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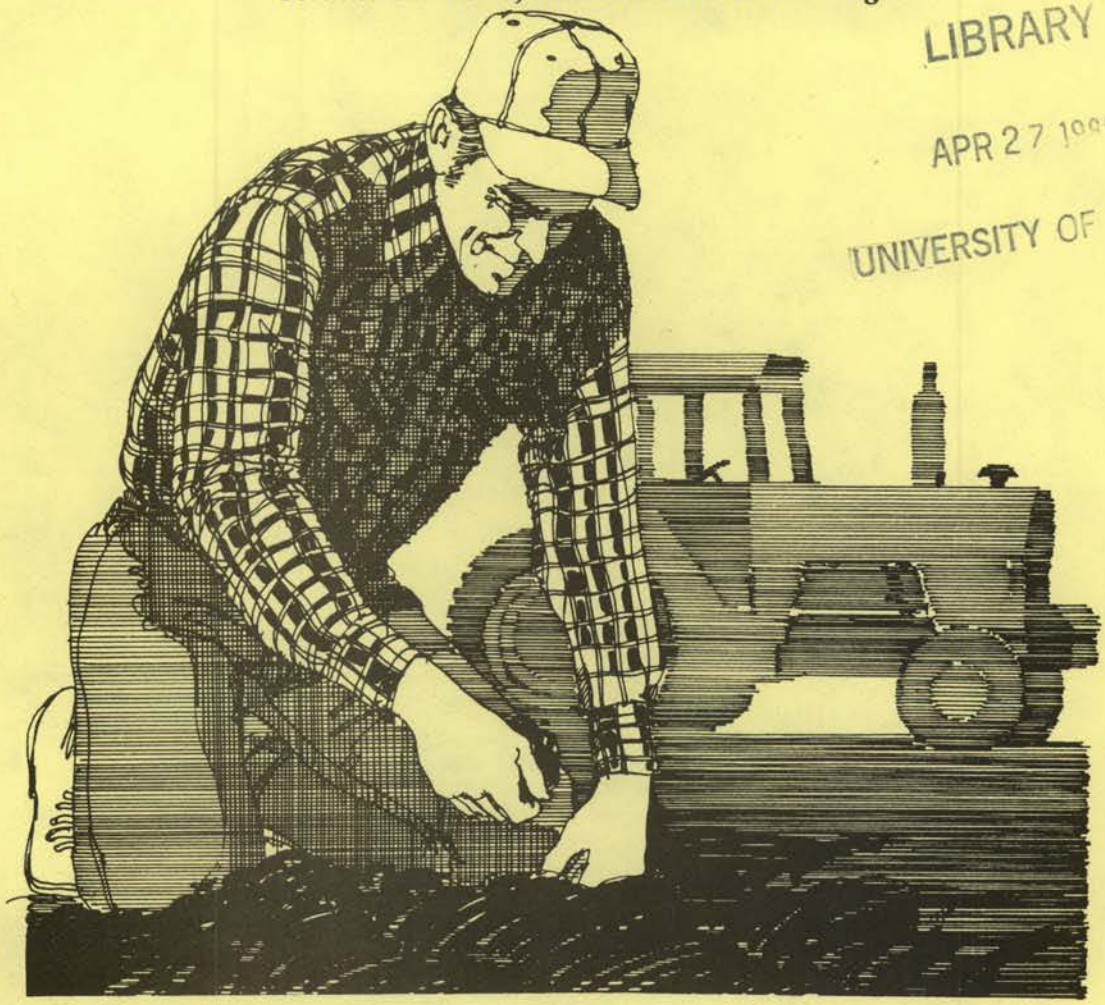
Use of Practices Recommended by Extension

A Study of the Relationship Between Frequency of Extension Contact and Use of Recommended Practices By Farmers and Ranchers

Corinne M. Rowe, Extension Rural Sociologist



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Abstract

Recent Extension program evaluation efforts have called upon social scientists to assist in documenting accomplishments based on benchmark or baseline data. Benchmarks for program planning and evaluation within the agricultural Extension program include use levels of recommended practices. Data collected from a statewide sample of farmers and ranchers were analyzed to assess program effectiveness, using cross-sectional survey evaluation techniques. Multiple Classification Analysis was used to analyze producer use of recommended agricultural production and management practices based on the level of producer contact with Extension.

Significant correlations were found between scaled measures of practices used and contact with Extension in the areas of general crop production, beef herd management and both crop and livestock financial management/marketing. No significant differences were found between Extension contact and irrigation practices, erosion control and small grain production practices. Inadequate measures and small sample size prevented analysis of practices within other enterprises.

Introduction

The Cooperative Extension System has been challenged in recent years to identify and document program impacts and opportunities for program improvement (USDA-CES 1983, Bennett 1982, 1984). Since 1984, with the implementation of the Extension Accountability Evaluation System, increasing emphasis has been given to the use of base data as benchmarks for evaluating program accomplishment. Social scientists are being called upon to assist in the collection and development of such benchmarks, many of which are behaviorally oriented. What is or should be included in the base data used as benchmarks for evaluation remains generally undefined. Current levels of practice utilization or the end results emanating from such practices are generally assumed as appropriate benchmarks, however. Few studies dealing with assessing the actual use of Extension recommended practices by clientele have been conducted either as needs assessment or as part of program evaluation (Rivera et al. 1983).

Impact evaluation is generally viewed as an assessment of a program's effectiveness in achieving its ultimate objectives. Evidence of effectiveness is based upon change occurring in level of clientele knowledge, attitudes, skills and/or aspirations, adoption of new technology or practices and the social or economic end results of such changes or practice adoption (Bennett 1977). This model follows the diffusion of innovation, knowledge utilization, research dissemination and planned social change literature in which innovation is generally considered to be an idea, practice or object that improves method of operation (Bennis et al. 1976; Glaser et al. 1983; Rogers 1983; Rothman 1974). Using this model, impact evaluation can be measured by assessing practice change or adoption which brings about certain benefits and consequences and results in attainment of the ultimate objectives of Extension programs. Offered as examples of practice change are the use of recommended farm or home management practices (Bennett 1977).

As Extension increases its efforts toward formalized program evaluation and impact studies, greater precision is needed in the identification and measurement of practices recommended to clientele. Most Extension program evaluation efforts have focused on identifying clientele, assessing program usage, determining mission and method successes or assessing public acceptability of and satisfaction with services and offerings (Rivera et al. 1983; Warner and Christenson 1984).

Verma and Behm (1985) collected data that measured the level of knowledge and skills possessed, practices followed and attitudes held by audiences in major Extension programs. The primary focus of their study was documenting program benchmarks to improve state situation statements and accomplishment reports and to provide direction for educational emphases. These benchmarks were intended for use as a comparison point when programs are re-evaluated to show progress and/or changes in audience behaviors. A series of surveys, 18 with adult audiences and an additional 7 with youth, were conducted by Louisiana Extension personnel generally at the local community level.

Within the agricultural program area, research-based recommendations of practices related to production, financial management and marketing of agricultural commodities can be identified. These recommendations are generally viewed as the primary means of technology transfer between the land-grant college system and producers. The information is made available in Extension publications developed by agricultural subject matter specialists and researchers.

The Idaho Cooperative Extension Service conducted two statewide surveys in late 1986, one of agricultural producers and one of Extension Home Economics program users. The primary purpose was to develop baseline data for use in needs assessment and future program planning.[1] Survey data also can be used to evaluate past program effectiveness, however. Levels of contact with Extension and use of program offerings were included in the questionnaire, making possible a cross-sectional survey evaluation design. The relationship between contact with and use of Extension programs and materials and operator use of recommended farm and ranch practices is the focus of this paper. Only the results of the agricultural producer survey are presented here.

The Study

Respondents

Data for the study were obtained from a 1986 statewide survey of farm and ranch operators. A random sample of 1,500 agricultural producers, stratified to reflect the four state Extension districts, was drawn by the Idaho Agriculture Statistical Services (IASS) from their listing of farmers and ranchers. Usable information was returned by 444 producers representing 31 percent of the sample. This relatively low return partially reflects the need to follow IASS survey procedures. Required procedures restricted such things as personalization of the cover letter and direct contact with farmers and ranchers. To the extent possible, however, Total Design Method procedures (Dillman 1978) were followed. Questions asked across a broad spectrum of agricultural enterprises may have been perceived by some as being unrelated to their situation, thus contributing to the reduced rate of return.

The characteristics of survey respondents were compared with 1982 Census of Agriculture figures (U.S. Department of Commerce, Bureau of Census 1984). Given the changes that occurred in farming during the past 4 years and recognizing the IASS sample bias toward larger commercial farmers, sample data compare quite favorably (Table 1). Eighty-four percent of the sample indicated having had some contact with Extension within the past 12 months. Other studies conducted in Idaho (Carlson 1985; Rowe 1985), have previously documented high levels of Extension use: 45 percent of Idaho households and 75 percent of Idaho farmers have been found to use Extension educational services. Thus, although nonresponse error may have

Table 1. Summary characteristics of the sample (N = 432) compared with 1982 Census of Agriculture data where applicable.

	Descriptive data	
	Study sample	Idaho ag census*
n =	(444)	(24,714)
Farm size by acres owned and rented		
1 to 99	26.3%	45.4%
100 to 499	48.7	32.5
500 to 999	18.1	10.4
1,000 to 1,999	7.0	11.7
Herd size (cattle and cows)		
n =	(173)	(15,980)
Cattle ranches % of total	39.3%	64.7%
1 to 19	21.8	34.0
20 to 49	27.6	22.5
50 to 99	22.9	15.9
100 or more	27.6	27.6
Gross farm sales		
Under $40,000	55.2%	63.4%
$40,000 to $99,999	23.9	17.5
$100,000 to $499,999	18.5	16.4
Over $500,000	2.4	2.7
Age		
Under 35	12.1%	16.8%
35 to 44	20.3	21.5
45 to 54	21.7	22.7
55 to 64	28.0	23.4
65 and over	17.9	15.6
Off-farm income		
None	37.2%	44.4%
Any	62.8	55.6
CES contact		
None	15.8%	
Low (1 to 19)	42.3	
High (20 to 60)	41.9	

*Source: U.S. Department of Commerce, Bureau of Census, 1984.

[1]For a report showing use as baseline data, see Rowe and Guenthner (1988).

been introduced due to the response rate, for purposes of this study the sample is considered acceptable.

Measurement of Variables

Practices representing the most up-to-date recommendations related to various aspects of agricultural production were generated by subject matter specialists over seven topical areas. These were (1) general crop production, (2) irrigation, (3) soil erosion and conservation, (4) small grain crop production, (5) alfalfa production, (6) beef cattle production and (7) management and marketing practices.[2] For purposes of analysis, responses within each area were restricted to those farmers or ranchers who answered the particular set of questions. Response categories followed a simple Likert scaling format, reflecting the frequency of practice use weighted as follows: (4) usually or always followed, (3) sometimes followed, (2) seldom followed and (1) never followed. From these items, additive scales were developed for use as dependent variables. For comparability, scores reflect scale means.

Chronbach's Alpha was used to test reliability of the seven scales. The scale measuring alfalfa production practices failed to achieve an acceptable level and was deleted from the study. Alpha scores for the remaining six scales ranged from 0.6101 to 0.8903.

Scales were operationalized as follows:

1. The general crop practices scale consisted of 12 practices or abilities relating to testing of soil fertility and plant tissue nutrients, control of weeds, insect pests and crop diseases and safety practices. The Alpha score for this scale was 0.7086.
2. Irrigation practices were measured by seven items related to irrigation equipment handling, maintenance and use. Alpha score, 0.8070.
3. Erosion control (soil conservation) practices reflected such things as the use of minimum tillage, no-till, crop residue mulching, fall chiseling, contour farming and the care and handling of problem areas. Ten items were included in this scale. Alpha score, 0.8132.
4. The scale for small grain production was made from 10 items reflecting producer's selection and handling of seed and management of storage facilities and equipment. Alpha score, 0.6106.
5. Beef herd management practices included 13 items reflecting the use of nutrient supplements, ear tags and implants, herd health practices, analysis and cost of diet content and the use of practices such as pregnancy and fertility tests. Alpha score, 0.7149.
6. Finally, the financial management and marketing practices scale included 15 items reflecting such things as the collection and use of records, annual financial planning and budgeting practices, calculation of profit and loss, market analysis and the ownership of a computer. The Alpha score for this scale was 0.8903.

Because of anticipated differences between crop producers and livestock producers, this set of practices was analyzed separately by the two independent variables: farm size and herd size. Independent variables selected for analysis included:

1. Farm size, measured by the total number of acres owned and rented.
2. Herd size, measured by the total number of cows and calves.
3. Gross sales of agricultural products during the past year (ranging from $1,000 or less to over $500,000).
4. CES contact. A selection of 13 ways clientele can contact the Cooperative Extension Service and use the various services offered were given with possible responses ranging from none to more than 5 during the preceding year. The total numbers of contacts made were scaled as a measure of Extension use.

5-7. Finally, age, education and percentage of total household income from off-farm sources were collected directly. Off-farm income was considered a proxy indicator of time available for farming.

Study Findings

To examine bi-variate relationships between the selected independent variables and the use of recommended practices, Pearson correlation coefficients were computed. Table 2 (see page 6) shows significant relationships at the .01 or .001 levels between all six practice scales and Farm Size. Except for Irrigation and Erosion Practices, correlations with Gross Sales and CES Contact were generally significant as well. Age as a predictive variable was significantly related (inversely) only to Management Practices: Crops. Education showed a significant correlation with Small Grain Practices, Beef Herd Practices and Management Practices: Crops. Off-farm income was significantly related only to General Crop Practices. The strongest relationships were between the Practices Scales and Farm Size, Gross Sales and CES Contact.

Table 3 (see page 6) displays the correlation matrix of relationships between the independent variables. As would be expected these variables are highly interrelated, most with correlations showing statistical significance at the .001 level. Since CES Contact is the variable of interest to this study, correlations between this measure and other predictive variables are of prime importance. Here, only Herd Size and Off-farm Income were not statistically significant. Education showed the strongest (albeit only a moderate) relationship with CES Contact (0.2776). Age also showed a moderate (inverse)

[2]Other sections included in the questionnaire but deleted from the present study due to low responses were specialized practices in potato production, dairy, sheep and swine production.

Table 2. Zero-order correlation coefficients between predictor variables and use of recommended practices scales.

Predictive variables	Use of recommended practices scales						
	General crop practices	Irrigation practices	Erosion practices	Small grains practices	Beef herd practices	Financial management	
						Crop	Livestock
Farm size	0.1549*	0.2014*	0.2789**	0.2406**	—	0.2257**	—
Herd size	—	—	—	—	0.1738	—	0.1889*
Gross sales	0.1790**	0.0575	0.0757	0.2793**	0.1610	0.2876**	0.3132**
Age	0.0301	0.0183	0.0174	−0.1370	0.0454	−0.1313*	−0.1794**
Education	−0.0159	−0.0104	0.1552	0.1585*	0.2159*	0.1450*	0.1870**
Off-farm income	−0.1668*	0.0023	−0.0080	−0.1171	0.1632	−0.1236	−0.1367*
CES contact	0.1694**	0.1507	0.1423	0.2384**	0.3800**	0.2718**	0.3029**
n	(343)	(153)	(182)	(269)	(172)	(363)	(174)

*Significant p < .01

**Significant p < .001 (1-tailed)

Table 3. Bivariate correlation matrix for independent variables.

Variables	Farm size	Herd size	Gross sales	Age	Education	Off-farm income	CES contact
Farm size	1.00						
Herd size	—	1.00					
Gross sales	0.5819**	0.4464**	1.00				
Age	−0.1432*	−0.0699	−0.2961**	1.00			
Education	0.1988**	0.0650	0.2205**	−0.3071**	1.00		
Off-farm income	−0.4313**	−0.2339**	−0.5845**	−0.0358	0.0324	1.00	
CES contact	0.1989**	0.1277	0.1768**	−0.2109**	0.2776**	−0.1078	1.00

*Significant p < .01

**Significant p < .001 (1-tailed)

Table 4. ANOVA table of F values and significance levels.

Predictive variables	df	General crop practices	Irrigation practices	Erosion practices	Small grains practices	Beef herd practices	Financial management	
							Crop	Livestock
Farm size	3	NS	NS	3.029*	NS	—	NS	—
Herd size	3	—	—	—	—	4.316*	—	NS
Gross sales	3	NS	NS	NS	3.728*	NS	3.263*	NS
Age	4	NS	NS	NS	NS	NS	NS	NS
Education	3	NS	NS	NS	NS	NS	NS	NS
Off-farm income	4	NS	NS	NS	NS	3.109*	NS	NS
CES contact	2	4.951**	NS	NS	NS	6.167**	7.948***	10.776***
Explained	19	1.825*	NS	NS	1.790*	2.381**	3.286***	2.727***
Multiple R^2		0.107	0.139	0.172	0.132	0.271	0.172	0.252
n =		(308)	(137)	(162)	(244)	(142)	(321)	(174)

*Significant p < .05

**Significant p < .01

***Significant p < .001

relationship. The correlations of Farm Size and Gross Sales with CES Contact were significant but low.

Multiple Classification Analysis (MCA) with Analysis of Variance (ANOVA) was used to analyze the effects of the independent variables on farmer-rancher use of recommended practices. Placing all independent variables into the ANOVA model for simultaneous analysis allows identification of significant contributions for each factor separately and the combined effects of all. Table 4 displays the summary F values, degrees of freedom and significance levels for each of the seven separate analyses.

With all six predictive variables included in the analyses, only Irrigation Practices and Erosion Practices failed to show significant F values for the main or explained effects. Similarly, none of the independent variables by themselves produced significant F values explaining individual factor differences in means for Irrigation Practices. Only Farm Size independently produced a significant F value for Erosion Practices. With all independent variables included, however, even Farm Size failed to produce a significant F value for Erosion Practices. Thus, variations found for erosion- and irrigation-related farm practices are not explained by the effects of farm size, gross sales, contact with Cooperative Extension, age, education and off-farm income.

Variation explained by the combined effects of the six independent variables for the remaining five sets of recommended practices was significant. F values for main (or explained) effects were significant at the .05 level for General Crop and Small Grains Practices, accounting for 11 percent and 13 percent, respectively, of the total variability (indicated by Multiple R^2).

Significant F values occurred at the .01 level for Beef Herd Practices ($R^2 = .271$). F values significant at the .001 level were obtained for the two Financial Management practices, with explained effects accounting for 17 and 25 percent, respectively, of total variability in each.

Of these five sets of practices, only the Small Grains Practices analysis failed to show a significant F value contribution from CES Contact. The only variable of significance to the use of Small Grain Practices was Gross Sales. CES Contact, however, appears to be the primary contributor to a significant main effects F value for General Crop Practices and Management Practices: Livestock, when the effects of all independent variables are included in the analyses.

The MCA categorical mean scores for independent variables displayed in Table 5 represent deviations from the grand mean of the dependent variables. Based on a 1 to 4 point scale depicting the extent to which recommended practices are usually or always followed, scores indicate considerable room for improvement. Grand means for the six scales of recommended practices ranged from a low of 2.56 for Financial Management Practices for those with livestock operations to a high of 3.01 for General Crop Practices. The patterns of scores based on varying levels of independent variables are mean scores after adjusting for the effects of all independent variables. The monotonic nature of change in mean scores as contact with Extension increases is evident for the areas discussed above.

Significant and striking differences ($p = .05$) are seen for General Crop Practices (3.09 mean score for high contact CES users, 2.96 for low contact users compared with a non-user mean score of 2.89), Beef Herd Practices (2.78 for high, 2.48 for low and 2.36 for non-users) and Financial Management Practices for both crop operations (2.81, 2.54 and 2.46 for high, low and non-users respectively) and livestock operations (2.77, 2.40 and 2.10 respectively). These differences confirm a positive relationship between contact with Extension and producer use of these recommended practices.

Table 5. MCA patterns of scores adjusted for all independent variables.

Predictive variables	General crop practices	Irrigation practices	Erosion practices	Small grains practices	Beef herd practices	Financial management	
						Crop	Livestock
Grand mean	3.01	2.69	2.81	2.83	2.61	2.67	2.56
Farm size*							
99 or less	2.98	2.17	2.56	2.79	NA	2.51	NA
100 to 499	3.03	2.70	2.75	2.87		2.68	
500 to 999	2.98	2.88	2.87	2.82		2.74	
1,000 or more	3.07	2.93	3.29	2.71		2.85	
Herd size					**		
1 to 19	NA	NA	NA	NA	2.34	NA	2.44
20 to 49					2.63		2.50
50 to 99					2.52		2.60
100 or more					2.88		2.72
Gross sales				*		*	
$40,000 or less	3.01	2.76	2.78	2.74	2.57	2.55	2.54
$40 to $99,999	2.95	2.60	2.86	2.82	2.67	2.70	2.49
$100 to $499,999	3.08	2.70	2.87	2.97	2.75	2.89	2.74
$500,000 or more	3.20	2.62	2.19	3.44	2.05	2.88	2.97
Age							
less than 35	2.98	2.56	2.65	2.87	2.49	2.62	2.64
35 to 44	2.95	2.64	2.76	2.85	2.68	2.70	2.57
45 to 54	3.03	2.80	2.81	2.79	2.68	2.69	2.56
55 to 64	3.06	2.70	2.91	2.86	2.56	2.70	2.61
65 ore more	3.00	2.82	3.01	2.75	2.63	2.55	2.45
Education							
less than HS grad	2.99	3.07	2.44	2.77	2.34	2.53	2.51
HS grad	3.01	2.67	2.82	2.82	2.63	2.64	2.52
Post HS	3.06	2.80	2.87	2.83	2.67	2.73	2.50
College grad	2.96	2.35	2.85	2.86	2.61	2.72	2.71
Off-farm income					*		
None	3.06	2.58	2.68	2.87	2.39	2.63	2.57
1 to 19%	3.05	3.03	2.84	2.78	2.47	2.59	2.52
20 to 49%	2.94	2.37	3.16	2.82	2.45	2.60	2.53
50 to 99%	2.98	2.74	2.84	2.78	2.82	2.77	2.58
All	2.90	2.98	3.08	2.92	2.66	2.69	2.55
CES contact	*				**	***	***
None	2.89	2.70	2.61	2.70	2.36	2.46	2.10
Low	2.96	2.57	2.87	2.78	2.48	2.54	2.40
High	3.09	2.77	2.80	2.90	2.78	2.81	2.77

Significance levels:
* $p < .05$
** $p < .01$
*** $p < .001$

Discussion and Conclusions

Based on these analyses, level of contact with Cooperative Extension correlates significantly with the acceptance and use of recommended farm production and financial management practices within four of the six topical areas examined: general crop production, beef herd management, and both crop and livestock financial management and marketing practices.

Recent shifts in emphasis from productivity to profitability as well as the tightening of requirements for planning and recordkeeping by lending institutions have increased the interest of farmers and ranchers in both financial and marketing analyses. Continued and increased programming efforts by Extension along these lines should prove fruitful.

Practices showing little or no correlation with Extension contact identify potential areas for improved or restructured programming efforts. If the individual items included in the Irrigation Practices, Erosion Control and Small Grain Production scales can be assumed to be good indicators of best practices as recommended by the Extension Service, one might wonder how consistently and persuasively these have been promoted with clientele. In these highly specialized areas, perhaps Extension agents would be better advised to identify and work more intensely with change agents from business, industry and other governmental agencies (e.g., ASCS, SCS). Many are presently reaching farmers and ranchers with specialized information, particularly in the areas of irrigation and erosion practices.

Also, additional study of effective alfalfa practices and increased efforts at identifying and promoting best practices among alfalfa growers appears to be needed. Practices identified for scaling purposes failed to provide a reliable measure of best production management practices. This could be due to lack of consistency in actual use. Possibly, different uses for alfalfa, and thus purposes for growing it, result in the use of different production practices. It may be necessary to separate these purposes before measuring practices used.

Finally, further assessments are needed within specific agricultural production areas. Such areas must be targeted more directly for particular agricultural enterprises, however, with study respondents drawn from among those specific producers.

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