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## TEACHING STRATEGIES BASED ON AN ANALYSIS OF PROFITABILITY FACTORS FOR SELECTED FARMING TYPES IN THE MINNESOTA VOCATIONAL AGRICULTURE MANAGEMENT EDUCATION PROGRAM

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The nature of this study is derived from the fundamental guidelines used to develop the Minnesota Vocational Agriculture Farm Management Education Program. One of the objectives addresses the need for current, reliable information, useful in teaching Farm Management Education.

Currently, more than 40 percent of the approximately 8,000 farm operators in the Farm Management Education Program derive 80 percent or more of their cash income from one or two farm business enterprises. It is this trend toward highly specialized and consequently high risk farming which generates the need for additional information about the relationship of production factors to labor earnings. If the farm management instructor is to provide timely and useful information in his education program, the profit characteristics of these specialized farms must be examined. A study of profitability factor relationship to labor earnings will provide new insights which will have an impact on the teaching strategies employed in the current Farm Management Education Program and provide additional management information for its clientele.

### Significance of the Problem

While United States agriculture becomes increasingly important at the national and international levels, it is disproportionately difficult for an individual to enter and sustain himself in the industry as an independent farm producer. The cost of making decisions provides for only narrow margins of error. These decisions, once made, are not readily changed and the penalty for a mistake can be extremely high. If a farmer is to make business decisions, it is important to have some measure by which he may ascertain its overall impact on his farming operation.

In an effort to improve agriculture education, the vocational agriculture departments in the Minnesota public school system have initiated an Adult Farm Management Education Program. This program, somewhat similar to the management program started at the University of Minnesota in 1929, was introduced into the vocational agriculture educational system in 1952. This adult farm management program is a major effort to make on-going management education available to large numbers of farmers through the local public schools. Since 1952, it has increased dramatically in size and now includes more than 10 percent of the farmers in Class I to IV farms in the state.

One of the basic concepts of this education program is helping farmers increase their knowledge and use of management principles to achieve their family goals. This concept poses a significant question: Will farm family goals continue to be effectively met through the current education program as the nature and substance of production agriculture changes?

One goal of many farm families in the management program is optimizing farm labor earnings. The nature of this goal, and the direction for achieving it, deal with components in the farm business analysis called profitability factors. These management or profitability factors provide an overview of the entire farm operation. Because these factors synthesize most of the farm business information into specific values and indices, what is their relationship to whole farm labor earnings based on specific types of farms?

There is ample evidence to sustain the idea that specialized types of farming require substantially different inputs and resources to operate. The resources and management practices required for dairy farming are much different than those required for cash grain farming. If the relationship exists between the profitability factors and labor earnings, how consistent is this relationship when analyzed among the specialized farm types. Also, what is the nature of the consistency of these factors over the years?

To this point, there has been no substantial examination of the factors used in the farm business analysis to predict economic impact on specialized farm types. This study will provide an opportunity to analyze an important management tool used as a basis for farm business analysis.

Because farm business management education is a highly dynamic and complex program, it is important to develop current information which is readily available to the management instructor and his clientele. The method of delivery for this information which has long term management implications is to develop specific teaching strategies which can be included in the farm management curriculum. These teaching strategies must meet some criteria. They must be comprehensible, reliable and useful to the program's clientele in terms of meeting their goals.

The persistence of the specialized farming trend, with its resulting impact on all phases of agriculture, and the responsibility of the agriculture instructor to provide current and reliable information for his farmer clientele dictates the need for this study.

### Objectives of the Study

It is the purpose of this study to determine the impact profitability factors have on farm labor earnings as applied to farms enrolled in the Minnesota Vocational Agriculture Farm Management Education Program. These specialized farms received 80 percent or more of their cash income from one or two farming enterprises with a minimum of 20 percent cash income from the second enterprise. This information will be used to develop suggestions for teaching strategies enabling farm management instructors to utilize the information from this study.

The specific objectives of this study are:

1. To determine the relationship of profitability factors, as defined in the farm business analysis, to labor earnings by farm enterprise type on an annual basis.
2. To examine the consistency of the relationship of profitability factors to labor earnings over a period of four years.
3. To develop teaching strategies which will aid in classroom and on-farm instruction in the management education program utilizing the information derived from the analysis of the two previous objectives.

### The Population

The population for this study is comprised of people enrolled in the Minnesota Vocational Agriculture Adult Farm Management Education Program. Students of this program are individuals or married couples who meet the following criteria: 1) have decided on farming as an occupation, 2) are established in the farming business, 3) have managerial responsibilities and control.

Participants attend programs administered through one of three agencies: 1) part or full time programs based in a

local public high school, 2) part or full time programs based in a public area vocational technical institute, or 3) a full time veterans adult vocational agriculture program.

### Population Sample

The sample population used in this study has been registered a minimum of one year in the program and successfully completed one or more farm business analysis. The records used meet the "specialized farming type" criteria. An examination of each farm record was initiated when the individual farm analysis was processed to determine whether it met the aforementioned criteria. The computational basis for the criteria is based on historical usage and is identical to that used in the "Type of Farming in Minnesota" farm business record series jointly published by the Agricultural Education Division and the Department of Agricultural and Applied Economics, St. Paul Campus, University of Minnesota. The selection process includes eleven specialized farm types and has been completed over the course of four years, 1972 through 1975.

The specialized farms comprise 44 percent, 46 percent and 42 percent of the total population which successfully completed an Annual Farm Analysis of their farm business for the years 1972, 1973 and 1974. The data for 1975 was not computed due to an incomplete computer selection for that year.

### Research Design and Procedure

In the study, a total of 7138 specialized farms were selected in 11 farm categories from 1972 through 1975. The numerical breakdown is as follows:

Farm Type	No. of Farms
Dairy Farms - Under 34 Cows	1,236
Dairy Farms - 34 to 54 Cows	858
Dairy Farms - 55 or More Cows	344
Dairy and Hogs Farms	307
Hogs Complete Farms	163
Cash Crop Farms	1,496
Dairy and Cash Crops Farms	1,231
Hogs Complete and Cash Crops Farms	842
Hogs Finishing and Cash Crops Farms	210
Feeder Cattle and Cash Crops Farms	264
Beef Breeding and Cash crops Farms	187
TOTAL	7,138

The profitability factors examined in this study are taken from Table 8 of each farm business summary which met the aforementioned criteria.

- Whole Farm Labor Earnings
- Crop Yield Index
- Gross Return Per Cropped Acre
- Percent Land in High Return Crops

- Index Return Per \$100 Feed Fed
- Livestock Intensity Per 100 Acres
- Total Work Units
- Work Units Per Worker
- Power, Machinery, Equipment and Building Expense Per Work Unit
- Capital Investment Per Worker

These factors were examined through the use of a number of mathematical procedures. They utilize the breakdown of the 11 farm types over four years creating 44 subtests of information for each procedure. The methods of analysis for these subtests of data are:

- Means of whole farm labor earnings groups compiled by increments of profitability factor achievement.
- Means and standard deviations of all variables.
- Correlation matrices developed through the use of Pearsons Product Moment Correlation statistic.
- Forward multiple stepwise regression models.
- Rank ordering of variables as developed by the regression models.

#### Findings of the Study

The findings of this study were as follows:

1. All specialized farm types comprise approximately 45 percent of the total number of farms in the Minnesota Vocational Agriculture Farm Management Education Program.
2. Means of the profitability factors and labor earnings indicated the specialized farms were generally similar in size, efficiency and cost when compared to the total population in the Minnesota Vocational Agricultural Farm Management Education Program.
3. Specific farm types demonstrated individual differences when the means of the profitability factors were compared with other specialized farm types.
4. The evaluation of labor earnings levels through the method of adding profits factor categories for those equaling or surpassing the group means were not consistent with the results of this study. This method does not allow for the high contribution of some profitability factors and the minor or negative contributions of other factors.
5. Forty-three of the 44 regression models which examined the four years of data for the 11 farm types were statistically related to whole farm labor earnings at the 5 percent level of significance.
6. The regression models predicted the percentage of labor earnings in a range from 13.3 to 90.3 percent of

the total. Eighty percent of the 44 models were able to predict from 30 to 70 percent of whole farm labor earnings.

7. Three variables were consistently important in predicting labor earnings when examined over all farm types for four years. They were: 1) total work units, 2) index return per \$100 feed fed, and 3) gross return per cropped acre.
8. Three variables were consistently important in predicting whole farm labor earnings when examined over a four year period by two principle farm groups: 1) livestock only farms, and b) livestock and crops farms. These variables were: 1) index return per \$100 feed fed, 2) total work units, and 3) gross return per cropped acre. The value of crop yield index, a fourth variable, was only slightly less important than gross return per cropped acre.
9. Three variables important in predicting whole farm labor earnings for cash crops farms were: 1) total work units, 2) work units per worker, and 3) crop yield index.
10. The three sizes of dairy farms in this study had identical variables ranked in first and second place. Index return per \$100 feed fed was ranked number one and gross return per cropped acre was ranked number two for all dairy farms.
11. Four farm types had total work units and index return per \$100 feed fed ranked one and two respectively as the two most important predictors of whole farm labor earnings. The farm types were: 1) dairy and hog farms, 2) hogs complete farms, 3) hogs complete and cash crops farms and 4) hogs finishing and cash crops farms.
12. Two farm types had index return per \$100 feed fed and total work units as the first and second best predictors of whole farm labor earnings. The farm types were: 1) dairy and crops farms, and 2) feeder cattle and cash crops farms.

#### Conclusions

Based on the information developed from this study, the following conclusions have been developed.

1. Specialized farm types, as defined in this study, make up almost half of the clientele in the Minnesota Vocational Agriculture Adult Farm Management Education Program. This provides a broad base for application of the findings from this study.
2. The profitability factors, as found in Table 8 of the Annual Farm Business

Analysis Report, are related to whole farm labor earnings in a reasonably predictable and consistent manner.

3. Three of the factors predict labor earnings with enough consistency over years and among farm types to be of practical value for planning and decision making. They are, ranked in order of importance:
  - 1) Total work units or size of business.
  - 2) Index return per \$100 feed fed.
  - 3) Gross return per cropped acre.
 The value of a fourth variable, crop yield index, as a predictor of labor earnings, is only slightly less than gross return per cropped acre.
4. When all specialized farm types are analyzed together for predictors of whole farm labor earnings, two factors are relatively equal in importance. They are business size (total work units) and feeding efficiency (index return per \$100 feed fed). Gross return per cropped acre also determines whole farm labor earnings but to a lesser degree.
5. Feeding efficiency is the most important predictor of labor earnings in all sizes of dairy farm in this study. This indicates the feeding program and its management is of critical importance to the successful operation of the dairy operation.

The second most important predictor for dairy farm is the gross return received from the cropping program. This supports the contention of many farm managers that a strong cropping program is integral to a successful dairy operation.

Business size, total work units, is the third best predictor of labor earnings by dairy herd size. The variable may have been of greater importance if all three dairy categories were placed in a common group and the continuum relating to size could have been further examined.

6. An analysis of all specialized farm types containing hogs indicates business size is the most important predictor of whole farm labor earnings. This is complemented by the second most important variable which is feeding efficiency. Without the support of an excellent feeding program, business size would be of little or negative value in its association to labor earnings.
7. Business size is the most important predictor of whole farm labor earnings for cash crop farms. This is complemented by the factor crop yield index which accounts for the production from the tillable farm

land. Business size would not be a good predictor of labor earnings if it were not supported by a well-managed cropping program.

### Recommendations

The recommendations derived from this study are as follows.

1. The educational curriculum developed as part of this study should be included in the adult farm management curriculum guide. It will increase the value of the study through the specific use in the adult farm management classes.
2. Initiate a computer program which would alert the farmer and the farm management instructor that an individual farm record is within the criteria established for specialized farm types. This would allow for more specific evaluation of the farm business in view of the findings of this study.
3. Retain the use of the eight management factors used in this study for future farm business analyses. While all are not highly related to earnings, they serve many other purposes in the analysis of individual farms. These factors must be maintained in a manner consistent with their initial creation, to give the farm family timely and useful information about their farm business.
4. Make greater research use of the available farm records, within appropriate guidelines to maintain confidentiality. These farms records provide an excellent source of empirical data which is consistent and highly accurate. Additional research can be used to improve existing knowledge and utility of the farm management education program and the farm business analysis for the clientele in the program. Because it is a major objective of the program to help farm families meet their goals, research in this area must be continued if adequate technical and educational support are to be maintained in the program.

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