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Abstract

A sample of Michigan farmers was surveyed in 1996 and 1999 to examine trends in their information-seeking behaviors and preferred methods of information delivery. In addition, the relationship between demographic characteristics and types of information sources used were examined. Some key findings for both years include: (a) The vast majority of farmers do not use web-based information; (b) income and farm size was positively correlated with all types of information delivery (print, web-based, radio/TV, organizational events and personal sources); and (c) part-time farmers and those with outside employment tended to use fewer information sources than full-time farmers. Suggestions are offered to help educators make better choices in campaign and message delivery.

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Abstract

A sample of Michigan farmers was surveyed in 1996 and 1999 to examine trends in their information-seeking behaviors and preferred methods of information delivery. In addition, the relationship between demographic characteristics and types of information sources used were examined. Some key findings for both years include: (a) The vast majority of farmers do not use web-based information; (b) income and farm size was positively correlated with all types of information delivery (print, web-based, radio/TV, organizational events and personal sources); and (c) part-time farmers and those with outside employment tended to use fewer information sources than full-time farmers. Suggestions are offered to help educators make better choices in campaign and message delivery.

Outreach education has long been a part of the mission of land-

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grant universities. It rests on the principle that one function of a land-grant university is to contribute to the well-being of the community in which it is located, through the practical application of research to community needs (Leholm, Hamm, Suvedi, Gray & Poston, 1999). In order to facilitate this goal, Extension organizations act as information clearinghouses, taking the findings from internally-conducted research and translating them into a format appropriate for the public at large, typically in the form of educational seminars or informational materials. These messages are often directed at agricultural producers and designed to inform these producers on issues such as increasing productivity, utilizing new technology, and improving sustainability.

Upon its conception, the objective of the Cooperative Extension Service was to aid in diffusing useful and practical information on subjects relating to agriculture and home economics and encouraging their application (Simons, 1962). In order to serve the changing information needs of extension customers, extension services all over the country have been refocusing their efforts to provide better services to their audiences by identifying, clarifying and prioritizing the issues affecting people, agriculture, natural resources, businesses, communities, organizations and governments (Suvedi, 1996). Efforts also have been made to design and to conduct educational programs and provide technical assistance focusing directly on these issues (Michigan State University Extension, 1993).

The importance to extension programs of effective delivery methods also has been suggested (Israel, 1991). Extension needs to consider the information-seeking behaviors of agricultural producers. Johnson (1996) defines information seeking as the "purposive acquisition of information from selected information carriers" (p. 9). Determining farmers' preferences for delivery methods is an important precursor to ensuring that they receive the information they need. Auburn and Baker (1992) note that many have criticized land-grant institutions and extension for not being primarily focused on farmers and farmers' needs.

Trede and Whitaker (1998) examined Iowa beginning farmers' perceptions toward the delivery of information. They found that beginning farmers were neutral about cutting-edge technology, and instead preferred one-to-one, on-site educational meetings, and interpersonal contacts such as family for

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information. When media are used, farmers preferred radio, data transmission network (DTN), marketing services, newspapers and television. Similarly, Tavernier, Adelaja, Hartley, and Schilling (1996) found that farmers prefer direct communication with Extension agents and other educators to other methods of delivery such as print and broadcast media and computer-based information. Other studies have found that media preferences dominate other delivery methods. Schnitkey, Batte, Jones and Botomogno (1992)had farmers rate methods of delivery. Radio broadcasts, general farm magazines, and commercial newsletters were the top three sources out of 22 possible options. Extension agents were ranked tenth and computerized information was fourteenth. Some studies have found that farmers prefer multiple methods of delivery. Caldwell and Richardson (1995) found that nontraditional farmers in North Carolina preferred a combination of delivery methods to a single method of delivery.

Previous studies have suggested that farmers' preferences for delivery methods depend on various demographic characteristics such as age, income, formal level of education, and farm size. The trend in education delivery has been to offer information through new technologies such as web-based information sources. Although farmers may adopt computers for business management capabilities, many farmers have been slow to adopt these new technologies to obtain educational information (Iddings & Apps, 1992) due to variables such as income, limited time, education and access (Tavenier et al., 1996). Amponsah (1995), for example, found a low rate of computer adoption by farmers that was based in part on income. Farm size and income are positively related to computer adoption. In addition, the United States Department of Commerce (1999) recently reported that minorities in general, regardless of income, are less likely to own computers or to use the Internet.

Purpose and Objectives

Prior research on agricultural producers' preferences for information delivery has not considered longitudinal trends. Given the increase in the availability of channels for information delivery, there is reason to believe that these preferences are changing over time. Thus, a longitudinal study was conducted to find out how agricultural producers access Michigan State University Extension (MSUE) information and farm-related

information. The longitudinal nature of the data allows for the assessment of change in information-seeking patterns over time. Specific objectives of this study were:

1. To determine the types of Extension education programs used by the Michigan agricultural community,
2. to examine important sources of information used by Michigan farmers, and
3. to determine the relationships between information sources used by farmers and their demographic characteristics.

Methods and Procedures

A survey was distributed to a random sample of agricultural producers, stratified by commodity type. The mailing list of the Michigan Agricultural Statistics Service (MASS) served as the sampling frame. Data were collected at two points in time in order to assess trends in information-seeking behaviors. In 1996, this sample consisted of 1,534 farmers and agribusiness operators; and in 1999, the sample consisted of 1,569 members of the same population.

A mail survey was chosen for data collection because of its low cost and advantageous uniform access to dispersed populations without interviewer bias (Salant & Dillman, 1994). A survey, which included both open and closed ended questions, was developed, validated by a panel of experts familiar with the population, and field-tested to ensure validity and reliability. The same instrument was used for both the 1996 and 1999 data collections.

The instrument was mailed to the sample in March of 1996 and March of 1999. One week after the first mailing, a follow-up postcard was mailed to the sample population. Two weeks after the postcard, nonrespondents were mailed a second copy of the questionnaire.

In the questionnaire, participants were asked to report demographic information including age, farm type, size, level of formal education, income, and others. Respondents were asked if they had participated in extension programs or received information from extension, and which delivery methods they had used in the last year. Participants also identified the sources they use to receive farm-related information and rated the importance of each source (1 = not at all to 5 = a great deal). The

major areas of information delivery addressed were print, electronic, organizational, and personal. Use of print information was measured with eight items and included delivery methods such as newspapers, farm magazines, and other publications. Electronic information use was measured with five items on two sub-scales and included television, radio, and computer-based information. The scale assessing use of organizational events for information seeking contained four items and included meetings, demonstrations, and statewide events. Personal sources of information were assessed with a four-item scale with items such as farm supply dealers, family, etc. Cronbach's alpha was determined for
the scales for both 1996 and 1999. The alphas, means and standard deviations for each scale are reported in Table 1.

In 1996, the survey had a usable response rate of 58% (N=851), and the 1999 survey had a usable response rate of 51% (N=730). Responses of early and late respondents on selected variables were

Table 1
Scale Means, Standard Deviations and Cronbach's Alpha Levels

Scale	Mean* (StDev)		Cronbach's Alpha	
	1996	1999	1996	1999
Print information	3.04 (0.79)	2.88 (0.82)	.83	.84
Electronic sources of information				
Web-based information	1.44 (0.74)	1.64 (0.96)	.50	.65
Radio/TV information	2.56 (0.98)	2.43 (0.97)	.78	.77
Organizational meetings	2.51 (1.05)	2.38 (1.07)	.85	.86
Personal sources of information	2.99 (0.74)	2.89 (0.78)	.58	.64

* The scale mean was computed based on 1=nothing at all, 2=little, 3=some, 4=a fair amount, and 5=a great deal.

compared to determine if significant differences existed between early and late respondents. In both cases, the responses of early respondents were not significantly different from those of the late respondents, so the findings of this study can be generalized to the population (Miller & Smith, 1983). The respondents were found to be representative of the various agricultural enterprises and counties in the state.

Results and Discussion

Demographic Characteristics

Some basic demographic information about the respondents was collected. Analysis of the information indicated that, in the 1996 sample, the greatest number of respondents (27.3%)were in the age group of 55 to 64 years. In 1999, however, the largest percentage of respondents were 45-54 years of age (28.3%). In both years very few respondents, less than 1%, were under 25 or in the age group of 26-34 (less than 6%) . In the age groups of 35-44, 45-54, 55-64, and 65 and older, the distribution varied between 22% and 28% for both years.

Analysis of farm income data revealed large changes between 1996 and 1999. In 1996, for example, the analysis of annual gross sales of farm products, or farm incomes, as reported by the respondents, revealed that the largest category of gross sales was between $100,000 and $249,999. In 1999, the largest category of respondents was for gross annual sales of $10,000 to $24,999. The percentage of farmers that made less than $2,500 nearly doubled between 1996 and 1999 from 7.8% to 14.5% of respondents (Table 2).

Analysis of the highest level of formal education completed by the respondents indicates that the majority had high school diplomas or the equivalent. In 1996, about 18.2% had some college, 6.2% had four-year college degrees, and about 5% had graduate degrees. Overall, the number of farmers and agribusiness operators with some higher education increased in the 1999 survey. For example, the number of participants reporting they had received a degree from a four-year college increased from 6% to 9%. Similarly, in 1996, almost 12% had less than or some high school education, whereas in 1999 this percentage decreased to 7.6%.

Land-holding varied greatly. In 1996, the range was from one to 5,000 acres (M=324.75; SD=460.97), and in 1999 from one to 8,300 acres (M=354.61; SD=703.28). Most of the respondents in the 1996 sample (23.2%) had land-holdings of 101 to 200 acres; 17.4% of those surveyed had land-holdings over 500 acres, while 17.7% held fewer than 50 acres. In the 1999 sample, the greatest percentage of respondents (22%) had fewer than 50 acres, 19% had 101 to 200 acres, and 17% had more than 500 acres.

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Table 2
Farm Income as Reported by the Respondents

Annual gross sales ($)	1996 number (%)	1999 number (%)
Less than $2,500	58 (7.8%)	90 (14.5%)
$2,500 - $4,999	50 (6.7%)	55 (8.9%)
$5,000 - $9,999	73 (9.8%)	58 (9.4%)
$10,000 - $24,999	114 (15.3%)	98 (15.8%)
$25,000 - $49,999	104 (13.9%)	77 (12.4%)
$50,000 - $99,999	109 (14.6%)	76 (12.3%)
$100,000 - $249,999	128 (17.2%)	83 (13.4%)
$250,000 - $499,999	70 (9.4%)	39 (6.3%)
$500,000 - or more	40 (5.4%)	43 (6.9%)

The sample for both surveys included respondents from all of the major commodity groups. Types of agribusinesses operated were categorized as cash crop, vegetables, fruits, nursery and greenhouse, beef, dairy, and swine. In both 1996 and 1999, the majority of respondents with crop operations were cash crop growers [N=422 (1996) and N=306 (1999)]. Of those respondents with livestock operations, the majority were beef [N=124 (1996) and N=129 (1999)] and dairy
farmers [N=124 (1996) and N=74 (1999)].

Of the farmers surveyed in 1996, about 53% surveyed were full-time farmers, whereas there were more part-time (51%) than full-time farmers(49%) in the 1999 survey. Analysis of off-farm employment status showed that in 1996, 40.6% were employed elsewhere. By 1999 the number had increased to 46.5% of respondents.

Sources of Extension-Related Information

The respondents were asked about their participation in MSU Extension programs and services. Findings indicated that, in both 1996 and 1999, the most used sources of
extension information was via county extension newsletters and/or mailers. Approximately 90% of those surveyed in 1996 indicated having received these documents and 84.2% in 1999 (Table 3).

Likewise, in 1996, 77% of the respondents had acquired extension bulletins or fact sheets compared with 73.4% in 1999. Mass media such as newspapers, radio and television were also used by 70.9% of the people to gain information from extension in the 1996 survey. This decreased to 64% in 1999. A significant change occurred in reports of visiting the Michigan State University campus for statewide programs, from 42% in 1996 to 35.6% in 1999.

Computer-based information has still not become a common method of participation in extension activities. Approximately 6% of

Table 3
Preferred Sources of Extension Information

Programs	1996 number (%)	1999 number (%)
Received county extension newsletters or mailers.	681 (90.6%)	565 (84.2%)
Acquired an extension bulletin or fact sheet.	557 (77.0%)	489 (73.4%)
Visited county extension office.	554 (74.2%)	482 (73.1%)
Gained information from extension through the mass media (newspaper, radio or TV).	523 (70.9%)	424 (64.4%)
Had contact with an MSU extension specialist.	416 (56.1%)	370 (56.2%)
Attended extension farm meetings/workshops.	392 (52.8%)	325 (49.5%)
Visited MSU campus to participate in AG Expo, ANR Week, etc.	312 (42.0%)	233 (35.6%)
Participated in field days/demonstrations.	302 (40.9%)	229 (35.5%)
A local extension agriculture agent or team of agents visited my farm/agribusiness.	270 (36.4%)	248 (37.7%)
Received electronic mail information (via DTN or Farm Dayta services).	73 (10.0%)	59 (9.2%)
Borrowed or purchased an extension-produced videotape.	58 (8.0%)	33 (5.2%)
Used an extension-developed software package.	43 (5.9%)	35 (5.5%)
Received information via computer on the World Wide Web.	10 (1.4%)	64 (10.0%)

the respondents had used an extension-developed software package. There was a significant increase in the percentage of respondents who gained extension-related information via the World Wide Web. In 1996, only 1.4% had received information via the World Wide Web; this increased to 10% in 1999. However, the vast majority of respondents still do not use the World Wide Web.

Results of chi-square analyses showed a difference between full-time and part-time farmers in frequency of participation in extension programs. In both 1996 and 1999, full-time farmers indicated greater awareness of extension programs than part-time farmers and tended to participate more in extension-organized farm meetings/workshops and field days/demonstrations. Overall, in both 1996 and 1999, full-time farmers reported greater participation in extension programs. The survey showed that a significantly higher ($p < 0.05$) proportion of full-time farmers acquire extension bulletins, fact sheets and newsletters. Full-time farmers have also used electronic information and Extension-developed software packages more than part-time farmers in the past year. A significantly higher number of full-time farmers reported that they had been visited by extension agents, had contact with extension specialists and had more frequently visited the Michigan State University campus to participate in organized, statewide events.

Both the 1996 and 1999 results indicate that those farmers who held off-farm employment attended extension meetings and participated in field days/demonstrations less frequently than those who did not have off-farm employment. Further analysis also revealed that, in both years, farmers who did not have off-farm employment tended to meet extension agents significantly more than those who had off-farm employment. The 1999 data also indicated that those who did not have off-farm employment were more likely to use extension software packages and gain information about extension via the mass media. This difference was not apparent in the 1996 data.

Sources of General Farm-Related Information

The information used by the respondents was categorized as print information, electronic information, organizational events, and personal sources of information. Various media sources were included in each of these categories. The respondents were asked to express their views on the importance of these sources of information to their operations.

Print information. Table 4 illustrates that, in 1996, the most important source of print information for respondents was general farm magazines; 17% of the respondents stated they used them a great deal and 38.3% a fair amount. On a scale of 1 (nothing at all) to 5 (a great deal), the mean in use of print information was 3.48. In the 1996 data, across all print sources, extension publications were ranked second in use (M= 3.21). This was again the case in 1999 (M = 3.12). Printed materials from commercial firms were also found to be an important source of information in the 1996 study (M= 3.18). The 1999 respondents were significantly less likely than the 1996 respondents to report relying on printed material from commercial firms [M= 3.02; t (1425) = 2.62, p=.009]. Likewise, agricultural newspapers were also found to be used by many respondents, and general daily/weekly newspapers also provided important information.

In the 1996 data, newsletters of farm organizations had a mean use of 2.97 and in 1999, the mean decreased to 2.78, which is significantly lower than the 1996 report [t (1348) =2.88; p=.004]. Specialized farm magazines appeared less informative in the 1996 data; 23.4% answered that they used no information at all from this source. The 1999 respondents were even less likely (M = 2.66) to rely on specialized farm magazines [t (1359)=3.57; p = .00].

Electronic information. In both 1996 and 1999, the use of information delivered through web-based sources was found to be less important than all other sources of information. Radio/TV-based information sources were found to be less important than either print or personal sources of information. In 1996 and 1999, the least important source of information to respondents was that from electronic information sources such as the Internet or other computer information. However, the 1999 respondents were significantly more likely to rely on the
World Wide Web and other sources of general farm-related computerized information than the 1996 respondents
[t (1337)=4.27, p=.00].

Organizational events. The use of information provided via organizational events was not as high as print information use. However, in 1996, 9.6% of respondents reported that they used information from extension meetings, workshops and courses a great deal; and 19.8% reported that they used it a fair amount. In 1999, these percentages were similar, as was the mean reported usage score

Table 4
Preferred Sources of General Farming Information

Information Source	*N* (1996)	*N* (1999)	1996 Mean* (*SD*)	1999 Mean* (*SD*)
Print information				
General farm magazines (such as Successful Farming, etc.)	793	648	3.48 (1.1)	3.25 (1.2)
Extension publications	762	639	3.21 (1.1)	3.12 (1.1)
Printed materials from commercial firms (seed, fertilizer, chemical companies, etc.)	781	644	3.18 (1.1)	3.02 (1.1)
Agricultural newspapers	764	635	3.17 (1.2)	2.99 (1.2)
General daily/weekly newspaper	780	642	3.00 (1.1)	3.02 (1.2)
Newsletters of farm organizations	748	600	2.97 (1.1)	2.78 (1.2)
Specialized farm magazines (such as *Hoard's Dairyman*, etc.)	751	608	2.94 (1.4)	2.66 (1.4)
Experiment station publications	745	614	2.49 (1.2)	2.49 (1.2)
Electronic information				
General TV or radio news	774	632	2.70 (1.2)	2.71 (1.1)
Radio farm programs	766	626	2.56 (1.2)	2.37 (1.2)
TV farm programs	769	624	2.45 (1.2)	2.34 (1.2)
DTN or Farm Dayta services	746	603	1.57 (1.1)	1.60 (1.3)
Internet or other computer information	745	608	1.33 (0.7)	1.70 (1.1)
Organizational events				
Extension meetings, workshops	762	629	2.64 (1.3)	2.62 (1.4)
Extension/demonstrations, field days	761	626	2.61 (1.3)	2.50 (1.3)
Farm organization/association meetings	756	616	2.42 (1.2)	2.28 (1.2)
Statewide events (ANR Week/Ag Expo)	760	625	2.41 (1.3)	2.21 (1.3)
Personal sources of information				
Farm supply dealers, salespeople, etc.	783	657	3.46 (1.0)	3.31(1.1)
Family, friends or neighbors	786	652	3.23 (1.0)	3.18 (1.1)
County agents or Extension specialists	766	650	3.05 (1.2)	3.01 (1.1)
Farm or business consultant	758	624	2.26 (1.3)	2.15 (1.3)

* Mean was computed based on 1=nothing at all, 2=little, 3=some, 4=a fair amount, and 5=a great deal.

(M = 2.64 in 1996 and M = 2.62 in 1999). In both 1996 and 1999, the majority of the respondents claimed to have used little or no information at all from farm organization or association meetings, and the mean for the 1999 respondents (2.28) was significantly lower than that of the 1996 farmers [M=2.42; t (1372) =2.07; p=.04], indicating that reliance on this source of information has decreased over time. Similarly, information conveyed through statewide events was also reported to be used significantly less by the respondents in the 1999 sample (M= 2.21) than by the 1996 respondents [M=2.41; t (1385)=2.85 p=.005].

Personal sources of information. This information source category appeared in general to be very important to the respondents. Among the sources in this category, information from farm supply dealers, salespeople, etc., was of the greatest importance to both the 1996 and 1999 respondents, although less so in 1999 [t (1440)=2.67; p=.008]. Information from family, friends, or neighbors was used a fair amount in 1996 (M =3.23) and 1999 (M=3.18), as was information from extension agents and specialists. In both 1996 and 1999, almost 40% of the respondents reported they used no information from farm or business consultants, and about 20% of farmers in both 1996 and 1999 felt that they used this source of information a fair amount or a great deal.

Composite scores were formed to determine overall use patterns of sources of information. Examination of the mean scores indicates that, in 1996, agricultural producers were more likely to rely on print and personal information, followed by electronic and organizational. In 1999, the numbers are much the same (though lower overall), with personal sources and print sources taking precedence over electronic and organizational sources. The data indicate an overall trend of fewer sources of informational use and that farmers are using those sources less.

Sources of Farm-Related Information and Demographic Variables

Analysis was conducted to determine correlations between the age of the individual, income level, education level, farm size, and choice of information source (Table 5). In 1996, moderate correlations between these factors were found. In the 1999 data, the pattern of correlations was similar. The correlations between sources of general farm-related information and demographic variables tended to

either increase or remain about the same between 1996 and 1999. In 1996, income and farm size were significantly related to nearly all information sources and by 1999, farm size and income were significantly related to all types of information sources. That is, farmers with more income and/or larger farms tend to use more sources of information than other farmers. In both years, the higher the gross income of the farmers, the more they purchased specialized farm magazines, attended extension meetings, workshops and courses, and attended farm organization or association meetings. The values of all these correlations were about 0.30.

Web-based sources were negatively related to age and positively related to income, education, and farm size for both years. In both 1996 and 1999, organizational sources of information were used more by those with higher incomes, more formal education, and larger farms. In both years, print information was used more by those with higher incomes and larger farms.

There were some changes between 1996 and 1999 in the use of radio/TV information sources and personal sources of information. In 1996, use of radio/TV was related to age (older farmers used it more

Table 5
Correlations Between Selected Demographic Information and Perceived Importance of Various Information Source Scales

Source of information (scales)	Year	Age r value	Income r value	Education r value	Farm size r value
Print information	1996	.05	.30*	.04	.19*
	1999	.04	.41*	-.02	.20*
Electronic information					
Web-based information	1996	-.18*	.23*	.10*	.27*
	1999	-.17*	.27*	.08*	.27*
Radio/TV information	1996	.11*	.00	-.05	.07
	1999	.01	.12*	-.04	.13*
Organizational events	1996	-.07	.32*	.14*	.18*
	1999	-.06	.42*	.11*	.19*
Personal sources of information	1996	-.04	.27*	.06	.12*
	1999	-.12*	.35*	.07	.18*

* = p<.05

than younger farmers). In 1999, however, this was not the case. Instead, radio/TV information sources were used more by those with higher incomes and larger farms. In 1996, personal sources of information were also used by those with higher incomes and larger farms.
This remained the case in 1999, with the addition of younger farmers having used personal sources of information more than older farmers.

Sources of Information and Farmer Employment Status

T-test analyses conducted on the various sources of information used by the respondents also showed significant differences ($p \leq 0.05$) between full-time and part-time farmers in both the 1996 and 1999 samples. In both cases, full-time farmers received more information from print sources such as general farm magazines, specialized magazines, extension publications, experiment station publications, agricultural newspapers, newsletters of farm organizations, and printed material from commercial firms. Likewise, in both 1996 and 1999, full-time farmers generally attended organizational events such as meetings, extension/research demonstrations, and farm organization/association meetings more than part-time farmers.

In both 1996 and 1999, it was also found that full-time farmers used personal sources of information significantly more than part-time farmers. This difference was evident in the acquisition of information by the two groups of farmers from farm supply dealers, salespeople, county agents or extension specialists, and farm or business consultants. In 1996, there was no difference between part-time and full-time farmers in obtaining information from friends and neighbors. The 1999 data indicate that part-time farmers are more likely than full-time farmers to rely on family, friends, and neighbors for information. In both1996 and 1999, full-time farmers used web-based sources of information significantly more than part-time farmers.

Statistical tests to determine if the off-farm employment status of the respondents made any difference in the sources of information used indicate that, in both 1996 and 1999, the off-farm employment status of the farmers made a significant difference. In 1996, those farmers who did not have off-farm employment obtained information significantly more from print sources such as general farm magazines, experiment station publications, agricultural newspapers, newsletters of farm organizations and printed materials from

commercial firms than those farmers who held off-farm employment. In 1999, the data showed the same pattern except there was no difference for outside employment on use of extension publications. Those without outside employment were more likely to use specialized farm magazines. In 1996, there was no difference between these two groups of farmers in receiving information from electronic sources (either web-based or TV/radio).

In both 1996 and 1999, farmers with no off-farm employment received significantly more information from extension meetings, workshops, courses, extension/research demonstrations, field days, and farm organization/association meetings. However, there was no difference between these groups in either 1996 or 1999 on use of statewide events for information. In both years, a significant difference was also found between these two groups of farmers in receiving information from personal sources. In 1996, farmers without off-farm employment were found to receive information from family, friends, or neighbors significantly more than those with off-farm employment. This was not the case in 1999, as those without outside employment were more likely than those who have employment outside the farm to look to consultants, extension agents, and farm salespeople for information.

Summary and Recommendations

In selecting methods of delivery, extension agents and other educators need to keep in mind farmers' information-seeking behaviors. Designing messages and campaigns can be extremely expensive and time consuming. Therefore, it is important to make sure the target audience will receive the message. Understanding differences in demographic groups can be helpful in selecting methods of delivery. Tracking changes over time is also important as new technologies may become more widely diffused and adopted.

Findings from these studies suggest that no single source of information is clearly dominant. Extension cannot assume, for example, that if it provides information via bulletins or mass media that all or even most farmers will receive it. In many cases, a variety of sources may be necessary to reach an audience. However, it is also clear that some sources of information were not widely used by farmers and should be used with extreme caution. DTN and web-based information are not popular sources of information, ranking in the last two

places out of 21 possible sources in both 1996 and 1999. Farmers with larger farms, higher income, and more formal education, as well as younger and full-time farmers, are more likely to use these services, so they may be appropriate for some of these audiences. However, considering that smaller, family farms, part-time and older farmers are often the intended audience for extension and farming information, other sources should be used. In addition, extension-produced videotapes are rarely used. In 1999, only 6 of 100 farmers used this information source.

For both 1996 and 1999, income and farm size were significantly and positively related with all types of information delivery (print, web, TV/radio, organizational events and personal sources). The larger the farm size and the higher the income, the more all sources were used.

Part-time farmers and those with outside employment also tended to use the same information sources, but less frequently than other groups. Educators face the challenge of trying to reach many types of farmers including those with less income, smaller family farms, and part-time farmers. Part-time farmers tend to rely on personal sources of information and print information that may be more readily available. To reach part-time farmers and those with outside sources of employment, extension may need to consider scheduling events and office hours on weekends and evenings.

To reach larger audiences, extension agents should continue to use radio, television, newsletters, mailers, and other print sources. Extension agents should consider sending articles and press releases to these media in addition to using extension's own publications. Extension should consider getting research-based information to local farm supply dealers who rated highly as sources of information; who can in turn pass this information along to their customers.

The results of this study can be a helpful in choosing delivery methods and point to the changing trends in information sources and the information-seeking behaviors of farmers. Educators and researchers need to continue to track and document these trends to make well informed choices in campaign and message delivery.

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