

Sources and Channels of Information Used by Educational Program Clients

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Abstract

Organizations that want to create change through educational programs need to engage clients in a process that makes use of existing communication networks. Most clients use a repertoire of sources and channels for becoming aware of, learning about, and making decisions about practice or technology adoption. This paper focuses on one group of clients served by Cooperative Extension—horse owners—to identify patterns in the sources and channels of information they use. Further, the association between sets of channels and sources is assessed, controlling for relevant client attributes. The results show that horse owners have four correlated sets of information sources and four sets of information channels. The net influence of channels on clients' use of sources varies, with traditional Extension channels, one-on-one consultations, and Internet channels being strongly associated with the use of sources characterized by linkages outside the community. Overall, the results suggest that horse owners can be sorted into distinct market segments that use specific sources and channels. These findings can guide the design of communication strategies for Extension professionals serving adult horse owners in Florida, as well as provide general rules for others involved in developing educational programs for other clients.

So What?

Communicators can develop effective strategies for reaching key audiences by identifying patterns in how distinct market segments use specific types of information. This study shows that communication channels connect audience segments to sources in specific ways. While these findings focus on horse owners, the design of the study can be adapted and applied to other audiences and media.

Many organizations have both an educational and communications mission, and foremost among these is the land-grant university system's Cooperative Extension Service. For more than 90 years, Extension has worked with clients to address economic, social, and environmental issues and needs. Though early educational efforts were based on direct communication with clients, changes in society and technology have resulted in programs using a diverse array of communication channels to reach clients, both directly and through surrogates.

Currently, considerable attention is focused on the role of the Internet as an educational and communications tool, but access remains limited for some Extension clients. In 2003, half (54.5%) of U.S. households had a computer with an Internet connection, and nearly one fifth had a high-speed connection, yet nearly one third of households had no Internet users (National Telecommunications and Information Administration, 2004). Blacks and Hispanics are less likely than Whites to use the Internet, and usage is also lower among those with low educational attainment, those who have low incomes, those who are unemployed, and those who head single-parent households. Many clients, especially older people, continue to rely on more "traditional" channels for information while using newer technologies as a complement (Howell & Habron, 2004; O'Keefe, Boyd, & Brown, 1998; Tucker & Napier, 2002; Vergot, Israel, & Mayo, 2005). Clients' choices of sources and channels are also likely to vary by topic (O'Keefe et al.) and will change as new communication technologies enter the marketplace and obsolete ones are retired.

Given this dynamic environment, it is important to periodically take clients' pulses on the processes used for obtaining educational information, as well as on emerging needs. Developing an understanding of the sources and channels used by clients to obtain information is a prerequisite for efficient educational programming because messages that go unheard or unseen cannot lead to change. In this study, we focus on adult horse owners in Florida to find more efficient ways to address their educational needs. Florida has a large horse industry, with goods and services valued at \$2.2 billion annually. Of Florida's 500,000 horses, 74% are involved in showing and recreation, 12% are involved in track racing, and 14% are involved in other activities, including ranching, mounted law enforcement, and therapeutic riding (American Horse Council, 1996). Horse owners often have questions and need information to address emerging issues, such as West Nile virus and equine encephalitis. By understanding their needs, Extension educators can tailor programs to better assist horse owners with these issues.

Given that many horse owners do not turn to Cooperative Extension for information, the question becomes: Where do they obtain it? It is important to understand the sources and channels used by clients so that Extension educators can achieve widespread coverage of the target audience (Israel, 1991; Vergot et al., 2005). If Extension educators know the types of sources and channels being used, they can adapt strategies to better reach horse owners. The purpose of this study is to identify patterns in the sources and channels of information used by horse owners. In addition, we assess the association of the set of channels with sources, controlling for relevant client attributes, knowledge, and involvement, in order to identify with whom and how Extension should collaborate to deliver educational information.

Theoretical Background

This study is informed by several theoretical perspectives, including rational choice theories, which include the utility maximization framework and social exchange theory (Israel, 1991; Strelbel, Erdem, & Swait, 2004; Varlamoff, Florkowski, Latimer, Braman, & Jordan, 2002), adoption-diffusion theory (Brown, 1981; Rogers, 2003), and social structure literature (Tucker & Napier, 2002), as well as classical communications theories (Stone, Singletary, & Richmond, 1999). First, we review the role of sources and channels in educational programs; then, we describe how channel use, client attributes, and client involvement are associated with horse owners' use of sources.

Sources and Channels

There is a large body of literature on the use of and preferences for sources and channels by Extension clients. Much of this research, however, glosses over the distinction between the two communication elements (O'Keefe et al., 1998), and few analyses of both source and channel patterns have been published in recent years (Rollins, Bruening, & Radhakrishna, 1991; Tucker & Napier, 2002; Vergot et al., 2005). A source is an individual or an institution that originates a message, and a channel is the means by which a message gets from the source to the receiver (O'Keefe et al.; Stone et al., 1999). The distinction is important because clients often use several channels to access information from a single source, a single channel to obtain information from multiple sources, or multiple channels and sources. This perspective assumes that clients select channels based on their expected or past usefulness in meeting their needs (Lin, 1999). Experience and expectations can influence decisions by some horse owners to obtain information directly from Extension, while others might rely on different sources (Israel & Knox, 2001). Considering the sources used by clients in tandem with the set of channels can increase the likelihood of reaching clients with useful information.

Researchers also have found that some people use multiple information channels during the adoption process (Rogers, 2003; Strebel et al., 2004; Tucker & Napier, 2002). Extension uses multiple channels to deliver information for several reasons, including the different contributions each channel can make to the phases of the adoption process (Lionberger & Gwin, 1982; Rogers). For example, mass media channels have been widely employed to create awareness of issues, practices, and new technologies, while field days and demonstrations are often used to help clients test and confirm information. In addition, the use of a channel is affected by differential access by specific client groups (Brown, 1981). Some audience segments, for example, do not have a computer and cannot access Web-based information. Hall, Dunkelberger, Ferreira, Prevatt, and Martin (2003) assert that major shifts in the way farmers access information are underway, and that this includes the diversification of channels. Similar changes are occurring for other audience segments, including homemakers (Boone & Zenger, 2001) and gardeners (Varlamoff et al., 2002).

Social exchange theory suggests that Extension clients are likely to use a particular source-channel combination when the social benefits are greater than the social costs. Similarly, uses and gratifications theory (Lin, 1999) acknowledges that users are goal-directed, active decision-makers who select information channels and sources that meet their needs. Social exchange theory also suggests that benefits are more likely to be realized when information is relevant to clients' needs and when channels provide detailed, individualized information. The potential benefits of a particular information channel vary with the depth, relevance, and specificity of the information that is provided to individuals.

Social costs also can vary among information channels. Clientele incur social costs in a number of ways. Examples include travel costs for participating in workshops, demonstrations, or meetings, and time spent reading information, watching videos, or searching for information on the Internet. Monetary costs for obtaining information, such as purchasing a computer and paying monthly Internet access fees, can also add to clients' social costs. Note that our use of social costs draws on social exchange theory (Blau, 1964; Homans, 1961) and is more broad-based than the definition used by Varlamoff et al. (2002). Social exchange theory also incorporates the psychological costs of subordination (such as having to ask for help). Finally, social costs include the difficulty of using information that may challenge clients' cognitive capabilities.

Information channels that have higher costs might also offer greater potential benefits. For example, workshops and demonstrations may be

relatively costly for many clients because they must schedule time away from other daily activities to attend. However, clients who attend workshops and demonstrations can benefit greatly, since they provide opportunities to obtain detailed information, ask clarifying questions, and ask questions specific to their situations. One of the potential benefits of group educational activities, in addition to obtaining needed information, is social contact and interaction, which many Extension clients say they enjoy. Clients working in a group at a seminar also can benefit from self-actualization (which can occur through contributions to solving a problem as a member of a team).

Individual consultation may occur through phone conversations or through visits to the Extension office or the client's farm. The benefits from farm or office visits (and, to a lesser extent, phone consultation) can be relatively great, since clientele can obtain information tailored to their specific needs, especially in situations when the Extension educator needs to visually inspect or consider a specific problem before making a recommendation. In contrast, mass media are a lower-cost information channel for most clients. However, these channels are likely to offer less benefit, since they may lack relevance, depth, or specificity. When the costs of a particular channel are perceived to be lower than the potential benefits, Extension clients can be expected to seek information by means of that channel.

Trust can also reduce the risk that a client's costs for obtaining information will outweigh the benefits. Trust is based on prior experience, as well as on the use of legitimating symbols, such as university letterheads or logos. Trust is important because costs are often immediate (e.g., a registration fee for a field day), while most benefits are realized well after the information exchange (e.g., outcomes from using the information). In the case of Extension, the link with land-grant universities can give clients greater confidence that they will benefit from their research-based information.

Patterns of preferences and use among Extension clientele for information channels can be predicted on the basis of benefits, costs, and trust. One pattern is based on lower-cost and lower-benefit channels. This pattern is expected to include the use of mass media and printed material. The benefits from these channels are expected to be limited in terms of their specificity to individual needs, and, in many cases, in their relevance or depth of information. The second pattern is based on high-cost and high-benefit channels, which include meetings, workshops, demonstrations, field days, and individual consultation. Clientele who prefer these channels are expected to be differentiated into those preferring group educational

information channels, those preferring individual consultation, and those preferring the Internet and printed publications.

Association of Sources With Channels, Client Attributes, and Involvement

Information channels can be viewed as proximate factors in the use of sources (as shown for the study's horse owners in Figure 1). This is because channels link the information source and the recipient (Stone et al., 1999). We also expect that there will be distinct patterns of channels and sources because a given source may be accessible through certain channels (e.g., a feed store owner provides one-on-one consultations at the store or by telephone, but would not typically publish newsletters or participate in a farm demonstration) and because clients have preferences for specific channels. Thus, channels that are frequently employed by Extension educators, such as newsletters, field days, and demonstrations, are likely to be associated with clients' use of that source. On the other hand, channels where Extension has a smaller role in providing information, such as trade magazines, are not expected to show a strong association with this source.

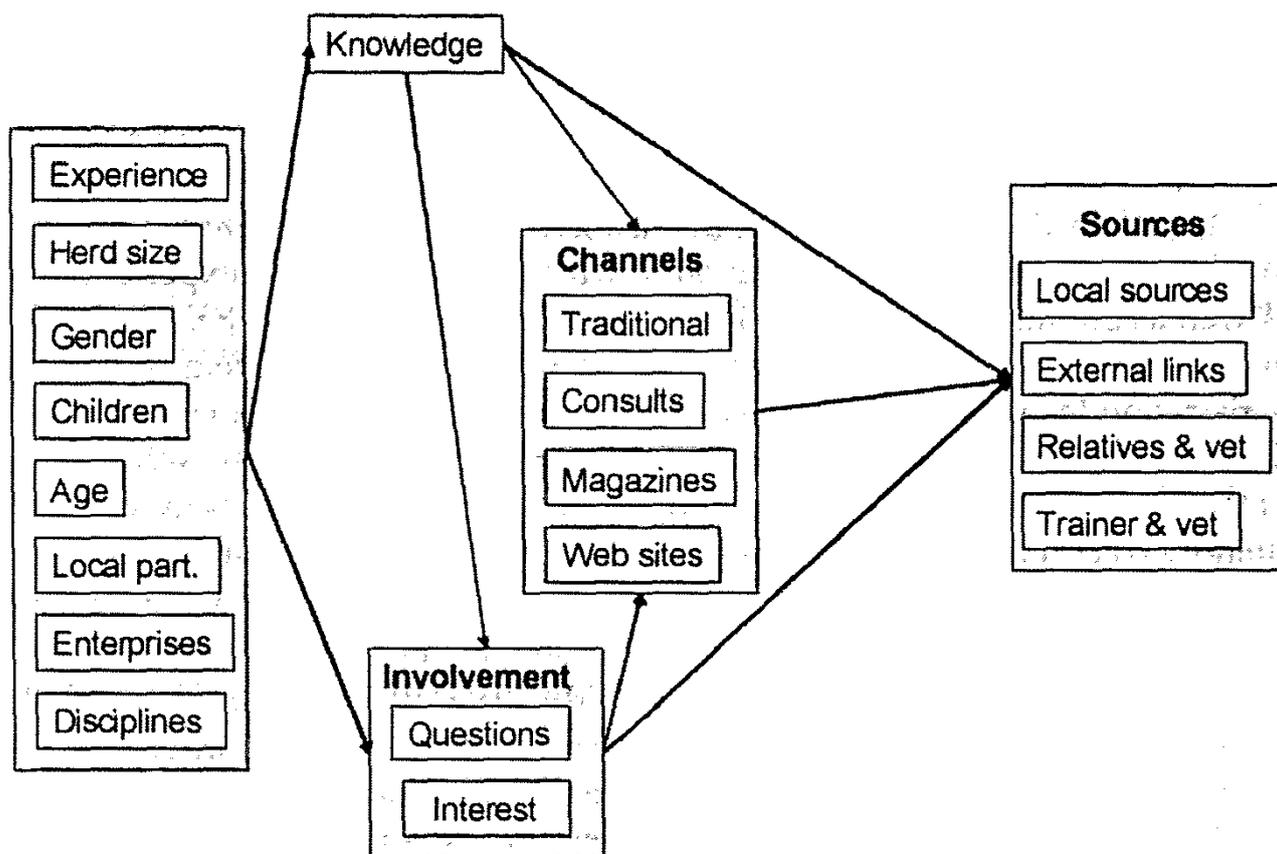


Figure 1. *Conceptual model for predicting the extent of use of information sources.*

The selection of information sources also might be affected by clients' cognitive involvement with horses. Clients' degree of interest in obtaining more information about horses might increase their use of selected sources

(more so for those with greater depth and scope of expertise) and associated channels (O'Keefe et al., 1998). Similarly, horse owners who feel they face a serious problem might be more likely to select higher-cost information channels than those facing a problem they perceive as less serious (Tucker & Napier, 2002). More involved horse owners also might generate more questions, which, in turn, leads to greater use of information channels and sources. On the other hand, more knowledgeable clients (who are likely to have fewer questions) might use specialized, expert sources more frequently (Strebel et al., 2004).

In addition to information channels, a long tradition of adoption and diffusion research suggests that differences in the use of information sources occur because of individual and structural attributes (Brown, 1981; Rogers, 2003; Rogers & Shoemaker, 1971). Individual attributes influence the need for information, as well as the capability to obtain and use information. Income and size of farm operation have also been shown to affect the use of sources (Howell & Habron, 2004; Rogers; Suvedi, Campo, & Lapinski, 1999; Tucker & Napier, 2002; Varlamoff et al., 2002). Horse owners with more resources can afford to use a broader range of higher-cost information channels. Larger operations have a larger number of income-generating enterprises and disciplines (i.e., types of horses and activities). As the operation's complexity increases, we expect more frequent use of channels that link to specialized sources of information.

The capacity to understand and use information, usually measured as educational attainment, also has been found to influence both patterns of information use and methods of delivery (Howell & Habron, 2004; Rogers, 2003; Rogers & Shoemaker, 1971; Suvedi et al., 1999; Varlamoff et al., 2002). Higher levels of education reduce mental effort and, hence, the cost of using new information. Given this, owners who are less experienced are more likely to face problems and seek information than those who have been owners for a longer period of time. Horse owners with more experience also tend to be more knowledgeable.

Demographic attributes, including age, gender, and the presence of children in the household, create distinct audience segments in the equine industry with unique effects on the use of information sources. Older people, for example, are likely to have more experience and more knowledge. On the other hand, older people might use some information channels, especially the Internet, less frequently than younger people (Howell & Habron, 2004; Suvedi et al., 1999). Women might use some sources less frequently than men (O'Keefe et al., 1998; Strebel et al., 2004), and people with children might rely more on sources that are accessible at times or locations that mesh with

family schedules. Finally, participation in local networks and community events (e.g., being a member of a local horse association or using a horse in a community parade) might develop broader-based relationships and greater trust in local sources, leading to a greater reliance on these sources.

In summary, the literature provides reason to expect that the frequency with which clients use information sources is associated with the use of specific channels, involvement with and knowledge of horses, and a set of client attributes that describes more or less distinct audience segments.

Methods

This study was part of a larger project that assessed the educational needs, as well as identified practices and demographics, of horse owners in Florida. The 11-page questionnaire was adapted from the University of Minnesota Extension Service Horse Owner Survey (Wagoner & Jones, 2004). The instrument was reviewed by experts in the field for content and face validity. A pilot test also was conducted with graduate students to identify question wording and navigation problems.

Measurement

The instrument included a set of items for sources and another for channels. Respondents were presented with a list of 12 sources and 16 channels and asked to indicate how often they used the source or channel on a 5-point scale (from 1, *never use*, to 5, *always use*).

Measures of client attributes included experience (in years), age (in years), gender (female = 0, male = 1), number of children under 18 in the household, operation size (based on the total number of horses owned and managed for others), social involvement (a sum of 3 items: first, whether the horse owner participated in community events; second, whether he or she was a member of a local horse association; and third, whether he or she met informally with other horse owners), the number of disciplines or activities in which the owner participated (based on 16 items), and the number of horse-related enterprises used to generate income (based on 14 items).

Respondents' knowledge of horses was measured as a perception. An index was calculated as the mean of 7 items by which the respondents rated his or her level of knowledge on the horse-related topic, using a 5-point scale. The knowledge areas were basic horse care, farm management, horse health, nutrition, reproduction, pasture management, and training/handling. Cronbach's alpha for the index was .878, and principal component analysis revealed a single factor with an eigenvalue of 4.152 that accounted for 59% of the variance. Two measures of cognitive involvement were also included. Frequency of horse-related questions was measured on a 5-point scale

(from 1, *never*, to 5, *very often*), and the level of interest in information about horses was measured on a 4-point scale (from 1, *not at all interested*, to 4, *very interested*).

Sampling Frame and Data Collection Procedures

The population for this survey was adult horse owners in Florida, who were defined as people 18 years of age or older, living in Florida, who own an equine species. Following Wagoner and Jones (2004), several sources representing different segments of the equine industry were used to build the sampling frame because no single list was available. The lists included subscribers to a statewide equine magazine, members of five associations and clubs, and mailing lists from several county Extension offices with active educational programs for horse owners. A sample of 1,000 horse owners was selected from the list of 2,913 individuals using the systematic random sampling procedure (Israel, 1992).

A multiwave strategy with four contacts was used to maximize response (Dillman, 2000). The first contact, a preletter informing horse owners that they would be receiving a questionnaire, was sent in January 2005. Three days after the preletter was sent, a package containing a cover letter, a questionnaire, and a postage-paid business reply envelope was mailed to the sample. All letters were personalized with a real signature and addressed to the specific individual. One week after the questionnaire was sent, a postcard was sent thanking respondents and encouraging nonrespondents to complete the survey. Finally, a second package containing a cover letter, questionnaire, and a business reply envelope was sent to nonrespondents about two weeks later.

A total of 615 (of an accessible sample of 937) completed surveys were returned, with an overall response rate of 65.6%. Since the respondents came from different segments of the equine industry throughout Florida, it was assumed that the data were broadly representative of the horse owner population (as has been the case for similar studies, including Martinson et al., 2006, and Swinker, Tozer, Shields, & Landis, 2003).

Data were compiled using Microsoft Excel 2000. A coding scheme was created using the validation function in order to reduce errors and prevent inappropriate values from being entered. Quantitative data were analyzed using SAS for Windows, version 9. Data on respondents' use of information sources and channels were subjected to principal axis factor analysis using an oblique rotation. Factor analysis assumes that there is an underlying structure or pattern to the observed relationships among sources and channels, respectively. The analysis produces eigenvalues for each component, or set, that represent the aggregated amount of the variance

for individual items (sources in the first factor analysis and channels in the second) that is common to the particular component or set. The factor loadings show the strength of the relationship between the set and each item. Note that an oblique rotation assumes that the components (sets of sources and sets of channels, respectively) are correlated.

Multiple regression analysis using ordinary least squares was conducted to identify variables associated with sets of information sources. The effects for all of the variables are estimated simultaneously to measure the net effect of sets of channels and other attributes on the use of information sources. Examination of correlations among variables and collinearity diagnostics was also performed to confirm that multicollinearity was not distorting the results.

Results

Information Sources

Horse owners were asked how frequently they used various types of people as sources of information for horse-related questions (Table 1). Horse owners reported that they usually or always use veterinarians (82%). Very few (1.6%) reported they did not use a veterinarian as an information source. Many respondents also reported usually or always using farriers, other horse owners in the area, and trainers as sources of information. County Extension agents, private consultants, and close relatives who own horses were seldom or never used as sources.

Next, factor analysis with oblique rotation was conducted on 12 items about how useful specific sources were to respondents (Table 2). The eigenvalues indicated that the list of sources can be broken into four variance components, or sets.

The first and strongest set has four sources that load .40 or higher in the oblique model (using the rotated component matrix). These include local feed store owners, tack store owners, other horse owners in the area, and, to a lesser extent, farriers. All of these sources are local in nature and represent a local network that some horse owners use for information.

The second set includes sources that represent external ties that horse owners may use to obtain information. All of the external ties have credibility because of educational backgrounds. These include university specialists, regional company sales representatives, private consultants, and county Extension agents.

Table 1. Percent Distribution of Information Sources Used by Horse Owners

	Never use	Seldom use	Sometimes use	Usually use	Always use
Veterinarians	1.6%	1.3%	14.9%	43.1%	39.2%
Farriers	3.9	6.5	52.0	24.8	12.7
Other horse owners	6.9	9.6	39.8	33.1	10.6
Trainers	16.3	9.6	27.1	28.9	18.1
Feed store owners	19.9	23.8	42.4	10.9	2.9
Tack store owners	29.2	28.1	33.3	7.2	2.3
Sales representatives	39.2	26.4	25.6	7.7	1.1
University specialists	42.4	21.5	21.7	8.7	5.7
Extension agents	52.9	25.3	18.1	2.9	0.8
Consultants	59.7	15.8	13.4	6.9	4.2
Relatives	63.0	17.1	10.3	5.7	3.9
Other	88.1	1.0	3.1	4.4	3.4

n = 613

The third set represents a unique segment of the horse industry and includes services that horse owners pay for. The primary source is trainers, with veterinarians complementing this source. These are sources that horse owners who have very valuable horses or a larger number of horses might use. This set could also represent sources of information that horse owners on the competitive circuit use more often.

The fourth set represents sources of information that recreational or less experienced horse owners might use. This set includes veterinarians, relatives who own horses, and, to a lesser extent, farriers. All of these sources would be able to answer any basic questions a horse owner might have.

The oblique factor model suggests that some horse owners who rely on local sources included in the first set might also rely on sources included in the other sets—that is, on external experts or basic information sources. This is the case for the second and third sets as well. If a horse owner relies, however, on the fourth set (relatives and vets), then they are less likely to rely on the other sets of sources.

Research

Table 2. *Factor Loadings and Explained Variance for Items Comprising Information Sources*

Component	Eigenvalue	Percent variance	Cumulative percent	
Set 1	2.724	22.7	22.7	
Set 2	1.500	12.5	35.2	
Set 3	1.218	10.2	45.4	
Set 4	1.097	9.1	54.5	
Factor loadings (rotated component matrix)				
Item	Set 1	Set 2	Set 3	Set 4
Local feed store owners	.831	.072	-.189	.097
Tack store owners	.748	.084	.133	-.071
Other horse owners in area	.712	-.204	.128	-.075
Farriers	.404	.140	.206	.345
University specialists	-.200	.778	.078	.054
Regional company sales representatives	.213	.592	.006	-.065
Private consultants	-.040	.609	.299	-.130
County Extension agents	.198	.568	-.449	.114
Trainers	.098	.066	.786	-.099
Veterinarians	.104	.197	.511	.435
Close relatives who own horses	-.010	.086	-.180	.620
Other	.092	.286	-.084	-.632

Information Channels

Respondents also were asked what channels they use to obtain information about horses from a list of 16 items (Table 3). Respondents reported using equine magazines and horse or farm magazines most frequently. Channels used less frequently included local newspapers, university Web sites, county Extension Web sites, and horse field days at research centers. Horse owners reported that they seldom use the specific methods of Extension channels. Extension channels used most by horse owners included bulletins, fact sheets, and county newsletters.

Table 3. Percent Distribution of Information Channels Used by Horse Owners

	Never use	Seldom use	Sometimes use	Usually use	Always use
Equine magazines	2.0%	4.9%	32.1%	39.2%	21.9%
Horse or farm magazines	4.6	6.7	35.2	34.8	18.8
Commercial Web sites	19.3	15.8	39.8	15.7	9.5
One-on-one consultations by farm visit	37.7	17.9	22.8	14.9	6.7
Television programs	28.1	25.3	32.6	10.3	3.8
One-on-one consultations by phone	41.6	20.6	24.1	8.7	5.1
Extension bulletins/ fact sheets	46.8	22.2	22.7	6.2	2.1
County Extension newsletters	49.8	19.9	23.0	5.4	2.0
Equine Allied Trade Show	48.5	23.2	20.7	6.2	1.5
One-on-one consultations by office visit	55.0	20.6	15.5	5.6	3.4
Farm demonstrations	51.1	27.4	17.6	3.1	0.8
Local newspapers	56.4	27.2	11.6	3.1	1.6
University Web sites	60.9	18.4	15.0	4.9	0.8
County Extension Web sites	64.4	18.8	14.2	2.1	0.5
Horse field days at research centers	69.5	18.3	8.5	2.3	1.5
Other	92.5	1.3	2.3	2.5	1.5

n = 613

Research

A factor analysis with oblique rotation was again conducted on 16 methods that respondents use to obtain information about horses (Table 4). Because the initial results indicated the "other" channel was a unique factor and because it included a wide variety of write-in responses, this item was dropped and the factor analysis was rerun. The eigenvalues in the rerun analysis suggest that the items form four variance components or sets.

Table 4. Factor Loadings and Explained Variance for Items Comprising Information Channels

Component	Eigenvalue	Percent variance	Cumulative percent	
Set 1	4.265	28.4	28.4	
Set 2	1.756	11.7	40.1	
Set 3	1.618	10.8	50.9	
Set 4	1.154	7.7	58.6	
Factor loadings (rotated component matrix)				
Item	Set 1	Set 2	Set 3	Set 4
Farm demonstrations	.659	.149	.073	.087
Extension bulletins/ fact sheets	.720	-.025	-.0001	.195
Horse field days at research centers	.579	.218	-.035	.111
Equine Allied Trade Show	.486	.049	.184	.095
County Extension newsletters	.603	-.073	-.022	.337
Local newspapers	.536	.084	.172	-.098
One-on-one consultations by phone	-.028	.808	.021	.070
One-on-one consultations by office visit	.040	.829	-.050	.029
One-on-one consultations by farm visit	-.061	.814	.055	-.057
Television programs	.025	.100	.391	.054
Equine magazines	-.080	.034	.892	.008
Horse or farm magazines	-.004	.022	.892	-.014
County Extension Web sites	.249	-.002	-.049	.728
Commercial Web sites	-.358	.004	.293	.731
University Web sites	.076	.110	-.100	.764

The first and strongest set has six methods that load .40 or higher in the oblique model (using the rotated component matrix). The factor included farm demonstrations, Extension bulletins and fact sheets, horse field days at research centers, the Equine Allied Trade Show, county Extension newsletters, and local newspapers. These factor loadings have a common theme that relates to traditional programmatic delivery. Whether the delivery is directly from an instructor or through literature, they are all similar in nature. All of these traditional programmatic delivery methods are also tied to Cooperative Extension and the University of Florida.

The second set includes items that involve individual consultation between a source and the horse owner. The item loadings include one-on-one consultation by office visit, by phone, and by farm visit.

The third set was based on commercial magazines as a method horse owners use to obtain information, complemented by television. The fourth set focuses on using university Web sites, county Extension Web sites, and commercial Web sites to obtain information.

Overall, the oblique factor model indicated that many horse owners used methods from two or more sets. As shown by the correlations among the components for channels in Table 5, use of one channel set was positively associated with use of other channel sets.

Sources and channels also are interrelated. As shown in the shaded area of Table 5, the local sources component has a modest correlation with each set of channels. In contrast, sources with external linkages are moderately correlated with the "traditional" channels (events and publications), one-on-one consultations, and Web sites. The relatives/vet combination has essentially no correlation with any of the channels, while the trainer/vet combination has a weak correlation with one-on-one consultation and magazine channels.

Factors Associated With Information Sources

A regression model was estimated for each of the four sets of information sources identified by the factor analysis. The results in Table 6 show that information channels have significant net effects on the frequency of use for three of the four sets of information sources. The use of magazines was moderately associated with more frequent use of local sources, while using traditional events and publications, one-on-one consultation, and the Internet was associated with more frequent use of external organizations. In contrast, the use of traditional events and publications was negatively associated with more frequent use of trainers and veterinarians, and one-on-one consultation and magazines were positively associated with this type of information

Table 5. Descriptive Statistics and Intercorrelations for Index Scores of Sources and Channels

	Source				Channels			
	Local sources	External linkages	Relatives and vet	Trainer and vet	Traditional	Consultation	Magazines	Web sites
Source								
Local sources	1.000							
External linkages	.286*	1.000						
Relatives and vet	.168*	.029	1.000					
Trainer and vet	.300*	.284*	-.041	1.000				
Channel								
Traditional	.188*	.505*	.060	-.046	1.000			
Consultation	.155*	.440*	.031	.272*	.367*	1.000		
Magazines	.334*	.227*	.080*	.206*	.303*	.291*	1.000	
Web sites	.287*	.455*	.042	.096*	.592*	.303*	.390*	1.000
M	8.642	6.691	2.641	5.123	6.028	6.252	8.773	5.982
SD	2.158	2.066	1.172	1.536	2.610	2.623	1.974	2.065
Range (min)	2.945	3.188	-1.219	.690	1.901	2.953	2.719	2.788
Range (max)	15.555	15.554	6.354	8.853	15.643	14.453	13.714	14.591

Note. The index scores for each source and channel set were calculated as the sum of the product for each item multiplied by its respective factor loading.

* $p < .05$

source. No set of information channels was associated with the frequency of use of relatives and veterinarians as an information source. Note that the regression model for the use of relatives and veterinarians as an information source was not significant and accounted for only 1.5% of the variation in the index score for this information source. The other three models were significant and accounted for 19% to 38% of the variation in each of the sets of information sources.

The net effect of the two involvement variables (the frequency of horse-related questions and interest in obtaining information about horses) was limited. The frequency of questions was significantly associated with more frequent use of external organizations as an information source and approached significance for use of the trainer/veterinarian sources. Interest in obtaining information about horses, which perhaps reflects a more generalized dimension of involvement, had no net association with any of the sources. Self-reported equine knowledge was positively associated with more frequent use of external organizations, as expected, and with more frequent use of the relatives and veterinarian source type, which was not anticipated.

All of the client attributes, with the exception of age, had a net effect on the frequency of use of one or more information sources. More frequent users of local sources had less experience (in terms of years owning horses), fewer horses, and fewer horse-related income-generating enterprises. More frequent users of local sources also were more likely to participate in local networks and community activities, as expected. In comparison, more frequent users of external organizations as an information source were more likely to be men, and other demographic attributes showed no net effects on use of this source. More frequent users of trainers and veterinarians were less likely to have children. These users were more likely to have a larger number of disciplines involving their horses (such as western riding, jumping, and dressage) and participated more in local networks and community activities. Finally, none of the client attributes showed any effect on use of relatives and veterinarians as an information source.

Discussion

This study examined the types of sources and channels that Florida horse owners are using to obtain information on selected topics. Respondents typically rely on veterinarians, farriers, other horse owners in the area, and trainers as their most frequently used sources of information. The factor analysis showed that horse owners employ the 12 information sources in 4 basic sets. Since Cooperative Extension is included in only one of these, specialists and agents will need to work with other sources to reach other segments of the horse owner population. This is similar to findings regarding sources used by beef cattle producers and sources used by homeowners for landscaping information (Israel & Knox, 2001; Vergot et al., 2005).

Table 6. *Simultaneous Regression of Use of Information Sources on Client Attributes, Involvement, Knowledge and Information Channels*

Variable	Local sources			External organizations			Relatives and vet			Trainer and vet		
	<i>B</i>	β	<i>p</i>	<i>B</i>	β	<i>p</i>	<i>B</i>	β	<i>p</i>	<i>B</i>	β	<i>p</i>
Intercept	4.608	—	—	1.318	—	—	1.616	—	—	2.775	—	—
Age (years)	.003	.016	.731	.009	.050	.217	.001	.014	.779	-.005	-.035	.449
Gender (male=1)	-.052	-.009	.823	-.651	-.119	.001	-.036	-.011	.805	-.270	-.067	.114
Number of children	.055	.018	.647	-.037	-.013	.717	.033	.020	.651	-.304	-.143	.001
Years owning horses	-.020	-.135	.005	.003	.018	.672	.003	.042	.434	-.003	-.025	.609
Operation size (horses)	-.017	-.152	.007	.003	.028	.485	-.003	-.051	.305	-.002	-.027	.556
Number of disciplines	.051	.043	.302	.033	.029	.440	-.044	-.068	.149	.157	.185	.000
Number of enterprises	-.156	-.109	.023	.024	.017	.683	-.042	-.053	.327	-.025	-.024	.625
Local participation	.280	.122	.003	.007	.003	.930	-.101	-.080	.077	.192	.116	.005
Equine knowledge index	-.140	-.047	.330	.274	.096	.026	.202	.123	.024	.062	.029	.553
Horse-related questions	.096	.033	.455	.404	.144	.000	-.113	-.070	.156	.178	.085	.057

Interest in information	.184	.061	.165	-.201	-.070	.078	.101	.061	.221	.023	.011	.813
Traditional channels	.065	.077	.140	.265	.330	.000	.002	.004	.942	-.124	-.206	.000
One-on-one channels	.056	.067	.124	.166	.210	.000	.006	.014	.777	.135	.227	.000
Magazine channels	.305	.276	.000	-.062	-.059	.135	.051	.085	.086	.077	.097	.030
Internet channels	.013	.012	.821	.193	.193	.000	.015	.026	.668	.057	.075	.165
Model statistics	$F = 11.80, p = .000$			$F = 22.79, p = .000$			$F = 1.54, p = .087$			$F = 9.59, p = .000$		
	Adj. $R^2 = .229$			Adj. $R^2 = .375$			Adj. $R^2 = .015$			Adj. $R^2 = .191$		

Note. The unstandardized parameter estimate (B), standardized parameter estimate (β), and p are shown for each variable. β shows the relative strength of each predictor within a model. p indicates the probability of obtaining a parameter estimate of that size due to chance (when $p \leq .05$, it is boldfaced).

The channels of information used by Florida horse owners also formed distinct sets, with respondents using methods in traditional programmatic delivery (events and publications), one-on-one consultations, Web sites, and magazines and mass media. Overall, horse owners used a variety of channels of information that were included in several sets. Further, the sets of channels did not align neatly within the high-/low-cost framework suggested by social exchange theory. This suggests that additional dimensions of costs and benefits might need to be used for specifying categories of high- and low-cost channels. Other affective or emotional motivations also might play a role in horse owners' choice of channels (Lin, 1999).

The results indicate that it is important for Extension educators to use a variety of methods to deliver educational programs. Because a large majority of horse owners use equine magazines (about 90%), it would be very desirable to publish articles in these magazines, which then can create awareness about Extension's programmatic offerings (Israel, 1991; Rogers, 2003). In today's world, using only traditional programmatic delivery methods is insufficient for reaching a wide cross-section of the equine industry. Complementing traditional channels with emerging technologies can also increase outreach to some segments of horse owners (Hall et al., 2003; Varlamoff et al., 2002). Although the use of the Internet was higher among horse owners in this study than for other clients (Suvedi et al., 1999; Varlamoff et al.), a sole reliance on new technologies cannot be justified until access and use become more widespread (Howell & Habron, 2004).

The results support the view that channels link audience segments to sources in specific ways. This finding is consistent with other research on health care consumers (O'Keefe et al., 1998), beef cattle producers (Vergot et al., 2005), and mixed-enterprise farm operators (Tucker & Napier, 2002). Educational programs should be designed to employ the channel-source linkages in order to maximize opportunities to recruit participants from each audience segment.

Because knowledge of clients' use of information channels and sources can have an impact on reaching these clients and, consequently, achieving intended outcomes, we suggest that periodic studies be conducted to identify trends among audience segments. In particular, monitoring the use of the Internet and other emerging information technologies will be important in determining the allocation of scarce resources among educational delivery options. As this study illustrates, traditional events and publications, complemented by one-on-one consultation and Web sites, will reach some segments of the horse owners in the state. But "business as usual" will almost certainly leave substantial numbers of horse owners behind because

of the choices that they make about how and where to get information (Lin, 1999).

Part of the solution is to develop relationships with the other information sources so that these can act as recruiters and surrogate educators for Extension. One reason for doing so is that client attributes continue to differentiate segments into users and nonusers of Extension. The results from this study are consistent with social structure literature (Tucker & Napier, 2002) and diffusion research (Rogers, 2003) in showing that factors such as operation size and complexity, gender, and social networks make a difference in determining the extent to which a client uses Extension or other actors as an information source. Extension educators who design educational programs that account for these contextual effects can increase coverage of the targeted audience and, subsequently, the impact of their programs.

Recommendations

The results suggest a number of specific actions that communication specialists and Extension professionals can take to reach Extension clients. First, develop partnerships with other sources (e.g., suppliers, veterinarians, farriers, and trainers) and involve them in Extension's educational events. For example, veterinarians and local businesses were recruited to be a part of several programs in Minnesota and, as a consequence, a large number of horse owners attended and gave positive evaluations of the events (Martinson et al., 2006). Involving partners in educational programs may lead them to promote the event to their clients and bring new people to Extension's programs.

Second, publish articles in appropriate magazines, which then can create awareness about Extension's programs. A large majority of horse owners use equine magazines, and many of them do not know about or use Extension. Thus, increasing exposure in magazines or trade journals can help Extension expand its client base.

Third, disseminate information to clients through multiple channels. Because most horse owners use channels from two or more sets, information provided through traditional methods, the Internet, consultations, and magazines can reinforce learning and increase the effectiveness of the total program. In addition, different channels can play a specific role in the adoption process (Rogers, 2003), and information might be sequenced through different channels to facilitate this process. For example, articles in a magazine or on the Internet might be used to create awareness. Then information presented at events such as field days can help clients test or compare the ideas. Finally, individual consultations can be used to troubleshoot problems and "seal the deal."

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