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A Comparison of Farmers Who Do and Do Not Use Cooperative Extension Services

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A Comparison of Farmers Who Do and Do Not Use Cooperative Extension Services

Abstract

Land-grant universities have a historical role of serving Americans through the Cooperative Extension Service (CES); however, not all citizens are equally served by CES. Using a mailed survey, we identified a subpopulation of farmers who did not use CES and compared them to those who did. CES should develop communication systems that reach late adopters using their preferred modes of receiving information such as direct mailings. It is the responsibility of the CES to serve all stakeholders through the mandate of the Morrill Act.

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Introduction

The land-grant university has a historical role of serving all Americans through teaching, research, and service via the Cooperative Extension Service (CES). In seeking to develop a model for gathering stakeholder input (Kelsey & Mariger, 2002), the researchers discovered a subgroup of farmers who did not use the CES. This paper statistically compares farmers who used the CES to those who did not.

The study reported here was concerned with wheat farmers' use of the *information dissemination process* developed by CES to teach Americans about new innovations developed at the land-grant university. The subpopulation of interest was those wheat farmers who reported that they did not use the CES as a source of information for wheat production. These farmers are referred to as *non CES users*. The farmers who were using CES are referred to as *CES users*.

Purpose and Objectives

Because of the need to better serve all citizens, the study sought to explore differences between those farmers who used CES programs and those who did not. The objectives of the study were to:

1. Identify differences in demographic and operational characteristics of farmers based on their use of CES programs.
2. Describe the differences in the agricultural problems, challenges, and concerns of farmers based on their use of CES programs.
3. Identify differences in the factors farmers consider when making production-related decisions based on their use of CES programs.
4. Identify differences in informational sources preferred by farmers based on their use of CES programs.

5. Determine the most effective means of communicating with farmers did not use CES programs.

Methods and Data Analysis

The study used an *ex post facto* descriptive design for data collection via a self-administered mail survey. The population consisted of 15,000 Oklahoma wheat farmers (Census of Agriculture, 1997). A proportionally stratified random sample ($n=750$) based on the population of wheat farmers in each of the state's 77 counties was drawn (Ary, Jacobs, & Rasavieh, 1996).

The survey instrument was developed in conjunction with wheat specialists to gather input from farmers regarding their demographic profile, communication history with the land-grant university (including use of CES programs), wheat production operations, problems, decisions, and sources of information. The survey included Yes/No responses, Likert-type scales, check all that apply responses, and fill in the blank responses. To establish face and content validity, the survey was circulated among five wheat specialists and a panel of experts comprised of four extension educators and two agricultural economics faculty.

The survey was pilot tested with a simple random sample of farmers ($n=100$) using a one-shot mailing. These farmers were removed from the sample frame and not contacted again. The data from the 20 returned surveys was statistically analyzed for reliability and qualitatively analyzed for ease of response by examining each survey for correct response format. Revisions were made to the survey to increase the ease of responding to the survey. The final survey was mailed to 750 farmers following a four-phase modified version of Dillman's (2000) procedures. A 29% ($n=218$) useable response rate was achieved. The Cronbach's alpha test of reliability yielded a coefficient of 0.94 (on a scale of 0 to 1.0) for all Likert-type scale items, meaning the survey was extremely reliable (Ary, Jacobs, & Rasavieh, 1996).

Control for non-response error was addressed comprehensively. Demographic information (mean age and land ownership) of respondents was compared to corresponding characteristics of the known population (1997 Census of Agriculture). Early (first quartile) versus late (last quartile) respondents were compared for differences on ten summated scale items regarding the importance of factors in making decisions about wheat production practices. Ordinal data can be treated as interval data for the purpose of comparing two groups (Kerlinger, 1986). Using an independent samples *t*-test, no significant differences were found between early and late respondents for these procedures.

In addition a random sample of 10% ($n=33$) of the non-respondents were telephoned by the Agricultural Statistics Service and asked to complete selected portions of the survey (Lindner, Murphy, & Briers, 2001). No significant differences were found in the mean age of respondents versus non-respondents ($\alpha=0.025$).

Of the 10 survey questions that were compared for differences, one item pertaining to the degree of importance of the terms of lease/agreement with landowners was found to be significantly different. Given the strength of the evidence that there were no differences between early, late, and non-respondents, the survey results can be generalized to the population of the state's wheat farmers minus the one variable.

Tests and procedures employed in the data analysis included student's *t*-tests, Chi-Square tests, and Cronbach's alpha. The data analysis yielded asymmetrical distributions for the smaller groups. While the data in this study met the assumptions of interval/ratio measurements, randomness, and independence, the small size of the group of those who did not use CES programs or literature ($n=24$) threatened the assumptions of normality and homogeneity of variance. We used a number of strategies to correct for the small size and lack of balance in the analysis.

Chi-Square tests were used to measure differences between groups on nominal and ordinal variables. The alpha level of 0.025 was set *a priori* and was used for all statistical tests and procedures. The Statistical Package for the Social Sciences (SPSS) version 8.0 was used for all statistical analyses.

In order to determine if the respondents were users of CES information, they were asked two questions on the survey. First, they were asked, "Do you communicate directly with land-grant faculty members, and if so, who" and given a Yes/No response set along with a space to write in their contact person. The listed contact person was then cross-referenced by us to verify that they were indeed university employees, specifically, CES personnel.

Second, they were asked, "Is there a reason for not using the CES to help you solve your wheat production problems?" and given 8 options to check, including the response "I do use extension" (option 8). If the respondent checked "No" to the first question and any of the first 7 options on the second question, they were categorized as *non CES users*. There were 24 individuals who fell into this category.

We make no claims or inference beyond the population of wheat farmers identified for this study. Readers may note certain parallels between the findings of this study and other populations, but should exercise caution in interpreting the findings to other groups.

Findings

The first objective was to identify differences in demographic and operational characteristics of farmers based on their use of CES programs. The groups were compared using either *t*-tests for interval and ratio types of data and Chi-Square tests for nominal and ordinal variables. The interval/ratio demographic variables were age, acres of wheat planted 2000-2001, percent of land owned versus rented, membership in agricultural organizations, and hours spent farming per week. An independent samples *t*-test indicated no differences between the groups in age, ownership of land, or hours spent farming per week.

The acres of wheat planted in 2000-2001 (an indicator of farm size) and membership in agricultural organizations differed significantly between the groups. The *CES users* ($n=140$) planted on average 697 acres versus the *non CES users* who planted 279 acres of wheat ($n=24$). The *CES users* belonged to two agricultural organizations versus the *non CES users* who belonged to one agricultural organization.

Table 1.
Independent Samples t-test: Acres Planted and Membership in Agricultural Organizations

Demographic	t	df	Significance	Effect size
Acres planted 2000-2001	4.491	63.767	0.000	Large
Membership in agricultural organizations	2.934	34.541	0.006	Large
Equality of variance not assumed.				

The two groups were compared for differences using a contingency table and the Chi-square test in gender, county of residence, ethnicity, primary source of income, off-farm employment, educational attainment, expansion plans, retirement plans, government farm payments, short-term loans, long-term loans, crop insurance, operation type, crops raised, and livestock raised.

The *non CES users* and *CES users* significantly differed on seven of the 15 variables (Table 2). *CES users* ($n=145$) had a median educational level of *some college*, while *non CES users* ($n=24$) had a median level of *high school graduate*. Overall, the *non CES users* were less likely to belong to an agricultural organization or a grain cooperative, they had fewer long-term loans, wheat was less likely to be their principal agricultural enterprise, and they were less likely to collect on crop insurance.

Table 2.
Chi-Square Test for CES Users vs. Non CES Users for Demographic Variables

Demographic	Chi-Square	df	Significance	Strength of Association
Educational attainment	24.508	8	0.002	Moderate
Ethnicity	14.322	4	0.006	Moderate
Coop membership	12.114	1	0.001	Moderate
Long term loans	7.048	1	0.008	Moderate
Principal enterprise is wheat	6.340	1	0.012	Weak
Collect on crop insurance	5.050	1	0.025	Weak

No agricultural organizations	4.483	1	0.035	Weak
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The second objective was to describe the differences in the agricultural problems, challenges, and concerns of farmers based on their use of CES programs and literature. The *problems* section of the survey asked farmers to respond to 43 summated scale items and one nominal item regarding the degree of severity (not a problem, less serious problem, serious problem, and very serious problem) in the following categories: (a) grazing, (b) diseases, (c) insect pests, (d) weeds, (e) grain quality, and (f) soil fertility. The items were entered into a contingency table based *CES users* versus *non CES users* status. A Chi-Square value, significance, and Cramer's V effect size were calculated for each variable.

Non CES users and *CES users* differed significantly on seven of the 43 wheat production problems, six of these involved wheat disease (Table 3). *CES users* rated wheat diseases and pests (Russian wheat aphids) as more problematic than *non CES users*. When asked to check which of the categories (grazing, diseases, insect pests, weeds, grain quality, and soil fertility) represented their greatest wheat production concern, *CES users* reported that wheat diseases were their greatest wheat production concern at a significantly higher frequency than *non CES users*.

Table 3.

Chi-Square Test of Differences between CES Users and Non CES Users for Diseases

Wheat Production Problem	Chi-Square	df	Significance	Strength of Association
Tan spot	11.615	2	0.003	Moderate
Wheat rusts	9.923	3	0.019	Moderate
Bunts and smuts	9.333	3	0.025	Moderate
Wheat streak virus	9.210	3	0.027	Moderate
Russian wheat aphid	8.149	3	0.043	Moderate
Soil born mosaic virus	8.095	3	0.044	Moderate
Septoria leaf blotch	7.769	2	0.021	Moderate
Greatest concern = disease	4.002	1	0.045	Weak

The third objective was to identify differences in the factors farmers consider when making production-related decisions based on their use of CES programs. The survey included 10 summated scale items. Farmers were asked to rate each factor on its importance using a three-point scale (1=not at all, 2=somewhat, and 3=very important). A Chi-Square analysis revealed that *non CES users* and *CES users* did not differ on maximizing income, commodity prices, minimizing costs, cost of inputs, and the terms of lease agreements with land owners. *CES users* rated long-term sustainability, maximizing yield, crop insurance, government commodity program funds, and interest rates as significantly more important than did *non CES users* (Table 4).

Table 4.

Chi-Square Test of Differences between CES Users and Non CES Users for Decision Making Factors

Decision Making Factor	Chi-Square	df	Significance	Strength of Association

Long-term sustainability	24.486	2	0.000	Relatively strong
Maximizing yield	15.232	2	0.000	Moderate
Crop insurance	14.094	2	0.001	Moderate
Government commodity program funds	12.881	2	0.002	Moderate
Credit interest rates	7.343	2	0.025	Moderate

The fourth objective was to identify differences in the information sources preferred by farmers based on their use of CES programs. The survey contained summated scale items on the frequency of use for 16 potential sources of production information (always, frequently, sometimes, and never). Each of the 16 sources of information was entered into contingency tables based on status and a Chi-Square value, and significance level was calculated for each variable.

There was no difference between *CES users* and *non CES users* regarding their use of non-Extension faculty, the Noble Foundation, trade or technical journals, scientific journals, friends/family/other farmers, newspapers, television/radio, government agencies, farm organizations, crop consultants, the Internet, and public libraries. While *non CES users* used all 16 sources of information less frequently than *CES users*, they used CES publications, CES personnel, other universities, and businesses or suppliers significantly less frequently than *CES users* did (Table 5).

Table 5.
Chi-Square Test of Differences between CES Users and Non CES Users for Sources of Information

Sources of Information	Chi-Square	df	Significance	Strength of Association
CES publications	33.797	3	0.000	Relatively strong
CES personnel	26.372	3	0.000	Relatively strong
Other universities	8.775	3	0.032	Moderate
Businesses or suppliers	8.060	3	0.045	Moderate

The fifth objective was to determine the most effective means of communicating with *non CES users* farmers. Farmers were asked to write an answer to the open-ended question: "How could communication between you and [the university] be improved?" Of the 24 identified *non CES users*, 9 answered the item. The most frequent recommendation for improving communication was to mail information (a newsletter) directly to farmers (Table 6).

Table 6.
Recommendations for Improving Communication between the University and Non CES Users

Comment	Frequency	Percent
Direct mailings of information	2	8.33

Weekly or semi-weekly crop newsletter	2	8.33
Communication should be more frequent	1	4.17
Don't know how to improve communication	1	4.17
Provide information on what help is available	1	4.17
I am a small farmer I don't need CES	1	4.17
CES only helps large farmers with money	1	4.17

Conclusions, Implications, and Recommendations

The statistically significant differences in demographics showed that the *non CES users* planted fewer acres of wheat, belonged to fewer agricultural organizations, had fewer contacts in formal organizations, and had lower educational attainment than the *CES users*. The most frequently cited non-written source of information among the *non CES users* was friends, family, and other farmers. It is recommended that the land-grant university develop communication and service systems that reach *non CES users* using their preferred modes of receiving information, in this case via informal communication channels and direct mailings to all farmers, not just those who request it.

Non CES users and *CES users* did not differ on 36 of 43 agricultural problems and challenges concerning wheat production. The area where they did differ was wheat diseases. Newsletters mailed to all farmers highlighting CES programs and literature would alert farmers to services available regarding disease identification and prevention.

Non CES users were less engaged with the land-grant university via CES than *CES users* on several levels. While it was predictable that those who did not know about CES programs were also less likely to be land-grant university graduates, it is important to note that they were also less frequently related to someone who attended the university. How does the CES break into the informal social networks of the *non CES users*?

Of the nine responses to the question, "how can communication between you and [the university] be improved," four farmers suggested that the university should mail information out to farmers. One farmer requested information on what help the university could provide. Another farmer stated that the university should communicate with him more frequently, while another said, "I don't know how communication could be improved." Two of the comments made by respondents were hostile toward the university, stating, "I am a small farmer and I don't need [the university]" and, "[the university] only helps large farmers with money."

The nature of the recommendations that were provided by farmers supports the idea that in order to serve all farmers, the university must seek them out through targeted mass media advertising campaigns. Mass mailings, newspaper advertisements, and public announcements on radio and television all reach a variety of audiences, including friends and family of *non CES users* who might share information with farmers. CES should invest more resources to advertise programs and literature using public forums that reach a larger audience than is currently served. It is the land-grant university's responsibility to reach *non CES users* farmers through whatever means necessary to fulfill the mission of the Morrill Act.

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