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Sources of information for commercial farms: usefulness of media and personal sources

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Abstract

The usefulness of several information sources is examined for U.S. farms with sales in excess of $100,000. The results indicate that crop/livestock-specific magazines and general farm magazines are the most useful information sources. Analyses indicate that the types and number of different commodities that the farm produced, as well as Internet use, are the most consistent predictors of attitudes toward various information sources. However, characteristics that explain attitudes toward different information sources vary substantially across the information sources considered. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

Developing a successful customer communication strategy is one of the most significant challenges faced by agribusiness marketers. The continuing consolidation in production agriculture has left a small number of large and sophisticated customers. In 1997, farms with sales in excess of $100,000 accounted for 18% of U.S. farms, produced 87% of the market value of agricultural products sold, and generated 84% of the farm sector's production expenses (Table 50, 1997 U.S. Census of Agriculture). These commercial farms are an important market segment for agricultural input suppliers.

Agribusiness marketers use numerous approaches to communicate product, service, and information offerings to these customers. Farm publications are one of the most frequently

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used communication tools. The Audit Bureau of Circulations reports that *Farm Journal*, *Successful Farming*, and *Progressive Farmer* each has a circulation of over 450,000. Such publications provide information to producers, and are major carriers of input supplier advertising. In addition to print publications, producers also obtain information from salespeople, consultants, radio programs, television shows, direct mail, government sources, video, the Internet, and universities.

A 1998 study, conducted by *AgriMarketing* magazine, estimated that agricultural input suppliers spent $147 million on print advertising, $98 million on farm trade shows, $64 million on direct mailings, and $60 million on radio advertising. Much of this expenditure was likely focused on the nation's largest farms. According to a 1993 study, commercial producers (farms with sales in excess of $100,000) received six phone calls per month advertising or promoting agricultural products or services (Center for Agricultural Business, 1993). As a result of such input supplier strategies, and advances in information technology that allow more information to be delivered at a lower cost, commercial producers are literally awash with information.

Allocating advertising and promotion budgets across the various information sources used by producers is a difficult but important decision for agribusiness marketers. Such decisions are dependent upon factors such as the type of information that the marketer wishes to convey, the mechanism through which that information is most effectively delivered, and the interest or capability of commercial producers to receive information from different sources. For example, print media can be used to deliver extremely detailed information, while radio broadcasts might be used to deliver timely, easily understood information. The means by which information is delivered by these sources is highly varied. For instance, salespeople deliver information in a highly personal, interactive manner, while farm magazines are relatively impersonal. Because each information source has advantages and disadvantages in delivering certain types of information, one would expect that nearly all would have a role in the communications strategy of most input suppliers. The challenge is determining which source provides the best communication vehicle in any given situation.

In addition to an information source's ability to transmit a particular type of information, agribusiness marketers must also consider their target market's preferences. For example, although a written technical report may offer a great deal of capacity for communicating product specifications, few producers may prefer to receive information in this form. If certain factors or characteristics of customers or market segments tend to be related to preferences toward information from a specific information source, agribusiness marketers can use such tendencies to guide their communications strategies. Thus, it is important to understand not only how favorably producers view different information sources, but also the factors or characteristics that influence their attitudes toward various information sources.

This article seeks to understand commercial producers' perceptions of the usefulness of information received from a variety of information sources, and identify factors that explain the variation in producers' attitudes toward these sources. The insights gained from this study should help improve the efficiency with which input suppliers conduct their marketing efforts. The next section briefly summarizes previous studies of the information preferences of commercial producers. Then the data, methodology, and hypothesized relationships are discussed. Finally, the results and conclusions are presented.

2. Summary of previous studies

In general, there has been considerable debate concerning farmers' attitudes toward specific information sources. For instance, Ortmann et al. (1993) found the agricultural salesperson to be a relatively unimportant source of information for production decisions, whereas Ford and Babb (1989) and Schnitkey et al. (1992) found private firms, cooperative firms, and salespeople to be important information sources for production decisions. Ford and Babb (1989) observed that farm magazines are a widely used information source, but also noted that large farmers prefer personal, service-oriented information as opposed to written information. This is in contrast to the findings of Schnitkey et al. (1992), who found Ohio commercial producers displayed a preference for written information.

There are also numerous inconsistencies with respect to the factors that influence farmers' attitudes toward specific information sources. Age and experience were important characteristics in determining information preferences in studies by Ford and Babb (1989) and Schnitkey et al. (1992), and unimportant in studies conducted by Pompelli et al. (1997), Foltz et al. (1996), and Ortmann et al. (1993). Measures of farm size were related to both attitudes toward, and the use of, information sources in studies by Ford and Babb (1989), Ortmann et al. (1993), Schnitkey (1993), and Foltz et al. (1996). Schnitkey et al. (1992) and Ortmann et al. (1993) found that the farm's use and attitudes toward different information sources varied by enterprise type. Other factors that have been found to influence attitudes toward information sources are experience with the information source (Pompelli et al., 1997), experience with technology such as computers (Schnitkey et al., 1993; Ortmann et al., 1993), and farmers' skills in different functional management areas (Ortmann et al., 1993). In light of the inconsistencies in findings, technological changes, and continuing consolidation in production agriculture, it is important to reconsider large U.S. farmers' attitudes toward different information sources and attempt to uncover factors that influence these attitudes.

3. Data

A mail survey of 10,500 farms with sales in excess of $100,000 was conducted in the Spring of 1998. The survey instrument was designed to collect information regarding a variety of issues, including the information preferences of commercial producers. The farms in the sample were identified from a proprietary database and were targeted with respect to farm size, enterprise type, and location. The sample was constructed such that 25% of the sampling population was believed to possess at least one enterprise that generated annual farm sales between $100,000 and $500,000, while the remaining 75% were expected to have at least one enterprise with sales in excess of $500,000. The six enterprises targeted were corn/soybeans, wheat/barley, cotton, dairy, beef cattle, and hogs. Geographic targeting was accomplished by ranking the production/inventory of each of the six commodities by state. The smallest number of states required to account for 75% of the production/inventory of each commodity were then identified. Finally, individual producers located in these states were identified for sampling.

The survey instrument was designed with the input of academics, representatives from

several large agricultural input firms, and the firm in charge of administering the survey. (A copy of the survey instrument can be found in Akridge et al., 2000.) The initial survey instrument was pretested with farmers in February 1998. After incorporating suggested changes, the final survey instrument and a postage paid reply envelope were mailed in March 1998. Farms were offered a copy of the results as an incentive for participation. A follow-up reminder card was sent approximately two weeks after the initial mailing. Next, calls were made to nonrespondents in late March. Data collection ended in April 1998.

Of the 10,500 surveys sent, 1742 usable questionnaires were returned, for a response rate of 16.6%. Although the response rate appears low, given the size of the farms in the sample, the length of the questionnaire, and the fact that no monetary incentives were employed the response was in line with expectations of 20%. A complete description of the survey design and the response can be found in Akridge et al. (2000). Farms with single-enterprise sales between $100,000 and $500,000 accounted for 39% of the respondents. Many of these farms actually had total farm sales in excess of $500,000. Corn/soybean farms accounted for the largest percentage of respondents (28% of the respondents), and wheat/barley growers made up the smallest percentage of total respondents (12% of the respondents).

4. Factors influencing attitudes toward information sources

Based on previous research, a variety of factors are expected to influence the usefulness of information sources. Table 1 describes the factors expected to influence the usefulness of various information sources, and the proportion of the sample with these characteristics or the mean response of the sample. The factors considered were age, education, farm size, the type of commodities produced by the farm's primary enterprise, Internet use, use of precision farming technology, number of commodities produced by the farm, and buying segment membership.

The majority of producers were between 45 and 54 years of age. Thirty percent of the respondents had received a four-year college degree. The respondents operated large farms with mean total annual sales of the six primary commodities (corn/soybeans, wheat/barley, cotton, dairy, beef cattle, and hogs) of slightly over $1,200,000. Corn/soybeans, cotton, or wheat/barley were the primary commodities produced on slightly over half of the farms (53%), and these farms were classified as crop farms. Cattle or hogs or dairy were the primary commodities produced on the remaining 47% of the farms, and these farms were classified as livestock farms.

There was a tendency for producers to specialize in the production of one or two of the six commodities. While the mean number of enterprises found on a commercial farm was 2.17, 26% of the respondents produced only one commodity, 40% produced two, and no farm produced more than five of the six commodities. Nearly half (49%) of the producers were using the Internet, and 27% were using precision farming technology such as computerized field mapping, satellite imagery, soil sampling with global positioning technology, and yield monitoring with global positioning technology. Gloy and Akridge (1999) found that four market segments characterized the buying attitudes of commercial producers. The largest of these segments was the Balance segment (47% of producers), while the Conve-

Table 1
Description of variables expected to influence attitudes toward information sources

Variable		Percent of sample
Age		
	Under 35 years	12
	35 to 44 years	23
	45 to 54 years	30
	55 to 64 years	23
	65 years and over	12
Education		
	attended high school	3
	high school graduate	32
	graduate of 2 year college or trade program	12
	some 4 year college	17
	college graduate	30
	masters degree	4
	advanced graduate work	3
Farm size: annual total farm sales in $'s (mean sales)		1,208,003*
Farm type: farms whose primary enterprise was crops (corn/soybeans, cotton, or wheat/barley)		53
farms whose primary enterprise was livestock (cattle or hogs or dairy)		47
Technology use		
	percent using the Internet	49
	percent using precision farming technology	27
Farm complexity: number of farm enterprises—ranges from 1 to 6 (mean)		2.17*
Customer segment: membership in buying segment		
	balance	47
	convenience	15
	performance	16
	price	21

* Sample mean.

nience segment accounted for 15%, the Performance segment accounted for 16%, and the Price segment accounted for 21% of the respondents. These segments and their attitudes are discussed in more detail in the hypotheses section.

4.1. The models

Producers were asked to rate each of the 15 information sources on a 5-point Likert scale (1 = never useful, 5 = always useful). Table 2 shows the distribution of ratings for each source. The rating could take on 1 of 5 discrete levels that measure the usefulness of information received from the source. The relationship between producers' ratings of the usefulness of the information received from a source and the factors that influence this rating were examined with logistic regression. An equation can be estimated for each cumulative logit, or the natural logarithm of the odds ratio of each level of usefulness (i.e., always useful, at least often useful, at least sometimes useful, etc.) (Demaris, 1992). In this case, there are five different levels of the dependent variable, so four different cumulative logit equations could be estimated. We have chosen to present the results corresponding to the natural

Table 2
The distribution of the rankings of each information source

Source	Never useful 1	Seldom useful 2	Sometimes useful 3	Often useful 4	Always useful 5	Total % often or always useful
Media sources						
Crop/livestock-specific publications	2.3%	3.8%	25.1%	54.4%	14.5%	68.9
General farm publications	0.4%	4.6%	31.8%	51.1%	12.1%	63.2
Direct mail	4.2%	16.8%	37.4%	35.1%	6.5%	41.6
Radio	13.1%	33.0%	33.0%	18.0%	3.0%	21.0
Video	17.9%	39.9%	32.5%	8.9%	0.8%	9.7
Television	22.6%	42.3%	25.3%	8.0%	1.9%	9.9
CD-ROM	54.6%	21.8%	18.0%	5.1%	0.6%	5.7
Personal sources						
Local dealer sales and technical people	1.0%	6.5%	35.6%	49.4%	7.6%	57.0
Other farmers	0.8%	6.5%	38.3%	45.6%	8.8%	54.4
Farmer meetings	2.1%	11.0%	36.9%	43.5%	6.5%	50.0
Extension/universities	4.1%	17.4%	35.5%	35.3%	7.8%	43.1
Demonstrations/field days	4.1%	15.6%	44.7%	30.8%	4.8%	35.6
Manufacturer technical specialists	5.1%	22.0%	43.7%	26.2%	3.1%	29.3
Manufacturer salespeople	5.1%	23.3%	46.4%	22.9%	2.4%	25.3
Telephone contact	21.0%	38.3%	26.5%	11.9%	2.4%	14.3

$N = 1{,}560$.

logarithm of the cumulative odds that a producer described an information source as often or always useful as opposed to sometimes, seldom, or never useful. That is, we estimate the following model:

$$\ln\left(\frac{p_{AU}+p_{OU}}{p_{SoU}+p_{SeU}+p_{NU}}\right) = \beta_0 + \sum_{i=1}^{4}\beta_i AGE_i + \sum_{i=5}^{10}\beta_i EDUC_i + \beta_{11}\,Sales + \beta_{12}Crop\,D + \beta_{13}Ent + \beta_{14}Internet + \beta_{15}Precision + \sum_{i=16}^{18}\beta_i Segment_i \quad (1)$$

where *ln* is the natural logarithm; p_{AU} is the probability the source always provides useful information; p_{OU} is the probability the source often provides useful information; p_{SoU} is the probability the source sometimes provides useful information; p_{SeU} is the probability the source seldom provides useful information; p_{NU} is the probability the source never provides useful information; the β_i's are parameters to be estimated; AGE_i is a series of four indicator variables for membership in an age category (1 = yes, 0 = no; less than 35 years old is the group omitted from the regression); $EDUC_i$ is a series of six indicator variables for membership in a specific education category (1 = yes, 0 = no; attended high school is the group omitted from the regression); *SALES* is total annual sales for each farm in dollars; *CropD* is an indicator variable for farms whose primary enterprise involves crop production (corn/soybeans or wheat/barley or cotton; 1 = yes, 0 = no); *INTERNET* is an indicator

Table 3
Hypothesized relationships for media and personal information sources

Factor	Media information sources	Personal information sources
Age	−	+
Education	+	+
Farm size	+	+
Crop farm	−	−
Number of enterprises	+	+
Precision technology	+	+
Internet use	−	+
Balance segment	+	+
Convenience segment	−	Mixed
Performance segment	+	+
Price segment	−	Mixed

variable identifying producers who indicated that they used the Internet in their farm business (1 = yes, 0 = no); *PRECISION* is an indicator variable which identifies producers who used precision farming technologies (computerized mapping, satellite imagery, soil sampling with GPS, yield monitor with GPS; 1 = yes, 0 = no); *ENT* is a the total number of commodities produced by the farm (six possible commodity groups); and $SEGMENT_i$ is a series of three indicator variables for segment membership (1 = yes, 0 = no; the Balance segment is omitted from the regression).

4.2. Hypothesized relationships

Seven of the information sources (crop/livestock-specific publications, general farm publications, direct mail, video, television, radio, and CD-ROM) can be characterized as media sources. Eight of the sources (local dealer sales and technical people, other farmers, farmer meetings, extension/universities, demonstrations/field days, manufacturer technical specialists, manufacturer salespeople, and telephone contact) can be characterized as personal sources. Table 3 shows the hypothesized relationships between the characteristics and the usefulness of information received from the media and personal information sources.

Age is thought to impact a decision-maker's demand for information. Schnitkey et al. (1992) argue that age is related to farming experience, and that farmers with more experience should have less demand for external information. Further, obtaining information from media sources involves an individual investment in information retrieval and interpretation on the part of the producer. Following the experience argument, older farmers may find making this investment less desirable than younger farmers. Thus, it is expected that age will be negatively related to the usefulness of information received from media information sources. With respect to personal sources, Kool, Meulenberg, and Broens (1997) found that input suppliers were more likely to have established relationships with older producers. If producers value the information provided by these relationships, age should be positively related to the usefulness of information received from personal information sources.

With respect to education, higher levels of education are expected to be positively related to the usefulness of information received from all information sources. Higher levels of

education should be consistent with increased ability to process information and/or individuals that seek out information. Higher levels of education should also influence the usefulness of information received from the sources that deliver the most sophisticated information. For instance, education should be positively related to the usefulness of information received from manufacturer technical specialists.

Ford and Babb (1989) found a positive relationship between farm size and the use of personal information sources. There are several reasons why farm size might be related to the usefulness of information received from both media and personal sources. Large farms should be able to derive a greater overall benefit from the costs of information acquisition. Another aspect of the relationship between farm size and the usefulness of personal information sources centers on salespeople. Salespeople often provide personalized or operation-specific information, which is more valuable than nonspecific information. To the extent that salespeople are more likely to call on large farms for simple economic reasons, it is expected that large farms will be more likely than smaller farms to find the information provided by personal information sources valuable.

Ford and Babb (1989) observed that livestock farms tended to rely on a larger number of information sources than did crop farms. Schnitkey et al. (1992) found that dairy farms relied more heavily on specialists than did other farm types. Similarly, Ortmann et al. (1993) found that livestock farmers spent more on consultants than did crop farms. Perhaps the findings of the previous studies indicate that livestock farms have a greater need for information than crop farms. However, it is difficult to argue why the information needs of livestock farms would be substantially greater than the information needs of crop farms because both crop and livestock production involve sophisticated and complex production techniques. Rather it is reasonable to expect that, consistent with the findings of previous studies, crop farms will be less likely than livestock farms to value information from both media and personal sources.

The number of different commodities produced by a farm is another indication of the complexity of the farm business. Production of more commodities suggests a more complex operation with more diverse information needs. These farms are expected to value information from all sources more highly than less complex farms.

Technology use should also impact information preferences. Precision farming technology is relatively complex, and farmers are likely to seek implementation assistance. It is expected that there will be a positive relationship between the use of precision farming technology and the usefulness of personal information sources, especially sources such as manufacturer technical specialists, manufacturer salespeople, and local dealer sales and technical people. Media such as farm magazines also carry a great deal of technical information, thus it is expected that there will be a positive relationship between the use of precision farming technology and the usefulness of information received from media sources.

The Internet is another technology that should influence information preferences. Large producers using the Internet are most likely to be using it to gather product and market information (Gloy and Akridge, 1999). If Internet use is indicative of producers who are likely to seek out information, one would expect that Internet use would increase the probability that producers receive useful information from all sources. On the other hand, Internet users might view the information received from the Internet as a substitute for

information received from media sources such as radio, farm publications, and direct mail. Thus, Internet use is expected to reduce the probability of receiving useful information from media sources. However, it is more difficult to substitute Internet information for the information received from personal sources. In fact, the Internet can be used to communicate with suppliers and other farmers. Therefore, it is expected that Internet use should be positively related to the usefulness of information received from personal sources.

Gloy and Akridge (1999) used cluster analysis to segment the commercial farm market into four market segments that characterized commercial producer's preferences for the bundle of products, services, and information that could be provided by an agricultural input supplier. The segments identified were Balance buyers, Convenience buyers, Performance buyers, and Price buyers. The segments differed with respect to many of the factors that characterize the decision-makers, their farm business, and the product/service/information mix that they are likely to desire. For instance, the segments differed with respect to demographics, management practices, brand preferences, loyalty, and attitudes toward salespeople. It is expected that membership in these buying segments will influence the usefulness of information received from different sources. The hypothesized information preferences of each of the segments are described next.

Balance buyers were sophisticated buyers who demanded an input supplier capable of providing a wide array of services and information, reasonable prices, and products that performed well. They did not frequently purchase the lowest priced items, and relied on off-farm sources of information when making purchase decisions. It is expected that Balance buyers will have favorable opinions of information sources that deliver service with information. These sources include the personal information sources such as manufacturer technical people, manufacturer salespeople, and local dealer personnel. Convenience buyers were very reliant on local influences and local dealers. It is expected that they will be more likely than members of the other segments to find the information delivered by local suppliers useful, and less likely to prefer information from manufacturer sources. Performance buyers were generally interested in product performance factors when selecting their input suppliers. It is expected that Performance buyers will find information sources that deliver detailed information more useful than members of the other buying segments. Such sources should include manufacturer technical specialists, manufacturer salespeople, local dealer salespeople, and direct mail. Price buyers were focused on purchasing from suppliers with the lowest priced products and services. By dealing directly with manufacturers, it is likely that producers can negotiate lower prices. Therefore, it is expected that Price members will find information from manufacturer sources more valuable than other segment members will.

4.3. Opinions of various information sources

Table 4 shows the mean ratings for each information source. The mean rating of 9 of the 15 sources was at least 3.0 (sometimes useful). The two most useful sources, crop/livestock-specific publications and general farm publications, were both media sources. Direct mail was the only other media source with a mean rating above 3.0. However, six of the eight personal sources received mean ratings above 3.0. The mean ratings of two personal sources,

Table 4
Commercial farmers' mean ratings of various information sources (1 = never useful, 5 = always useful)*

Information source	Mean rating
Media sources	
Crop/livestock-specific publications	3.75 (±0.04)
General farm publications	3.70 (±0.04)
Direct mail	3.23 (±0.05)
Radio	2.65 (±0.05)
Video	2.35 (±0.04)
Television	2.24 (±0.05)
CD-ROM	1.75 (±0.05)
Personal sources	
Local dealer sales and technical people	3.56 (±0.04)
Other farmers	3.55 (±0.04)
Farmer meetings	3.41 (±0.04)
Extension/universities	3.25 (±0.05)
Demonstrations/field days	3.17 (±0.04)
Manufacturer technical specialists	3.00 (±0.04)
Manufacturer salespeople	2.94 (±0.04)
Telephone contact	2.36 (±0.05)

N = 1,560.
* 95 % confidence interval in parentheses.

local dealer sales and technical people, and other farmers were above 3.5. Among the personal sources, local dealer personnel were rated more highly than both manufacturer technical people and manufacturer salespeople. Based on the mean ratings, it appears that farmers perceive little difference between the two types of manufacturer information sources.

Four media sources and four personal sources were selected for the logistic regression analysis. The media sources selected were crop/livestock-specific publications, general farm publications, direct mail, and radio. The four personal sources selected were local dealer sales and technical people, manufacturer salespeople, manufacturer technical specialists, and other farmers. These sources were chosen because they are frequently used by agribusiness marketers and were among the highest rated information sources.

4.4. Media source results

The marginal effect of each parameter in each of the media source models is reported in Table 5. The marginal effect for a variable is the change in the probability that an individual would find the source either often or always useful (as opposed to sometimes, seldom, or never useful) caused by a unit change in the variable. The effects of indicator variables were calculated by holding the variables outside the indicator variable group at mean levels and calculating the difference between the probability of finding the source always or often useful with the characteristic and the probability of finding the source always or often useful without the characteristic. For example, other things equal, the probability that a crop farm will find crop/livestock-specific farm publications often or always useful is 8.11% less than the probability that a livestock farm will find crop/livestock-specific farm publications often

Table 5
Marginal effects in the media information source models

Variable	Crop/livestock-specific farm publications	General farm publications	Direct mail	Radio
Age[a]			***	
35 to 44 years	0.0049	0.0021	−0.0184	−0.0066
45 to 54 years	0.0437	0.0039	0.0869**	0.0233
55 to 64 years	0.0617	0.0548	0.0968**	0.0511
65 years and over	0.0873*	0.0500	0.0502	0.0764*
Education[a]				
high school graduate	0.0796	0.0185	0.0996	0.0632
graduate of 2 year college or trade program	0.1401*	0.0409	0.1073	0.0551
some 4 year college	0.1048	−0.0186	0.1206	0.0623
college graduate	0.1540*	−0.0292	0.0567	−0.0048
masters degree	0.1580	0.0458	0.0904	0.0478
advanced graduate work	0.0576	−0.0716	0.0281	0.0440
Total sales	−1.06E-08*	−4.80E-09	−4.17E-09	−5.30E-09
Crop farm	−0.0811***	0.0474*	0.0615**	0.0773***
Enterprises	0.0253*	0.0259*	0.0492***	0.0348***
Internet use	0.0831***	0.0084	−0.0035	−0.0007
Precision farming	0.0331	0.0118	0.0225	−0.0311
Segments[a]				
convenience	0.0232	0.0375	0.0270	0.0477
performance	0.0200	−0.0198	−0.0251	−0.0300
price	−0.0160	−0.0279	−0.0150	0.0085
Model significance[a]	***		***	***

[a] Likelihood ratio test for joint significance of parameters.

* Indicates significance at the 0.10 level; ** indicates significance at the 0.05 level; and *** indicates significance at the 0.01 level.

or always useful (Table 5). The marginal changes in probability for the sales and enterprise variables were calculated as the product of the parameter estimate and the logistic density function evaluated at the mean of all the explanatory variables.

The χ^2 statistics for the likelihood ratio tests of the joint significance of all the nonintercept parameters is significant at the 0.01 level in all models except the general farm magazine model. General farm magazines were clearly identified as one of the most useful information sources, with 63.2% of respondents indicating that the information they provided was either often or always useful (Table 2). The factors considered in the model do not appear to distinguish the producers that find general farm publications often or always useful from those who find them less useful.

Compared to general farm publications, a slightly larger proportion of the respondents considered crop/livestock-specific farm publications to be often or always useful (68.9%; Table 2). Unlike general farm publications, several factors serve to distinguish producers who find this source often or always useful from those who do not. There was a negative relationship between farm size (as measured by total farm sales) and the probability that respondents found crop/livestock-specific farm publications often useful (Table 5). Likewise, livestock farms were more likely than crop farms to find crop/livestock-specific farm

magazines often or always useful. Farmers who had adopted the Internet were more likely than nonadopters to find the specific publications often or always useful. Similarly, the more commodities produced by the farm, the more likely that the respondent found this source often or always useful.

Though rated much less useful than either general farm publications or crop/livestock-specific publications, direct mail received relatively high ratings (41.6% considered it often or always useful; Table 2) compared to manufacturer technical specialists, manufacturer salespeople, and radio. Only three variables were significantly related to the probability that respondents found direct mail at least often useful (Table 5). The age variables had relatively large marginal effects and were significant as a group. However, the relationship between age and the usefulness of this source was not generally increasing or decreasing with age. Producers in the 55 to 64 year age group were the most likely to have a favorable view of direct mail, while producers in the 35 to 44 year age group had the least favorable view. Crop farms had a more favorable view of direct mail than did livestock farms. As the number of enterprises increased, the information provided by direct mail was more likely to be viewed as often or always useful.

The last media source examined was radio. Overall, the fewest respondents indicated that radio often or always provided useful information (21% of respondents; Table 2). Crop farms were more likely to value radio than livestock farms (Table 5). Also, there was a positive relationship between the number of commodities produced by the farm and their rating of this source.

4.5. Personal information source results

Table 6 shows the results for the personal information source models. Local dealer sales and technical people were the third highest rated information source, with 57% of the respondents indicating they often or always provided useful information (Table 2). Crop farms were more likely than livestock farms to value the information provided by local dealer sales and technical people, and farmers who used precision farming technology were much more likely to value the information received from this source. As was the case with the other personal information sources, Internet users were more likely to value information provided by local dealers than nonusers. Finally, buying segment membership was important. Performance members were the most likely to find the local dealer useful, while Price members were much less likely than other segment members to view the local dealer as a useful information source.

According to the percentage of farmers finding the source at least often useful, other farmers were the fourth most useful information source (54.4% of respondents; Table 2). Age was a strong indicator of farmers' perception of the usefulness of this source. Interestingly, the probability that farmers perceived this source often or always useful declined as age increased (Table 6). This suggests that younger producers might be more receptive than older producers to marketing efforts involving opinion leaders. Likewise, the larger the farm, the less likely that other farmers were considered an important information source. On the other hand, Internet users were more likely to find other farmers useful. Members of the Perfor-

Table 6.
Marginal effects in the personal information source models

Variable	Local dealer personnel	Other farmers	Manufacturer technical specialist	Manufacturer salesperson
Age[a]		***	*	
35 to 44 years	0.0460	−0.1103**	0.1168***	0.0034
45 to 54 years	0.0658	−0.1009**	0.0911**	0.0332
55 to 64 years	0.0732	−0.2143***	0.1005**	−0.0140
65 years and over	0.0049	−0.2180***	0.0747	0.0242
Education[a]				
high school graduate	0.1463**	0.0428	0.0560	0.1075
graduate of 2 year college or trade program	0.1091	0.0082	0.0306	0.0880
some 4 year college	0.1522**	0.0931	0.1170	0.1076
college graduate	0.0949	0.0161	0.0590	0.0661
masters degree	0.0598	0.0194	0.1481	0.0844
advanced graduate work	0.0001	0.0973	0.1981*	0.1815*
Total sales	5.63E-09	−1.20E-08*	9.81E-09	1.17E-08**
Crop farm	0.0823***	0.0396	0.0923***	0.0440*
Enterprises	0.0482***	0.0181	0.0402***	0.0147
Internet use	0.0461*	0.0673**	0.0864***	0.0674***
Precision farming	0.1021***	0.0050	0.0939***	0.0462*
Segments[a]	***		*	
convenience	−0.0374	0.0028	−0.1068***	−0.0490
performance	0.0145	0.0746*	−0.0320	−0.0495
price	−0.1033***	−0.0174	−0.0163	0.0114
Model significance[a]	***	***	***	***

[a] Likelihood ratio test for joint significance of parameters.

* Indicates significance at the 0.10 level; ** indicates significance at the 0.05 level; and ***indicates significance at the 0.01 level.

mance buying segment were more likely to value other farmers as information sources than were Balance members.

Manufacturer technical specialists and manufacturer salespeople were only viewed as often or always useful by 29.3 and 25.3% of respondents respectively (Table 2). Part of this lower rating may be because of the way manufacturer representatives are currently used. Few manufacturing firms have direct sales activities aimed at producers of the scale studied here. These representatives are more likely to be used as resources by local dealers for informational meetings or for addressing product performance problems rather than making on-farm sales calls.

The relationships between the factors and the perceived usefulness of each manufacturer source were slightly different. Though age was not an important factor in the manufacturer salesperson model, it did explain differences in the manufacturer technical specialist model (Table 6). However, there was not a general relationship between age and the ratings of the usefulness of the manufacturer technical specialist. Producers in the 35 to 44 year age category were the most likely to find the technical specialists useful, while producers in the 55 to 64 year age group were second most appreciative. Larger farms were more likely to view the manufacturer salesperson as useful, while there was not a statistically significant

relationship between size and usefulness of information received from manufacturer technical specialists.

Crop farms, Internet users, and precision technology users were more likely than producers without these characteristics to find the information provided by both manufacturer technical specialists and manufacturer salespeople often or always useful. As the number of commodities produced by the farm increased, so did the rankings of the usefulness of information received from technical specialists. Finally, buying segment membership was important in explaining the attitudes toward manufacturer technical specialists. Balance segment members were the most likely to value the information received from manufacturer technical specialists and Convenience members the least likely to value the manufacturer technical specialist. Surprisingly, Price members had a slightly more favorable view of the technical specialists than did Performance segment members.

5. Summary

Although no factor was significant in every model, it is possible to draw several conclusions about the factors that influence attitudes toward information sources. First, farms that produce a larger number of commodities are more likely to have positive attitudes toward a variety of information sources than farms that produce few commodities. The number of commodities that a farm produced significantly increased the probability that producers often or always received useful information from 6 of the 8 information sources. Similarly, Internet use tends to be associated with producers who have more favorable views of information sources. In five different models, Internet use increased the probability that producers had a favorable view of the information source. Based on these results, it appears that the Internet might be a complement rather than a substitute for traditional information sources, or an indicator of producers who find traditional information sources useful. Likewise, crop farms and livestock farms tend to have different attitudes toward information sources. Producers operating crop farms had more favorable views than did livestock producers for 6 of the 8 information sources. Only crop/livestock-specific farm publications were more likely to be viewed favorably by livestock producers. This is somewhat contradictory to the findings of Schnitkey et al. (1992) and Ford and Babb (1989). It is possible that the differences are because of the populations being sampled. The farms in the sample used in this study are generally much larger than those sampled in the previous studies.

The remaining factors were not significant in more than three models. In the case of precision farming technology, producers using these techniques were much more likely to value information provided by local dealer sales and technical people, manufacturer technical specialists, and manufacturer salespeople. Similarly, farm size was only significant in 2 of the 8 models. However, it is important to note that all of the farms in this sample are “large” to some extent, and farm size might be an important explanatory factor if smaller farms were included in the analysis. Buying segment membership tended to influence attitudes toward manufacturer and local dealer personnel. Finally, education was not important in determining attitudes toward any of the information sources. This result is consistent with the findings of Foltz et al. (1996) and Pompelli et al. (1997). In general, it would

indicate that within the population of commercial producers, education is a relatively unimportant indicator of preferences toward information sources, but one must recall that the population considered in this study is relatively well educated, as 65% had more than a high school education.

6. Conclusions

Each information source provided benefits to some producers. Some sources, such as crop/livestock-specific publications and general farm publications, had broad, appreciative audiences with few distinguishing characteristics. Others, such as direct mail, are less well received in general, but are valued by certain groups of producers. There is little consistency with respect to the factors that influence the perceived usefulness of the sources. Factors that appeared to be positively related to the perceived usefulness of information sources include the number of different commodities produced by the farm and the Internet use. Similarly, crop farms appeared to be more satisfied with most sources than did livestock producers. Factors such as farm size, education, and age were infrequently, if ever, related to the usefulness of information received from the sources. Factors such as the use of precision technology were important predictors of the usefulness of information sources such as local dealer sales and technical people, manufacturer technical specialists, and manufacturer salespeople.

The data used to examine information preferences of commercial farms came from a large, nationwide survey of farms. These farms are among the larger family farming operations in the nation. Although factors such as age and education were generally unimportant in explaining information preferences in this sample, they could be important in the general farm population. Likewise, if a firm's customer base differs dramatically from the sample farms explored here, it would be unwise to assume that these factors were entirely unimportant. The results suggest that a variety of factors influence attitudes toward different information sources. In general, it appears that the factors that affect attitudes toward each source are somewhat idiosyncratic. The analyses also indicate the continuing need to search for factors that might influence preferences.

Input suppliers can use the results of this analysis to refine information offerings to their target markets. The fact that different groups of producers have different attitudes toward information sources such as local dealer sales and technical people, manufacturer salespeople, and manufacturer technical specialists could be a result of targeting on the part of these suppliers. In other words, it could be argued that the existence of these relationships might be an indicator of the degree of targeting of information that different agribusiness marketers are undertaking.

There are several managerial implications of the study. When selecting methods to deliver information to commercial producers, agricultural marketers must consider the type of information to be delivered, the capability of the information source for delivering the information, and their target market's preferences for receiving information from various sources. When selecting information sources, agricultural marketers should recognize that there are differences with respect to the factors that influence attitudes toward each source.

In other words, each source should be evaluated on a case-by-case basis. The factors that are important in explaining attitudes toward one information source may be very different than the factors that explain attitudes toward another information source. Many agricultural marketers are evaluating the role that the Internet will play in their product, service, and information offerings. Evidence here suggests that the Internet will be a complement to the information offerings rather than a substitute to input supplier's information offerings. Regardless, the preferences of commercial producers will continue to be important in determining where and how to allocate scarce marketing resources.

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