 percent of combined crop and livestock sales.

Table 2. Median Net Farm Income by Farm Type, Region, and Year, Used for Benchmarks, North Dakota Farm Business Records

Farm Type & Region	Year						
	1989	1990	1991	1992	1993	1994	1995
----- \$ -----							
Crop and Mixed Enterprise Farms							
Red River Valley	27,625	40,365	38,447	42,728	20,848	43,344	51,751
North Central	12,167	32,096	28,513	41,565	49,257	44,627	38,741
South Central	15,212	33,885	39,350	44,038	43,412	28,188	15,683
West	11,246	7,505	28,441	47,215	56,349	38,362	36,938
Livestock Farms	21,206	30,161	20,764	31,218	43,112	19,149	8,094

Analysis

Two approaches were used to evaluate the effect of management education program participation on financial performance. The first used all records, between 1989 and 1995, where years of participation are known. In this approach, the number of records declined with years of participation as farmers discontinue the program or have just begun the program. Some farms may have a record in the program each of the seven years in the data set, while others may have only one record. The single record often was the first or second year of participation, but may be any participation year. For example, farmers who had participated in the program for many years, but recorded 1989 as their last year of participation would have only one record.

This analysis did not compare an identical group of farms for each program participation year. Because the same farms are not in each year of participation group, the trend could be distorted if the difference between farms entering and leaving the program is great. However, the large number of records tended to mitigate this problem. The number of records by calendar year and farm type and region for years of participation groups are shown in Table 3.

The second approach was to compare a group of the same farms over time. This approach limited the analysis to farms that have records for a minimum of five continuous years starting with their first year in the program. Sixty-nine farms met this criteria. Because there are seven years in the data set (1989-1995), these farms would have had to begin the program in either 1989, 1990, or 1991. The number of farms in this approach by region and type are presented in Table 4. Because the same farms are analyzed, the number of farms by region and farm type do not change among years of participation groups. The advantage of using the same farms was offset by the small number of observations.

Table 3. Number of Records by Calendar Year and Farm Type and Region, for Years of Participation Groups, North Dakota Farm Business Records

Particip. Years	Total Farms	Calendar Year										Farm Type and Region				
		1989	1990	1991	1992	1993	1994	1995	Crop and Mixed Enterprise Farms		West	Livestock State				
		1989	1990	1991	1992	1993	1994	1995	RR Valley	N. Central			S. Central			
1	427	59	52	52	40	62	71	91	85	94	104	41	103			
2	378	55	61	58	51	44	49	60	65	77	94	53	89			
3	368	51	74	56	50	54	38	45	68	75	94	45	86			
4	340	44	50	69	54	45	43	35	54	69	111	38	68			
5	302	18	46	46	68	43	37	44	45	66	100	26	65			
6	256	21	19	41	43	62	37	33	38	60	90	21	47			
7	222	20	24	17	42	38	46	35	30	48	81	12	51			
>7	1,073	93	119	139	149	164	187	222	210	256	296	50	261			
Unknown	242	138	55	19	7	9	10	4	7	45	102	28	60			
Total	3,608	499	500	497	504	521	518	569	602	790	1,072	314	830			

Table 4. Number of Farms by Farm Type and Region, Same Farms Analysis,^a North Dakota Farm Business Records

Farm Type & Region	Farms
Crop and Mixed Enterprise Farms	
Red River Valley	21
North Central	20
South Central	14
West	4
Livestock Farms	<u>10</u>
Total	69

^aFarms for which there are consecutive records for at least their first five years in the program.

Both approaches compared net farm income of farms grouped by years of participation to the appropriate benchmarks shown in Table 2. For example, in the first approach, the “all records” analysis, there were 427 farms in the first year participation group (see Table 3). Again, the farmers’ first year of participation could be any year of the data set, 1989-1995. Net farm income as a percent of benchmark (%NFI) was calculated for each of the 427 farms and the median figure was used to evaluate performance of the first year participation group to other years of participation groups. To exclude the influence of extreme values, the median value was reported rather than the mean.

Results

Relative Net Farm Income

Median net farm income as a percent of benchmark farms (%NFI) by participation year is shown in Figure 2. Results for all records and the same farms analysis are both presented in the figure.

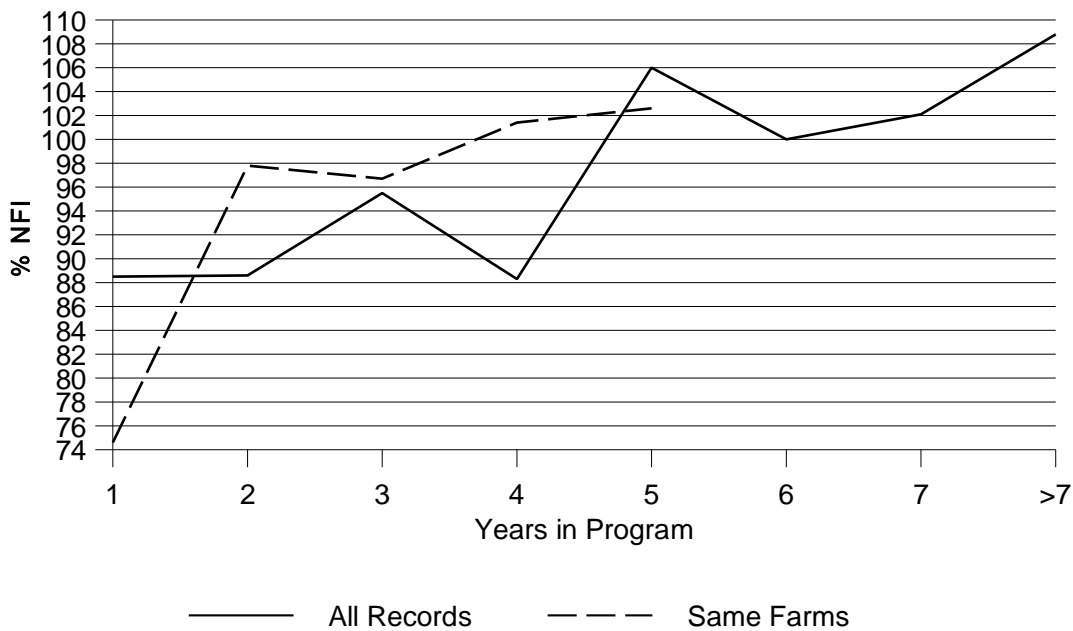


Figure 2. Median Net Farm Income as Percent of Benchmark by Years of North Dakota Farm Business Management Education Program Participation

The data using both approaches indicate that participating farmers improved their net farm income relative to benchmark farms while in the program. The all records data show an upward pattern, but with considerable year-to-year variation. The variability is due in part to random effects of farms with different incomes entering and leaving the years of participation groups. The increase in relative net farm income, however, is 13.6 percentage points from year one to year seven and 20.3 percentage points from year one to those with more than seven years in the program.

The same farms analysis data show a large increase in relative net farm income for year two, a slight decrease in year three, followed by improvement in years four and five. Over five years, the gain in %NFI is 28 percentage points.

The results give strong evidence of the effectiveness of the program. The benchmark farms are made up of all farms in the management education program regardless of the number of years of enrollment. The upward progression in relative net farm income with years of enrollment has been made in comparison to farmers with similar motivation and management education participation.

Net Farm Income and Selected Farm Characteristics

Measures of income, efficiency, size, debt-equity, and personal items were summarized for each year of program participation group. The median level of these measurements is presented in Tables 5 and 6 for the all records and same farms analysis, respectively. These items are not measured relative to a year, region, and farm type benchmark. However, external factors should not materially affect the participation years' comparisons because the proportion of farms from each year, region, and farm type are similar among comparison groups. (See Table 3.)

Net farm income trended upward with years of program participation in both analyses. The net farm income figures reported in Tables 5 and 6 are not directly comparable to the %NFI analysis presented in Figure 2 because no adjustment has been made for year or region-farm type.

The average increase in net farm income from year one through year seven of program participation was \$1,129, per year, for the all records analysis. The same farm analysis shows a \$3,548 average annual net farm income increase from participation years one through five. Because no farm income data were available for the years before enrollment in the program, it was impossible to evaluate the effects of the first enrollment year. Nonfarm income showed no relation to years of program participation.

Four measures were used to evaluate changes in efficiency of farm operation: labor earnings, rate of return on assets, rate of return on equity, and net farm income as a percent of gross. All measures improved with years of program enrollment. The improvement tended to be greatest in the first three to five years in the program (see Tables 5 and 6).

Size of business was measured by gross sales, farm assets, and crop acres. All size measures increased with the greatest growth the first four to six years in the program.

Although total liabilities increased with years of program participation, assets tended to increase faster, resulting in a declining debt-to-asset ratio. One of the most persistent improvements was registered in the farmer's net worth.

The farmers in the program are younger and have been farming for less time than the average farmer in North Dakota. According to the North Dakota State Census Data Center, in 1992, the average age of North Dakota farmers was 50. The median age and years of farming for the all records group did not increase in step with years in the program because farmers of differing ages and farm experience enter and exit the program.

Table 5. Median Measures of Income, Efficiency, Size, Debt-equity, and Personal Items, by Years of Participation in Farm Business Management Education Program, All Records Analysis, 1989-1995

Particip. Years	Income			Efficiency Factors			Size			Debt-equity			Personal		
	Net Farm	Nonfarm	Labor Earnings	Return on Assets	Return on Equity	NFI %	Gross Income	Farm Assets	Crop Acres	Farm Liab.	Debt-to- Asset Ratio ^a	Interest %	Total Net Worth ^a	Age	Years Farming
1	\$26,353	\$6,895	\$16,782	6.8%	4.9%	20.0%	\$129,538	\$323,041	1,024	\$159,834	50.9%	8.5%	\$176,603	37	14
2	27,935	5,968	17,065	6.8	4.3	23.0	133,315	350,466	1,139	164,274	49.0	8.3	192,496	37	14
3	28,315	6,543	17,801	6.5	4.9	22.3	136,086	370,376	1,119	174,680	48.8	8.0	191,718	37	14
4	27,542	6,501	17,501	5.1	5.2	21.8	140,613	359,869	1,178	167,201	46.6	8.8	196,842	38	15
5	34,182	6,168	23,140	7.8	7.3	25.3	143,885	404,695	1,115	172,042	45.9	8.2	206,356	38	16
6	33,649	7,381	22,866	8.0	6.9	24.1	157,180	403,163	1,225	174,493	45.7	8.3	225,100	38	16
7	33,126	5,521	21,738	7.0	6.5	22.0	154,242	406,992	1,201	181,144	46.7	8.3	237,860	40	17
>7	34,464	5,656	20,619	6.8	6.1	22.2	166,568	398,451	1,247	191,433	44.6	8.2	247,690	41	18

^aIncludes both farm and nonfarm.

Table 6. Median Measures of Income, Efficiency, Size, Debt-equity, and Personal Items, by Years of Participation in Farm Business Management Education Program, Same Farms Analysis, 1989-1995

Particip. Years	Income		Efficiency Factors			Size		Debt-equity			Personal				
	Net Farm	Nonfarm	Labor Earnings	Return on Assets	Return on Equity	NFI % Gross	Gross Income	Farm Assets	Crop Acres	Farm Liab.	Debt-to-Asset Ratio ^a	Interest % Gross	Total Net Worth ^a	Age	Years Farming
1	\$22,535	\$8,511	\$11,485	5.8%	1.4%	18.8%	\$111,363	\$275,952	1,025	\$134,471	47.5%	10.3%	\$142,894	34	13
2	31,726	6,023	20,942	8.2	7.2	27.6	134,458	311,658	1,139	143,913	45.5	8.4	186,604	35	14
3	39,802	8,141	26,347	9.0	12.2	28.9	146,768	360,684	1,228	171,622	42.0	7.4	213,686	36	15
4	42,744	7,893	30,144	10.7	11.9	26.3	168,576	428,154	1,219	191,720	41.0	8.3	245,360	37	16
5	36,726	9,359	21,941	7.9	6.8	22.8	171,177	426,725	1,245	222,223	43.4	8.0	270,194	38	17

^aIncludes both farm and nonfarm.

Conclusions

Study results show that North Dakota farmers in the Farm Business Management Education Program increase their net farm income with years enrolled both absolutely and also relative to similar farmers in the program. The increase in net farm income occurred from a combination of improved efficiency of operation and increased size and equity.

The annual value of the program could be more accurately determined if control group data were analyzed. No data from a nonparticipating group of similar farmers were available. Even for participating farmers, no before-enrollment data are available to evaluate the income effect of the first year of program participation. However, the two analyses of participating farmers, all records and same farms, indicated net farm income improvement from \$1,100 to \$3,500 per year.

The cost/benefit ratio of the program should not be measured solely by comparing program expenses to the added net farm income during program participation. Additional benefits are the cash accounts and depreciation schedule farmers must keep for income tax purposes and annual balance sheets and other financial data normally required by credit agencies.

The benefits to farmers enrolled are not the only program benefits. The published farm financial summaries and crop and livestock enterprise reports are valuable resources for extension farm management educational programs, for credit agencies (Swenson and Gustafson), for farm policy analysis (Koo et al.), and for interested nonparticipating farmers. There is no other readily available comparative farm financial and enterprise analysis in North Dakota. The record-generated summaries serve as a valuable benchmark for management decisions by farmers, agricultural educators, consultants, and policy analysts.

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