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The Effectiveness of Women's Agricultural Education Programs: A Survey from Annie's Project

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This study determined the effectiveness of 'Annie's Project—Education for Farm Women' in improving women's skill sets. Illinois farm women who participated in Annie's Project were given a pre–test or baseline survey which measured farming practices in the five areas of risk (production, marketing, financial, legal and human resource). The women were later resurveyed. The main methodology to measure improvement in skill is calculated by the difference in the percentage of 'yes' responses from the baseline to the post–test. Results suggest an overall increase of 10.92 percent with the largest improvement occurring in the financial area of risk. In general, the differences in 'yes' responses were found to be significantly different from zero. Regression analysis was also performed to determine whether socio–economic variables, such as marital status and farm size, play a role in the difference in the percentages of 'yes' responses.

Keywords: farm women, educational programs, annie's project

Introduction

Educational outreach programs for farm women are becoming more prevalent throughout the United States. The Alaskan Women in Timber, the Minnesota Agri–Women and the University of Vermont's Women's Agricultural Network are just a few of a growing number of outreach programs. The central research question for this research is: are these programs effective in increasing the skills of farm women? A secondary research question is: are any socio–economic variables essential in explaining who could benefit from educational programs?

This study focuses on one program known as 'Annie's Project—Education for Farm Women' as an example. The main purpose of this article will be to assess the effectiveness of Annie's Project by considering the extent to which Illinois women's skill sets improved as a result of participating in the program. The paper includes the following: literature review and conceptual model, purpose and objectives, program description, research methods and data, survey results and conclusion. The methods and results rely on a statistical review of survey responses based upon analysis of mean, variance and multiple regression. Results indicate a significant increase in women's skill sets. There is some evidence from regression analysis, but highly inconclusive, that socio–economic factors may play a role in the skills gained by women participating in Annie's Project. It is more likely that the increase in skill sets occur regardless of socio–economic factors.

Literature Review and Conceptual Model

For a variety of factors, the role of women in agriculture is increasing. A brief review of the literature showed that the role of women is indeed increasing but the reasons for this increase are complex. The main purpose for this paper is more modest than fully understanding the causes of women's role in agriculture; it is to evaluate educational programs, such as Annie's

Project, that might help educate women for increased production and financial management of farms. Regardless of the reasons for the increase, educational programs need evaluation. However, the reading of the literature helps inform the authors' underlying conceptual model.

According to the 2002 US Census of Agriculture, women farm operators increased more than 13 percent between 1997 and 2002. Furthermore, the number of acres operated primarily by females increased by 16.5 percent. This evidence continues a trend established during the 1980's. Between 1980 and 1990, farm sales and real estate values plummeted, causing the most recent farm crisis (Lobao & Meyer, 2001). It was during this crisis that women's participation in farm production and financial management increased dramatically. On the other hand, other authors argue the role of women in agriculture has always been significant but invisible (Sachs, 1983; Whatmore, 1990).

Empirical studies have suggested that one should expect women's involvement in farm management to increase when profitability diminishes and when farm size becomes smaller (Barry & Yoder, 2002; Buttel & Gillespie, 1984). The increased trend in women's involvement in production and financial management has also brought greater attention to gender divisions of labor and increased study in the literature. Others have argued that women's role in agriculture will increase with alternative marketing and production methods (Trauger, 2004).

Literature on gender roles in agriculture also point to a significant and increasing role for women in agriculture. McGonigal (1993) studied the roles of New York farm women and found that more than 75 percent of the women helped with farm management decisions in addition to juggling an off–farm career and household duties. These and other contributions by farm women date back to the pioneer days; unfortunately, the extent to which women contributed at that time is unknown, mostly because the evidence comes from two–century-old letters or personal diaries (Alston, 1998).

Simpson (1998) reported that the nature of farm women's work is usually associated with various production tasks, bookkeeping and household tasks, while men are more likely to be involved with the physical or structural aspects of the farm. As modern farms have evolved, production and financial management have increased in importance and have involved women more compared to traditional roles.

Motivations play a large role in the gender division of labor. Men are usually motivated by high incomes and material rewards, while women are found to be motivated by 'the need for independence.' Women seek recognition from others and desire to put their skills and knowledge to use (Hisrich & Brush, 1986).

Carmen Albright (2006) focused upon the changes in the roles of farm women and what these trends meant for researchers who are addressing the needs of local farm women. She noted that educators began to notice the rapidly changing roles for farm women in the mid-1980. At that time, conferences aimed to suit the changing needs of women began to emerge in some states. The demand for these conferences has continued to rise as the needs and roles of women have changed. In this article, Albright reviewed surveys conducted with women who attended the 2005 and 2006 Arkansas Women in Agriculture Conferences. Albright discovered that women who are involved in the agricultural community are more likely to be involved in multiple roles, such as leadership and decision making.

Based on the authors' reading of the literature, causes for change in women's roles on farms are complex. Yet the effectiveness of educational programs should be studied. This conceptual model is based on the fact that Annie's Project, and educational programs in general, can increase women's proficiency in five specific risk categories derived from the literature: marketing, financial, human resource, legal, and production.

Purpose and Objectives

Given that the role of women in managing farm operations is increasing and, further, that educational outreach programs for farm women are becoming more prevalent, the main objective is to evaluate one program popular in many farm states, Annie's Project. Although the causal nature of changing roles in agriculture is complex, evaluating increasingly important educational programs is essential. A secondary objective is to determine the effectiveness of

Annie's Program based on socio–economic factors that might help targeted educational programming in the future.

Program Description

Annie's Project was founded in 2002. The initial grant funding for Annie's Project was obtained from Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers (OASDFR), a United States Department of Agriculture initiative. Significant funding was also provided by the North Central Risk Management Education Center located in Lincoln, Nebraska. The main objective of OASDFR is to provide outreach and assistance activities which enable minority farmers to own and operate farm and ranch businesses successfully (Dismukus, 1997).

The mission of Annie's Project is "to empower farm women to be better business partners through networks and by managing and organizing critical information" (Eggers 2002). The target audience for the program is farm women who have a passion for business and a desire to be involved. More than 4,800 farm women from 25 states have enrolled in the Annie's Project program. The average age of these women is 46.7 years with a reported average of 18 years farm experience. The average number of acres operated for all participants is 613 acres. Nationally, 67 percent of the women reported farm income greater than $150,000. Eighty–six percent of the farm enterprises are arranged as sole proprietorships. Most of the women, 76 percent, are married, and 17 percent are single. Widowed and divorced women account for 7 percent of Annie's Project participants. Thus Annie's Project participants vary widely in demographics and are from diverse backgrounds.

Annie's Project, along with many women's educational programs, is a fairly new endeavor. There is a practical need for research to determine the effectiveness, or impact, of these newly emerging programs, and sponsors such as OASDFR could benefit from this knowledge.

Methodology and Data

Annie's Project is designed specifically to empower women by providing the necessary tools and networks which are vital to running a successful operation. Teo (1996) found that successful businesswomen have access to current technology, training, and other educational programs. The authors hypothesize that Annie's Project is increasing women's proficiency in five specific risk categories derived from the literature: marketing, financial, human resource, legal, and production.

The methodology used to explore this hypothesis is a comparison of survey responses. These responses were generated from a pre–test survey administered during the first session of each Annie's Project program and identical post–tests mailed at least six months after the completion of the program. Post–test surveys were mailed to every Illinois Annie's Project participant who participated between 2004 and 2007. Of the 190 participants, 92 returned the post–test, representing a 48.4 percent response rate. The identical surveys were structured into two distinct parts. First, socio–economic descriptors establish age, number of children, marital status, farm size, years of experience, business structure, and income. The second part of the survey consists of 49 'yes' or 'no' questions which inquire about the individual's business acumen in the five risk categories.

Married women accounted for 82 percent of the Illinois Annie's Project participants, followed respectively by widowed (10 percent), single (4 percent), and divorced (4 percent). Married participation was slightly higher than the national averages reported earlier as was that of widowed participation. The average age of the participants was 48.9 years with 23 years of farm experience, both higher than the national average. Average family size was three children. The average number of acres owned is 406. In Illinois, 40 percent of the women reported farm income of greater than $150,000. Both these measures of farm size are smaller than the national average of Annie's Project participants. As was the case with national participants, the greater proportion of farm businesses represented, about 67 percent, were in sole proprietorships. Approximately 87 percent of the women were from crop production farms while 43 percent help manage livestock farms.

Table 1 shows the changes in 'yes' responses for eight selected questions that relate to the five risk areas: marketing, financial, human resource, legal, and production.

Table 1
Summary of 'Yes' Responses for Selected Questions

Question	*Pre–test Percent Yes*	*Post–test Percent Yes*	*Difference*
Production records	70.00%	83.70%	13.70%
Marketing plan	10.00%	22.80%	12.80%
Balance sheet	55.80%	77.20%	21.40%
Income statement	43.20%	68.50%	25.30%
Comfort with debt level	66.30%	84.80%	18.50%
Next generation plan	45.30%	64.10%	18.80%
Life insurance	90.50%	95.70%	5.20%
Will	70.00%	76.10%	6.10%

The first item in the table, production records, relates to a production area question, *do you keep production records such as yields, hundredweight sold, inventories, etc.?* Seventy percent reported keeping such records on the pre–test while 83.7 percent responded 'yes' on the post–test. The difference of 13.7 percentage points is assumed to be a result of participating in Annie's Project and applying the learned skills to the production operation.

The second item in Table 1, market plan, is related to a specific market planning question: *do you have a written marketing plan?* An astonishing 90 percent of the pre–test participants reported not having written marketing plans. The number of respondents who implemented marketing plans as a result of taking the program increased by 12.8 percentage points.

Financial related questions ask whether the participant prepares annual balance sheets and income statements. Approximately 56 percent prepared balance sheets and 43 percent prepared income statements at the time of the pre–test. These percentages increased by 21.4 percentage points and 25.3 percentage points, respectively. Comfort with the farm's level of debt increased by 18.5 percentage points. The increase for this question is interesting because the *amount* of debt most likely stayed the same in the short period between pre- and post–testing. It is likely women became more comfortable with the debt level as a result of program participation and acquiring a better understanding of the borrowing process.

Additional questions dealt with human resources and were both legal- and family-oriented. The 'yes' response to '*do you have a plan for passing your business to the next generation?'* had a difference of 18.8 percentage points. Participants increased ownership of personal life insurance policies by about six percentage points. A similar number of participants implemented a will as a result of Annie's Project.

A comparison of pre–test and post–test 'yes' responses by risk category are summarized in Table 2. For all risk categories, the proportion of 'yes' responses increased. The largest impact is in the financial category with a difference in 'yes' responses of 15.58 percentage points. The category with the smallest impact is the production category with a change of 5.18 points. This result is consistent with the findings from Simpson et al. (1998), who reported that women are more likely to contribute to bookkeeping tasks rather than physical production tasks. Women may have been more familiar with financial planning to begin with and, hence, more attuned to ways to improve such planning. Other categories which exhibited large increases in 'yes' responses are legal and human resources.

Table 2
Pre–test/Post–test Comparison by Risk Category and by Total

Risk Category	# of questions	Pre–test % Yes	Post–test % Yes	Difference
Production	12	47.63%	52.81%	5.18%
Marketing	6	26.58%	35.33%	8.75%
Financial	15	56.74%	72.32%	15.58%
Legal	6	50.96%	64.67%	13.71%
Human Resources	10	49.21%	59.67%	10.46%
All Categories	49	48.57%	59.49%	10.92%

Survey Results

The extent that Illinois women's skill sets improved in the five areas was measured by calculating the difference in the number of 'yes' responses from the baseline pre–test to the post–test. The authors assumed that an increase in 'yes' responses indicated an increase in skill level. Statistically significant increases in these skill levels would indicate that Annie's Project is indeed effective. Statistical analysis of mean and variance in both responses and across individuals combined with a multiple regression framework to discover whether socio–economic descriptors contribute to the increase in 'yes' responses were explored.

It was hypothesized that there would be a statistically significant increase in the proportion of 'yes' responses. The results were reported for individual risk categories as well as across all categories combined. A similar hypothesis testing procedure was employed to gauge improvement in the mean of the individual increase in 'yes' responses. It was hypothesized that there would be a significant increase in the mean of individual 'yes' responses. It was further hypothesized that the individual variability in post–test 'yes' responses would significantly decrease from the pre–test. This decrease in variability would suggest that the overall content of the program is an effective means to improve the comprehensive extent to which Illinois women's skill sets improved.

Hypothesis tests designed to determine whether the increase in 'yes' responses exhibited in Table 3 were performed on both responses (proportions) and across individuals (means and variance). These three tests were conducted for each category of risk and in total. The tests for proportions and individual mean responses were two–sample tests of hypothesis employing the Z–statistic. The two-sample test for variance employs the F–statistic. The results depicted in Table 3 indicate the increases in 'yes' responses are indeed statistically significant.

All but one of the comparisons are significant at least the 0.01 level of significance. The weakest link between Annie's Project participation and the increase in 'yes' responses was in the production area. As discussed before this result is consistent with the findings from Simpson et al. (1998). The improvement in all other risk areas, and in total, is highly significant. The all-category decrease in the variances of 'yes' responses is significant at the .001 level, but this is not consistent across individual categories. Significant decreases in the variance were observed at the 0.05 level of significance in the production, financial, and legal risk areas. The decrease in variance in the marketing and human resources risk areas did not prove to be significant in this study. In view of Table 3, evidence suggests that Annie's Project is an effective program.

Table 3
Significance Testing for Responses (Proportions) and Individuals (Means and Variance)

Risk Category	% Change	Z (Proportions)	Z (Means)	F (Variance)
Production	5.18%	2.99**	2.07*	1.62**
Marketing	8.75%	3.57***	2.47**	0.91
Financial	15.58%	9.01***	6.95***	1.47*
Legal	13.71%	5.60***	5.15***	1.78***
Human Resources	10.46%	5.23***	4.72***	1.03
All Categories	10.92%	12.13***	6.73***	1.95***

*p < .05, **p < .01 ***p < .001

Multiple Regression Analysis

Barry and Yoder (2002) have demonstrated that socio–economic factors play an important role in defining both women's roles and their level of participation in agriculture. A regression analysis was performed to determine if the socio–economic descriptors included in the first part of the survey impacted the difference in 'yes' responses between the pre–test and the post–test. Because of the confidential nature with which information was collected, the following procedure was introduced: Multiple random samples of the 190 pre–test survey responses were matched with the 92 post–test responses. This study will present the results of six of these. A backward linear regression elimination of independent variables routine was then applied to determine which socio–economic characteristics influenced the change in 'yes' responses. Backward linear regression analysis is a procedure in which all independent variables are considered in the beginning and then systematically removed one by one. The variable which gets removed first has the least correlation with the dependent variable. The removal process continued until none of the variables met the removal criterion. The significance level for independent variable removal was set at a 0.20 significance level to allow for a robust level of inference from the sample data.

The multiple regression model used represents a composite of demographic independent variables and is specified, in general terms, as:

$$\Delta Yes = f(IC, S, SB)$$

where:

ΔYes = the change in 'yes' responses between the pre–test and post–test surveys.

IC = individual characteristics developed from the pre–test survey demographic responses and includes age, years of experience, marital status, and number of children.

S = size characteristics developed from the pre–test survey demographic responses and includes number of acres operated and categorical income levels specified as <$50,000; $50,001 to $150,000; $150,001 to $300,000; and >$300,000.

SB = business structure characteristics developed from the pre–test survey. Farm business was classified categorically as sole proprietorship, partnership, S–Corporation or C–Corporation, Limited Liability Company, and other.

In total there were 17 independent variables developed from the surveys. Four of these were discrete variables: age, years of experience, acres operated, and number of children. The remaining variables were categorical constructs representing marital status, income, and business structure. Table 4 presents the results of the backward elimination process for six random samples of the pre–test data.

Table 4
Backward Linear Regression: Impact of Socio–Economic Factors

	1	*2*	*3*	*4*	*5*	*6*
Age	—	-2.38***	—	—	-2.26***	-2.35***
Acres Operated	-1.63*	—	-1.65*	—	-1.66**	-1.34*
Children	1.77**	1.61*	2.00***	—	—	2.44***
Less50	—	1.64*	—	—	—	1.46*
Divorced	-1.32*	—	—	—	—	—
Widowed	-1.53*	—	—	—	—	—
LLC	1.57*	—	—	—	—	—
150to300	—	—	–2.06***	—	—	—
Partner	—	—	—	1.449*	—	—
Greater300	—	—	—	-1.86**	—	—
F	2.11**	2.48**	3.43***	2.08*	3.80***	2.69***
R Square	0.12	0.09	0.12	0.05	0.09	0.12

* p < .20 ** p < .10 ***p < .05

A review of Table 4 does offer some insight into factors that may influence the success of Annie's Project, but again, the evidence is not consistent for the random samples. Age appears in the final regression three out of six times. All three coefficients were significant at the 95 percent confidence interval. The negative signs suggest that, as age increases, the increase in 'yes' responses is smaller. Acres operated appears four times with one regression exhibiting a significance level at 0.10, and all four coefficients were negative, suggesting that, as farm size increases, the increase in 'yes' responses is smaller. In other words, older women and women from large farm operations are less impacted by the class than women from smaller operations. The number of children appears four times at a level of significance much like age, but all coefficients were positive, suggesting a positive relationship between children and number of 'yes' responses. In other words, as the number of children increases, the increase in 'yes' responses will increase. As may be recalled, many of the questions in the human resource risk area dealt with intergenerational issues such as planning to pass the farm down and developing a will. Further sampling did not offer any additional evidence that socio–economic factors play a consistent and significant role in gauging the effectiveness of Annie's Project than offered here.

Conclusions

As the number of female principle operators continue to increase, we will most likely continue to see an increase in the demand for educational outreach programs for women such as 'Annie's Project—Education for Farm Women.' This program offers extensive, hands–on training to women who have a desire to become better farm managers. The participants are from diverse backgrounds. For example, ages in the Illinois program range from 18 to 86 and computer skills range from no –experience to highly –experienced.

There is a need to study the effectiveness of educational outreach programs, particularly Annie's Project as the program has extended to other Mid–Western states. This study determines the effectiveness of the program by examining the improvement in skill sets of Illinois farm women who have participated in the program.

The research question for this study inquires whether Annie's Project is increasing women's proficiency in farm business management in the five areas of risk: production, marketing, financial, legal, and human resources. Multiple

hypothesis tests performed across responses and individuals to gauge the effectiveness of the Annie's Project were quite consistent. A significant increase in 'yes' responses appeared in all areas of risk and in total. The variability of responses also significantly decreased in total and for three out of five risk areas. The overall content of Annie's program is an effective means to improve the comprehensive extent to which Illinois women's skill sets improved. These results have important implications for OASDFR and other sponsors of these programs. Programs such as Annie's Project should continue.

Multiple regression analysis was also undertaken to determine if socio–economic factors played a critical role in determining who benefited most from Annie's Project. The evidence was inconclusive as class participants were not tracked as the identity of individuals was withheld in the post–test surveys. However, age, acres operated, and number of children may play a role in the benefit received by individual class participants. If the authors can speculate, the results suggest that younger women, from smaller farms, most likely with children, seemed to benefit to a greater degree from class participation. Hence the programs have a target audience to whom course materials can be structured. On the other hand, older women, likely from larger farms, did not experience the same degree of benefits as the increase in 'yes' responses diminished with age and farm size. Suggested here is that there may be unique needs in this population that need identification. It is the authors' recommendation that, in order to conclusively determine the impact of socio–economic factors, a more structured sampling process that allowed for better tracking of individual specific responses would be required. The more evident and important conclusion however lies in the strength of the general hypothesis testing procedures outlined in this paper. Increases in skill sets likely occur regardless of socio–economic factors, and therefore programs like Annie's Project will be beneficial to all participants regardless of socio–economic background.

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