Selecting Delivery Methods for Outreach Education Programs

Bryson R. Carter and Marvin T. Batte[*]

Abstract

Farmer perceptions of extension program delivery methods and an analysis of the relationships of method and farmer characteristics to evaluation scores are presented. Evaluation scores tend to increase with written, interactive and variable-scheduled methods and methods where users determine the agenda. Evaluations tend to be lower for high user cost and "high-tech" methods. Substantial similarity of results exists across groups of farmers differing by age, education levels, farm size and farm type. There are differences, however, in absolute valuation of the method characteristics across the groups.

Key Words: Extension, education, methods

It is a challenge for agricultural economists to provide information that both meets the needs and interest of farmers and is communicated by the most effective method. There are many methods for channeling information to farmers, including farm magazine and newspaper articles, newsletters, bulletins, educational meetings, farm tours, demonstration plots, and computer software. Satellite television broadcasts and video cassette tapes are not commonplace in the farming community, but are gaining in acceptance by farmers. The personalized individual contact between the farmer and educator is still popular and often necessary whether by telephone, office or face-to-face visit.

But all is not well in the educational program delivery arena. Extension personnel note that attendance at many extension educational meetings and field days has declined to the point that some county and state events have been discontinued because of poor attendance. Budget constraints are limiting one-on-one educational contacts. Free and low cost printed materials from land grant universities are not as available as they once were. Local extension budgets are strained, and with higher postage costs, extension publications often sit on shelves unused. And, adoption of high-technology delivery methods by farmers has been slow.

Why is this happening? Does it really matter whether the information is communicated in oral or written form? Is it all that important to allow for physical demonstration of equipment or technique? Should the information flow one way from sender to receiver or is it important to allow for interaction? Is the traditional winter meeting a method that has outlived it's usefulness? These are just a few of the questions facing the outreach educator.

This study was initiated to gain insight into farmer preference for alternative program delivery methods currently used in extension work. Six attributes associated with 19 program delivery

methods were identified for analysis. It was hypothesized that preference for various attributes of a method is a function of farmer and business characteristics. Knowledge of these relationships can allow the extension educator to better select a delivery method that will be readily accepted by the targeted audience. Multivariate statistical techniques are used to relate differences in farmers' evaluations of alternative program delivery methods to physical attributes of the delivery method and farmer characteristics.

Previous Research

Earlier studies have attempted to evaluate educational program delivery methods. These studies often have resulted in varied, and contradictory, conclusions. Gamon, Bounaga and Miller found that Iowa farmers preferred face-to-face discussion, newspaper and magazine articles and newsletter educational methods for learning about soil conservation. In an earlier study, Iowa farmers rated field demonstrations and county and local meetings as a most useful communication method for learning about environmental issues (Bruening). Rollins, Bruening and Radhakrishna found similar results for Pennsylvania farmers.

Riesenberg and Gor classified methods of receiving agricultural information as interpersonal (e.g. on-farm demonstrations) and mass media (home study). They found the interpersonal methods were preferred by farmers over the mass media methods for receiving information on new or innovative farming practices. Bouare and Bowen surveyed agriculture agents in the Ohio Cooperative Extension Service to determine their perception of communication methods most appropriate for outreach education. Agents ranked interpersonal communication most highly, mass media based communication lowest, and public meetings about mid-range. In a study of part-time and full-time beef farmers, Obahayujie and Hillison found that part-time beef farmers preferred more individual contact methods such as on-farm demonstrations and farm and home visits. However, they found the full-time farmers preferred mass contact methods, such as newsletters/publications, bulletins, radio programs, and leaflets/pamphlets.

Preferences for information delivery method also may vary with an individual's learning style. Cano suggests that learning styles vary substantially. At one extreme is the "field dependent" type of learner who wants to be with people and interact with the instructor, who likes the lecture technique and favors the "spectator approach" to learning. At the other extreme is the "field independent" type who prefers to find the answers working alone in the laboratory setting (Cano).

Some learners want action while others do not; some want to discuss topics with a teacher rather than peers; and some abhor written work while others dislike reading (Golay). Golay stresses a point that "it is the student's personality style that determines which instructional methods will be most effective...we must adapt to his nature rather than try to alter him to our wishes."

The Myers-Briggs Type Indicator clearly suggests that people differ in the way they collect and process information. Some people, identified as sensing types, use their eyes, ears, and other senses to identify what is actually there and actually happening. These types "tend to accept and work with what is 'given' in the here-and-now, and thus become realistic and practical" (Myers, p. 5). Other people acquire information "through intuition, which shows you the meanings, relationships, and possibilities that go beyond the information from your senses" (Myers, p. 5).

These studies show that people have differing preferences about how they learn; they do not explain the connection between learning preferences and characteristics of delivery methods. The purpose of this study is to investigate that relationship so that educators can match methods to learners. If one knows the characteristics or attributes of a delivery method, then one can predict how well that method will be received or used by a group of learners.

Methods

The approach used in this research was to first ask farmers to evaluate each of 19 delivery methods frequently used by Extension Service educators. Mean evaluation scores were calculated and all 19 methods were ranked from highest to lowest mean. A second and more extensive step was then taken to use multivariate statistical

techniques to investigate how various attributes of delivery methods impacted farmer scores.

The procedure for obtaining the data, descriptive statistics for the sample, and a summary of the initial survey responses are presented first to establish a point of reference for the ensuing discussion. Then the rationale, application and statistical analysis relating to delivery method attributes follows as three separate, but closely connected units of methodology.

Data Collection and Survey Results

In a 1990 survey, active farmers[1] selected at random from United States Department of Agriculture, Agricultural Stabilization and Conservation Service mailing lists in nine southern Ohio counties, were contacted by mail and asked to evaluate various aspects of a farm management education program. The section of the survey that pertains to delivery methods is presented in the appendix. Questionnaires were mailed during the summer and early fall of 1990 to 2,571 farmers. Fifty-one percent of the farmers responded to the survey. Eleven percent of the sample indicated they were no longer farming. Another three percent preferred to not participate. Nine hundred forty-nine farmers were actively farming, completed the survey instrument and served as a basis for these analyses.

Table 1 provides descriptive statistics for the sample and comparable statistics from the Census of Agriculture. Average farm size and gross sales were larger for the sample than for the Census of Agriculture, suggesting that the sample may under-represent small, part-time farm operators.

Average farm size for the surveyed farms is 373 acres. Average respondent age is about 51 years and most are high school graduates owning at least a portion of their farmland. Twenty-four percent reported gross sales from farming exceeding $100,000 in 1989. Over one-half (58%) reported 1989 gross sales under $40,000. Slightly more than half of the farmers work off the farm.

Farmer evaluations of the 19 delivery methods are presented in Table 2. The middle two columns include mean evaluation scores for each of the 19 program methods. The raw score is based

on the five-item evaluation score. The scale ranged from 1 (Dislike) to 5 (Like). Farmers were given the opportunity to indicate that they did not use or were not familiar with a method. The number of farmers evaluating each method is included in the first column of Table 2. The standardized evaluation score was constructed by standardizing individual farmer's responses to the 19 program types so that each farmer's response distribution has a mean of zero and a standard deviation of 1.0. Standardization was done to remove inconsistencies in the way individuals used the five-item evaluation score. A standardized score above zero indicates that the associated program type was evaluated above the mean for all program types.

The five top-ranked methods are farm magazine articles, books and bulletins, newsletters, personal contact with extension professional and farm field days. The five methods receiving the lowest ratings are in-depth three-five day schools, pre-recorded telephone dial-in, computer software, audio cassettes and satellite TV broadcasts. Rank and pattern of usage or familiarity (number evaluating) are not strongly associated. For example, almost as many farmers (882) evaluated newspaper articles as farm magazine articles (884), yet the evaluation rankings were one and six respectively.

Attributes of Delivery Methods - Rationale and Application

There is a wide variation in the average evaluations given to the 19 program delivery methods as evidenced by Table 2. However, the reason for this variation is not apparent. Conceivably, identical subject matter could be communicated using any of these methods. Therefore, the revealed preference for some delivery methods over others must be due to attributes of the delivery method.

Six attributes associated with each of the 19 program delivery methods are identified in Table 3. Each attribute is defined to be binary -- the attribute is present or it is not. Each delivery method was assigned subjectively to an attribute class for each of the six attributes.

One attribute is the form of communication employed. Each method was classified as written or

Table 1. Descriptive statistics for selected farm and farmer characteristics

Measure	Mean	Std. Dev	Mean[a] For Region
Farm acreage	373	525	195 3
Operator age	50 9	13.2	51.9
Operator Education	Percent		
Grade/high school	12 5		
High school graduate	46 5		
Some college/technical school	24.7		
Four-year college degree	8.4		
Post graduate	8.0		
Respondent's Role in the Business	Percent		
Sole owner	67.2		86.6
Equal participant	14.7		
Senior participant	8 4		
Junior participant	2 6		
Other	7 1		
Approximate 1989 Gross Sales From Farming	Percent		
Under $40,000	58 4		82.8
$40,000 - $99,999	17 5		10.5
$100,000 - $249,999	17.2		5.2
$250,000 - $499,999	5.2		1 2
Over $500,000	1.8		0.2
Off-Farm Employment			
Seasonally	6.5		
Throughout Year	45.0		
Total	51.5		57.3
Percent of Spouses Working Off The Farm	45 1		
Business Plan Next Five Years	Percent		
Expand size of business	21 7		
Maintain size of business	49 9		
Retire	14.8		
Other	13.6		

[a]1987 Census of Agriculture means for the nine county region

oral.   Twelve of the program delivery methods relied primarily on oral communication.   The remaining seven, including computer software and educational displays, were judged to involve primarily written (or visual) communication.

The methods also differ in the nature of communication flows.   Some delivery methods allow interaction between the sender and receiver, for instance, interpersonal communications. Others including books, audio and video tapes, and broadcasts, involve only one-way communication flows.   Computer software was included in the interactive category.   Computer-based teaching modules usually are designed to interact with the user, taking different paths based on responses to questions posed of the user. Even decision analysis

software can be viewed as interactive because the user can react to one analysis by changing parameters and solving the problem again to get new information.   Eight of the delivery methods were judged to be interactive.

The program delivery methods also differ in terms of the schedule for delivery of information. All educational meetings are scheduled to occur at a fixed date. The farmer does not determine these dates, but rather decides whether to attend these scheduled meetings.   On   the   other   hand, communication with CES faculty can be initiated by the farmer at his/her (variable) schedule. Similarly, the farmer can consult books, publications, audio or video tapes and computer software when needed.

Table 2. Farmer evaluation of the 19 program delivery methods

Program type	Number Evaluating	Evaluation Scores		Rank
		Raw	Standardized	
Farm magazine articles	884	4.22	0.62	1
Books & bulletins	886	4.15	0 58	2
Newsletters	886	4.12	0 54	3
Personal contact with CES faculty	862	4 01	0.47	4
Farm field days	871	3.97	0.46	5
Newspaper articles	882	3.79	0.21	6
Visits to research farms	861	3.72	0.19	7
Farmer get-togethers	857	3.64	0.13	8
Videocassette tapes	651	3.47	0.05	9
Radio programs	876	3.41	-0.11	10
Evening educational meetings	857	3.39	-0.10	11
Learn-by-mail series	796	3.29	-0.23	12
In-depth one-day workshops	821	3 26	-0.21	13
Educational exhibits & table displays	763	3.15	-0 33	14
Satellite broadcasts of CES programs	522	2.99	-0.37	15
Audio cassettes	710	2.96	-0.46	16
Computer software	545	2.79	-0.57	17
Pre-recorded telephone dial-in	730	2 60	-0.81	18
In-depth 3- to 5-day schools	716	2.54	-0.88	19
Mean		3.50	0 00	
Standard Deviation		1.24	1 00	

Table 3. Attributes of the 19 program delivery methods

Program type	Oral or Written	Inter-active	Fixed or Variable Schedule	User Deter-mines Agenda	Explicit Cost	High Tech?
Audio cassettes	Oral	No	Variable	Yes	Low	No
Books & bulletins	Written	No	Variable	Yes	Low	No
Evening educational meetings	Oral	Yes	Fixed	No	Low	No
Farm field days	Oral	Yes	Fixed	No	Low	No
Visits to research farms	Oral	Yes	Fixed	No	Low	No
Learn-by-mail series	Written	No	Variable	No	Low	No
In-depth one-day workshops	Oral	Yes	Fixed	No	Low	No
Newsletters	Written	No	Variable	No	Low	No
Newspaper articles	Written	No	Variable	No	Low	No
Farm magazine articles	Written	No	Variable	No	Low	No
Personal contact with CES faculty	Oral	Yes	Variable	Yes	Low	No
Farmer get-togethers	Oral	Yes	Fixed	Yes	Low	No
Radio programs	Oral	No	Fixed	No	Low	No
Pre-recorded telephone dial-in	Oral	No	Variable	No	Low	Yes
Satellite broadcast of CES programs	Oral	No	Fixed	No	High	Yes
Videocassette tapes	Oral	No	Variable	Yes	Low	Yes
Computer software	Written	Yes	Variable	Yes	High	Yes
Educational exhibit & table displays	Written	No	Fixed	No	Low	No
In-depth 3- to 5-day schools	Oral	Yes	Fixed	No	High	No

With each of the program delivery methods, someone must determine the agenda (topics) for communication. In the case of educational meetings, broadcasts, newsletters and other periodicals, and educational exhibits, the educator (sender) determines the topics to be presented. However, in the case of personal contact with CES faculty or other farmers, the user (receiver) can set the agenda. Books, audio and video tapes, and computer software also were considered to address the receiver's agenda because he/she can select from a library of such materials those which address his/her questions.

Cost is another attribute that differs among the 19 delivery methods. We identified two categories of cost associated with each of the delivery methods. Some delivery methods have an

explicit cost attached -- for instance, subscription fees, registration fees and ownership costs for computers, software, or satellite dishes. Three sources were judged to have important explicit costs. Extended workshops usually have substantial registration fees. The ownership costs of computer software and equipment and satellite dishes can be significant, and thus were included in the high explicit cost category. The explicit costs associated with publications and periodicals or registration fees for evening or one-day meetings were considered to be small, and thus were included in the low explicit cost category.

There also are implicit cost sources. Primarily, this is the opportunity cost of time associated with using the source. Meetings that occur during business hours or at other high-cost times are expected to have large implicit costs. On the other hand, books, videos, computer software, and similar other materials can be used at lower opportunity cost times. The implicit cost attribute was not included for this analysis due to high correlation with another attribute -- the fixed or variable scheduling of the program. Because variable-scheduled delivery means the operator can choose a low opportunity cost time to use the information source, this attribute also is a good indicator of implicit costs.

Finally, the 19 methods were classified as either high- or low-technology systems. Farmer clients often have an aversion to some delivery technologies. For instance, previous researchers (Batte, Jones and Schnitkey; Putler and Zilberman) have found a significant negative relationship between farmer age and the adoption of computer technology and a significant positive relationship between education level and computer adoption. We hypothesized that other high-technology delivery methods also would be viewed negatively by some user groups. Four delivery methods were considered to be high-tech. Computers, satellite television broadcasts, video cassette tapes and telephone dial-in message systems. Audio cassettes were subjectively assigned to the low technology class because these devices are more widely used and are viewed as less threatening.

Statistical Analysis Relating Attributes to Farmer Preferences

In this section, a statistical analysis is presented to relate selected attributes of the educational program delivery method and farmer characteristics to farmer evaluation scores. The attributes are used as independent variables in a qualitative choice model to explain delivery method preference. The data included questionnaires for 949 farmers, each of whom was given the opportunity to evaluate the 19 delivery methods. The unit of observation was an individual evaluation of a program delivery method. Thus, there are 18,031 (949 x 19) potential observations evaluating information sources. However, several farmers indicated that they were not familiar with some delivery methods and did not give evaluations. Other farmers gave identical ratings for all methods evaluated. We viewed this as evidence that these farmers did not take the evaluation process seriously, and excluded these farmers from the analyses.

A binary-choice model was formulated. The dependent variable was an indication of the relative evaluation (preference) for each method. Specifically, the standardized scores for each observation (summarized in table 2) were placed in two classes. Those observations below the standardized evaluation score mean (zero) were viewed as less preferred methods and were assigned a dependent variable value of zero. Observations with standardized evaluation scores above zero were assigned a value of one. The logit model was used to predict class membership for this preference variable.

The equation estimated was:
$$\ln (p/1\text{-}p) = b_0 + b_1\ AGE + b_2\ EDUCATE + b_3\ OFF\text{-}FARM + b_4\ SALES1 + b_5\ SALES2 + b_6\ ORAL + b_7\ INTERACT + b_8\ VARSCHED + b_9\ AGENDA + b_{10}\ EXPCOST + b_{11}\ HIGHTECH,$$
where $\ln (p/1\text{-}p)$ is the natural logarithm of the probability of giving an above average evaluation for a particular program delivery method; *AGE* is the operator's age in years; *EDUCATE* is 1 if the farmer has some post-high school education and is 0 otherwise; *OFF-FARM* is 1 if the farmer works away from the

farm business and is 0 otherwise; *SALES1* is 1 if the farm has less than $40,000 in gross sales and is 0 otherwise; *SALES2* is 1 if the farm has more than $100,000 in gross sales and is 0 otherwise; *ORAL* is 1 if the method involves oral communication and is 0 if written; *INTERACT* is 1 if the method allows interactive communication and is 0 if all communication flows are one way; *VARSCHED* is 1 if the communication is scheduled by the receiver and is 0 otherwise; *AGENDA* is 1 if the receiver determines the topics to be communicated and is 0 if the agenda is determined by the sender; *EXPCOST* is 1 if the method involves an explicit outlay of funds by the individual and is 0 if no substantial outlay is required; and *HIGHTECH* is 1 if the delivery method involves a high technology delivery method and is 0 otherwise.

A maximum likelihood estimator was used. Estimated coefficients are reported in table 4. The models were highly significant as indicated by the model chi-square statistics. Just over 62 percent of the observations was correctly classified.

Several variables measuring farmer and business characteristics were included in the model. This was done to explain systematic differences that might exist in evaluation due to these characteristics. Standardization of evaluation scores was done to remove differences in score methods. However, because different numbers of farmers evaluated each delivery method (see table 2 for the number of evaluations for each delivery method), systematic differences associated with farm and farmer characteristics may remain. For example, older farmers were less likely to evaluate computer software. Similarly, farm size may impact the value derived from information, and thus may influence the number of sources evaluated. Operator age and education level, operator off-farm employment, and farm size (gross sales) were included to account for such group differences.

Impact of Delivery Method Attributes on Farmer Evaluations

All six program delivery method attribute variables were highly significant. *ORAL* is negative in sign and significant at the 0.01 probability level (table 4). Sixty-two percent of the program evaluations involved oral communication. The

negative sign indicates that oral (written) communication methods are negatively (positively) associated with the likelihood of an above average evaluation (standardized evaluation score above zero) for these program delivery methods. The rightmost column of table 4 gives the estimated change in probability that a program method will be evaluated positively. With all other explanatory variables held constant, an oral (written) communication form is associated with a 0.114 reduction (increase) in the probability of an above average evaluation score.

Interactive program delivery methods are different from methods primarily utilizing one-way communication flows because interactive methods allow the receiver to redirect the communication to answer questions relevant to the receiver. Forty-three percent of the program delivery methods evaluated were considered to be interactive. The regression coefficient for *INTERACT* is positive in sign and statistically significant. With all other explanatory variables constant, presence of the interactive communication attribute increased the probability of an above average evaluation by 8.8 percentage points.

VARSCHED describes whether the program delivery method is presented on a fixed or variable schedule. Fifty-two percent of the program delivery methods were considered to be presented on a variable schedule. The regression coefficient is statistically significant and positive, indicating that farmers tend to prefer sources that are variable in schedule.

AGENDA is an indicator of which party, the sender or receiver, determines the topics to be discussed. The regression coefficient for *AGENDA* is positive in sign, indicating that user determined agenda programs have an increased likelihood of receiving an above average evaluation score.

Clients of information delivery programs are expected to have a downward sloped demand curve. Thus with all else equal, those sources with increased costs to the user are expected to be less preferred. The regression coefficient for *EXPCOST* indeed is negative and is statistically highly significant. Those sources for which there is an

Table 4. Multivariate logit model of program delivery method preference

	Mean	Beta	T	Change in Probabilities
Constant		0.473	4 64c	
AGE	49.15	-0 004	-2.73c	-0 001
EDUCATE	0.44	-0.032	-0.88	-0 007
OFF-FARM	0.49	0.089	2.18b	0 020
SALES1	0.51	0.024	0 53	0.006
SALES2	0.27	0.100	1.95a	0.023
ORAL	0 62	-0 498	-9.49c	-0 114
INTERACT	0 43	0 383	7.68c	0 088
VARSCHED	0 52	0 301	5 36c	0.069
AGENDA	0 30	0 211	4.62c	0 048
EXPCOST	0 12	-1 042	-14 57c	-0 239
HIGHTECH	0.16	-0.532	-8 33c	-0.122
N		14,363		
Model Chi Square		975c		
McFadden R-square		0 05		
Percent correctly predicted:		62.11		

[a]Significant at the 0.10 level
[b]Significant at the 0.05 level
[c]Significant at the 0.01 level

explicit user cost are associated with a decreased probability of an above average user evaluation. With all other variables controlled, the presence of an explicit user charge resulted in a 23.9 percentage point decrease in the probability of a positive evaluation.

Finally, previous studies have documented a general unwillingness of farmers to adopt high technology information systems. Results for these analyses suggest this reluctance exists for high technology program delivery methods. Presence of the *HIGHTECH* attribute is associated with a decrease (0.122) in the likelihood of an above average evaluation.

Preference Differences Among Farmer Subgroups

In order to examine the stability of preferences among groups within the sample, the logit models were re-estimated for each subgroup. For instance, farmer age is a demographic variable often associated with farmers' preference for methods (Gamon, Bounaga and Miller 1992; Riesenberg and Gor 1989). The sample was divided into two groups -- those above and below the mean age of 51 years. Comparison of the estimates for the two groups reveals substantial similarity of

results (table 5). Of the six delivery attribute measures, five were statistically significant and had the same estimated sign for the two models. The only fundamental difference between these two groups was for the interaction attribute. Younger farmers significantly valued this attribute -- the presence of interaction increased the likelihood of a positive evaluation of the delivery method. The regression coefficient for *INTERACT* was not statistically different than zero for the older farmer group -- this characteristic did not impact farmer evaluation scores for the delivery methods.

Examination of the Changes in Probabilities (bottom panel of table 5) provides an indication of the impact of each attribute on the probability of an above average method evaluation. For instance, even though both age groups significantly preferred written information, the absolute impact was greatest for older farmers. With everything else equal, changing from an oral to written delivery method increased the probability of an above average evaluation by 10.25 percentage points for the younger group of farmers as compared to 34.55 percentage points for the older group of farmers. Thus, one can conclude that both groups of farmers tend to value the same information delivery

Table 5. Multivariate logit model of program delivery method preference by age and education level

	Operator age class				Operator education level			
	Less than 51 years		51 years or older		High school or less		Post-secondary education	
	Regression		Regression		Regression		Regression	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
CONSTANT	0.0583	0.37	0.9949	3 77[c]	0.8616	6 42[c]	-0.0281	-0.19
AGE	-0.0002	-0.06	-0.0067	-1.72[a]	-0.0060	-3.16[c]	-0.0018	-0.78
EDUCATE	-0.1179	-2.45[b]	0.0797	1.41				
OFF-FARM	0.1040	1.65[a]	0.0603	1.00	0.0899	1 64[a]	0.0861	1.38
SALES1	0.1617	2.55[b]	-0 1441	-2.08[b]	-0.0208	-0.33	0.0872	1 25
SALES2	0 2321	3.38[c]	-0.1045	-1.27	0.0963	1.38	0 1121	1.45
ORAL	-0.4414	-6.46[c]	-0.5572	-7.00[c]	-0.5507	-7 73[c]	-0.4318	-5.70[c]
INTERACT	0.4522	6.17[c]	-0.0518	-0.62	-0.1094	-1.48	0.6499	7.88[c]
VARSCHED	0.4895	7.30[c]	0.1900	2.57[c]	0.1643	2.47[b]	0.5967	7.97[c]
AGENDA	0.4248	5.23[c]	0.5216	6.09[c]	0.5547	7.11[c]	0 3594	3 99[c]
EXPCOST	-0.9817	-10.14[c]	-0 7842	-6.98[c]	-0.8540	-8.57[c]	-0 9588	-8 86[c]
HIGHTECH	-0 3570	-4.23[c]	-0 6802	-6.81[c]	-0.5394	-6.11[c]	-0.4350	-4 63[c]
N of evaluations	7,848		6,515		7,968		6,395	
Model Chi-square	574.9[c]		502 9[c]		603.8[c]		489 3[c]	
Prediction success (%)	62.8		61.4		62.5		63.6	
			Change in Probabilities					
AGE	-0.0000		-0.3293		-0.0014		-0.0004	
EDUCATE	-0.0274		0 0351					
OFF-FARM	0 0242		0.0295		0.0208		0.0198	
SALES1	0.0376		-0.0735		-0.0048		0.0201	
SALES2	0 0539		-0.0282		0.0223		0.0258	
ORAL	-0 1025		-0 3455		-0 1276		-0.0994	
INTERACT	0 1050		-0.0223		-0.0254		0 1496	
VARSCHED	0.1137		0.0988		0.0381		0.1374	
AGENDA	0.0987		0.1565		0.1286		0.0827	
EXPCOST	-0.2280		-0 0941		-0.1979		-0 2208	
HIGHTECH	-0.0829		-0.1088		-0.1250		-0.1002	

[a]Significant at the 0.10 level
[b]Significant at the 0.05 level
[c]Significant at the 0.01 level

attributes, but there are differences in the absolute valuation of the attributes.

Similar results can be observed when the farmers are grouped by level of education (table 5), or farm size or type (table 6). In each case, regression coefficient estimates for each attribute variable are consistent in sign and statistical significance except for *INTERACT* which is nonsignificant for those with high school or lower education and for the two smallest farm size groups.

Summary and Implications

There were two primary reasons for conducting this research. The first was to determine farmer preference for various education program delivery methods currently used in extension work.

The second was to determine how various attributes of these delivery methods impacted farmers' evaluations of these methods.

The findings clearly suggest that if extension educators must choose a single method to communicate educational materials, print media (farm magazine articles, books, bulletins and newsletters) are likely to be well received by most farmers. Personal contact with extension faculty and farm field days also were highly rated delivery methods. Farmer preference for some traditional delivery methods, including newspaper articles, evening educational meetings, radio programs, and in-depth one-day workshops ranked less favorably. Video cassettes, satellite broadcasts and computer software, while gaining in acceptance as a method for communicating to farmers, still ranked near the bottom.

Table 6. Multivariate logit model of program delivery method preference by gross sales and farm type

	Gross Sales					Farm Type			
	Less than $40,000 Regression		$40,000-$99,999 Regression		$100,000 or more Regression		Crops only Regression		Livestock/Crop Regression
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient t-value
CONSTANT	0 8161	5 36^c	-0 0841	-0 38	0 4217	2 41^b	0 3941	2 07^b	0 6367 4 52^c
AGE	-0 0074	-3 52^c	0 0059	1 74^a	-0 0062	-2 14^b	-0 0025	-0 93	-0 0053 -2 52^b
EDUCATE	0 0127	0 25	0 0225	0 26	-0 0753	-1 10	0 0370	0 57	-0 0695 -1 38
OFF-FARM	0 0512	0 87	0 2451	2 80^c	-0 1044	-1 15	0 0882	1 21	0 0683 1 16
SALES1							-0 0905	-1 02	0 0104 0 16
SALES2							0 0017	0 02	0 0818 1 21
ORAL	-0 5933	-8 12^c	-0 4385	-3 56^c	-0 3940	-4 09^c	-0 5114	-5 57^c	-0 5239 -7 25^c
INTERACT	0 1016	1 32	0 0608	0 47	0 6107	5 90^c	0 2604	2 67^c	0 2034 2 66^c
VARSCHED	0 3138	4 52^c	0 4040	3 45^c	0 4375	4 62^c	0 3694	4 16^c	0 3173 4 62^c
AGENDA	0 4469	5 46^c	0 6244	4 52^c	0 4115	3 58^c	0 4405	4 14^c	0 5040 6 22^c
EXPCOST	-0 8527	-8 21^c	-0 9236	-5 22^c	-0 9132	-6 80^c	-0 8467	-6 51^c	-1 0224 -9 92^c
HIGHTECH	-0 5470	-6 00^c	-0 7049	-4 56^c	-0 2489	-2 11^b	-0 3988	-3 52^c	-0 5015 -5 55^c
N of evaluations	7,298		2,624		3,945		4,387		7,574
Model Chi-square	568 3^c		247 9^c		241 3^c		285 7^c		595 0^c
Prediction success (%)	62 5		62 8		62 5		62 2		62 7
				Change in Probabilities					
AGE	-0 0017		0 0014		-0 0014		-0 0006		-0 0012
EDUCATE	0 0029		0 0052		-0 0174		0 0085		-0 0161
OFF-FARM	0 0118		0 0566		-0 0241		0 0203		0 0158
SALES1							-0 0208		0 0024
SALES2							0 0004		0 0189
ORAL	-0 1369		-0 1012		-0 0908		-0 1176		-0 1212
INTERACT	0 0235		0 0140		0 1407		0 0599		0 0470
VARSCHED	0 0724		0 0932		0 1008		0 0850		0 0734
AGENDA	0 1032		0 1441		0 0948		0 1013		0 1166
EXPCOST	-0 1968		-0 2131		-0 2104		-0 1948		-0 2364
HIGHTECH	-0 1263		-0 1627		-0 0574		-0 0917		-0 1160

[a]Significant at the 0 10 level
[b]Significant at the 0.05 level
[c]Significant at the 0 01 level

The second portion of the research considered how various attributes of the 19 program delivery methods impacted farmers' evaluations. Six attributes were investigated. Estimated coefficients suggest that written (oral) delivery methods tend to increase (decrease) the probability of an above average evaluation score, all else equal. Similarly, farmers tended to prefer interactive to non-interactive delivery methods, variable-scheduled to fixed-scheduled methods, receiver-determined to sender-determined agendas, and lower explicit cost and lower technology delivery methods.

In order to judge the stability of these preferences across groups of farmers differing by age, education, or other characteristics, the logit model was estimated separately for farmers grouped by age, education level, farm size and farm type. The sign of the regression coefficients was very stable across these groups. However, there are differences in the magnitudes of the estimated coefficients across the groups.

Implications of these results are several. First, attributes of the delivery method matter. Second, relative preference for these attributes among farmers is largely the same -- i.e., all farmer subgroups studied preferred written to oral methods. Third, the absolute difference (magnitude of the regression coefficient) in farmers' preference for various attributes are sizable enough that the composition of the audience may be an important consideration as one selects a program delivery method.

This third conclusion may suggest the opportunity to "target" the most appropriate delivery method given the audience that is expected for an educational meeting. Alternatively, the third conclusion may suggest that outreach educators may need to employ multiple delivery method education programs. Recognizing that the program participants are likely very homogeneous in their learning styles and preferences for various delivery attributes, the educator may enhance the success of

the educational effort by combining lectures, visuals, discussion groups, demonstrations, and the like so that each participant's preferences are met by some portion of the program. It is quite likely that two individuals may leave the program pleased with that they learned, but each viewing a different portion of the program as most valuable.

References

Batte, Marvin T., Eugene Jones, and Gary D. Schnitkey. "Computer Use By Ohio Commercial Farmers." *Amer. J. Agr. Econ.* 72 (1990): 935-945.

Bouare, Dasse', and Blannie E. Bowen. "Communications Methods Used by Agricultural Extension Agents." *Journal of Applied Communications* 74 (1): 1-7.

Bruening, Thomas H. "Communicating with Farmers About Environmental Issues." *Journal of Applied Communications* 75 (1991): 34-41

Cano, Jamie. "Learning Styles." *Understanding and Teaching the Adult Learner,* eds. E. Norland, J. Heimlech, B. Seevers, K. Smith, and J. Jones, San Francisco: Jossey-Bass Publishers, forthcoming.

Carter, Bryson R. and Marvin T. Batte. "Identifying Needs and Audiences in Farm Management Extension Education." *Rev. Agr. Econ.* 15 (1993): 403-415.

Gamon, Julia A., Lachen Bounaga, and W. Wade Miller. "Identifying Information Sources and Educational Methods For Soil Conservation Information Used by Landowners of Highly Erodible Fields." *Journal of Applied Communications,* 76 (1992): 1-5.

Golay, Keith. *Learning Patterns and Temperament Styles.* Fullerton, CA.: Manas-Systems, 1982.

Myers, Isabel B. *Introduction to Type: A description of the theory and applications of the Myers-Briggs Type Indicator,* 4th ed. Palo Alto, CA.: Consulting Psychologists Press, Inc., 1991.

Obahayujie, Julius and John Hillison. "Now Hear This! Delivery Methods For Farmers." *Journal of Extension* Spring (1988): 21-22.

Putler, Daniel S., and David Zilberman. "Computer Use in Agriculture: Evidence from Tulare County, California." *Amer. J. Agr. Econ.* 70 (1988): 790-802.

Riesenberg, Lou E. and Christopher Obel Gor. "Farmers' Preferences for Methods of Receiving Information on New or Innovative Farming Practices." *J. Agr. Ed.* 30 (Fall 1989): 7-13.

Rollins, Timothy J., Thomas B. Bruening, and Rama B. Radhakrishna. "Identifying Extension Information Delivery Methods for Environmental Issues." *Journal of Applied Communications* 75 (2): 1-9.

Rosenberg, Alejandro and Calum G. Turvey. "Identifying Management Profiles of Ontario Swine Producers Through Cluster Analysis." *Rev. Agr. Econ.* 13 (1991): 201-213.

Appendix

The survey section dealing with delivery methods is presented below.

Farmers receive information in a variety of ways. We would like to know how you feel about using each of the following methods to receive educational information.

Please use the last column (?) if you are unfamiliar with a method.

		Dislike				Like	
				(Circle your answer)			
Q-47	Audio cassettes	1	2	3	4	5	?
Q-48	Books and bulletins	1	2	3	4	5	?
Q-49	Evening educational meetings	1	2	3	4	5	?
Q-50	Farm Field Days and On-Farm Demonstrations	1	2	3	4	5	?
Q-51	Visits to research farms	1	2	3	4	5	?
Q-52	Learn-by-mail series	1	2	3	4	5	?
Q-53	In-depth one day workshops	1	2	3	4	5	?
Q-54	Newsletters	1	2	3	4	5	?
Q-55	Newspaper articles	1	2	3	4	5	?
Q-56	Farm magazine articles	1	2	3	4	5	?
Q-57	Personal contact with Extension professional (telephone, farm, office)	1	2	3	4	5	?
Q-58	Farmer get-togethers to discuss common problems	1	2	3	4	5	?
Q-59	Radio programs	1	2	3	4	5	?
Q-60	Pre-recorded information for telephone dial-in						
Q-61	Extension programs received through TV satellite dish	1	2	3	4	5	?
Q-62	Videocassette tapes	1	2	3	4	5	?
Q-63	Computer software	1	2	3	4	5	?
Q-64	Educational exhibits and table displays	1	2	3	4	5	?
Q-65	In-depth three- to five-day schools	1	2	3	4	5	?

Endnote

1. An active farmer was identified as anyone who currently cultivated land or crops, or raised animals regardless of farm size or income. Also, included in the active farmer definition is someone considered a potential recipient of localized farm management educational programming, even though their farming activity might be minimal. For example, semi-retired or retired farmers engaged in father/son working arrangements or who were considered active elderly farmers were left on the list.