

Journal of Applied Communications

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Organizational Learning in a High-Risk Environment: Responding to an Anthrax Outbreak

Research Brief

Digital Versus Printed Publication: Results From an Agricultural Extension Readership Survey



Official Journal of the Association for
Communication Excellence in Agriculture,
Natural Resources, and Life and Human Sciences



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The Colorado AgrAbility Project (CAP) assists farmers and ranchers with disabilities by providing information on assistive technologies.

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Publishing Policy and Instructions for Contributors

PURPOSE STATEMENT: The *Journal of Applied Communications* is a quarterly, refereed journal offering professional development for educational communicators who emphasize agriculture, natural resources, and life and human sciences.

What We Look For

The *Journal of Applied Communications* is a peer-reviewed journal. It welcomes original contributions from any author, although priority may be given to ACE members, should manuscripts of comparable quality be available. First consideration will be given to theoretical and applied articles of direct value to ACE members. Categories to which an article should be submitted are as follows:

- **Research and Evaluation** – These are the traditional, scholarly articles, using quantitative (e.g., statistical and survey methods) and/or qualitative (e.g., case studies) methods.
- **Professional Development** – These articles take advantage of the author's particular expertise on a subject that will benefit career performance of ACE members. These articles tend to be more of a how-to nature.
- **Commentary** – These are opinion pieces. They speak to trends in communication or other issues of importance to professional communicators.
- **Review** – These are critiques of new books, journal articles, software/hardware, technologies, or anything else that would be appropriate for the audience of the JAC.

All submitted manuscripts are considered for publication. However, prospective contributors are encouraged to be aware of the focus of this journal and manuscript requirements. A manuscript is accepted with the understanding that the *Journal of Applied Communications* has exclusive publication rights. This means the manuscript has not been submitted concurrently, accepted for publication, or published elsewhere. While every effort is made to maintain an interval of no more than nine months from submission to publication, authors should be aware that publication dates are contingent on the number and scope of reviewer comments and response times during the review process. All submissions are peer-reviewed (blind).

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The format for articles is as follows:

- Text double-spaced in Times New Roman or similar font, 12-point, 1-inch margins.
- Separate title page listing authors' names, titles, mailing and e-mail addresses. Indicate contact author, if more than one author.
- Inside pages with no author identification.
- No more than six tables or figures.
- Images, photos, and figures should be high resolution (300 dpi or higher). Tif format is best; jpg format is acceptable. A file size of 300 kb or a pixel width of 1500 pixels is a good reference point for jpgs.
- Acknowledgment of any funding source.
- Acknowledgment if manuscript is based on prior presentation.

Manuscript Organization

Every article (with the exception of reviews or commentaries) must contain an abstract of no more than 250 words. If applicable, briefly list the purpose, methodology, population, major results, and conclusion. Begin the manuscript text as page 1. Use appropriate headings to break up the body of the text. List footnotes and literature citations on separate pages at the end of the text along with tables or figures, if used. Indicate in margins of the text approximately where tables / figures should appear. Include three to five keywords.

Manuscripts should follow the style guidelines in the *Publication Manual of the American Psychological Association* (Fifth Edition).

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JAC Transitions

Mark Tucker and Dwayne Cartmell

A 2009 issue of *BOOKFORUM* published a cartoon titled “The Lost Library — where all of the unwritten books go” (Shaw, 2009). As depicted in the cartoon, the Lost Library is a lonely place. Dusty shelves overflow with books and publications of untold value — novel and creative ideas that never see the light of day.

Why books and articles go unwritten is not hard to figure out — often it’s a matter of busy people trying to do too much. Usually, it’s our creative projects that are put on hold. That’s unfortunate for us as individuals and as an organization, as we’re deprived of ideas that could impart new forms of creativity, improved styles of management, or more efficient ways to perform our jobs. Despite their potential, none of our great ideas produce value if not shared. Florita Montgomery and her ACE colleagues (1996) summed up the situation for applied communicators more than 10 years ago:

... Unshared knowledge spawns duplication of effort — or sometimes just plain frustration — in land-grant offices in other states and countries. Keeping the wealth locked away also slows the growth of the body of knowledge for applied communications: If everyone is working simultaneously but separately on similar problems, some will waste time building where they need not. Others will be unaware of foundations that could let them build higher. (p. 40-41)

Publishing your novel ideas and creative works in the JAC is one of the best ways to share this wealth. While our publishing schedule has been delayed in recent issues, we want JAC readers to know we are committed to maintaining the JAC as a forum for professional development and research in applied communications. Working closely with ACE leadership, the JAC editorial team is now focusing on the following measures:

- Implementing Manuscript FastTrack to improve the efficiency and transparency of the manuscript review process
- Working to promote the journal internationally to more potential scholars willing to share fresh, creative ideas
- Striving to get the first JAC online issue published later this fall
- Anticipating getting the JAC publication schedule back on track in the coming year

Introduction

If you believe in the JAC mission, there are a number of ways you can help. We need authors to continue to develop and submit professional development and research content, reviewers to continue to evaluate articles and ensure quality control, and readers to continue to use and comment about our content. We want to thank those of you who have supported the journal during these transitional times. Your efforts are helping keep the JAC from the Lost Library.

In This Issue...

We offer a special note of thanks to the authors who share their creative wares in the following pages. In our professional development section, Jerold Thomas and his coauthors review the performance of various technology tools and provide advice for their adoption and use. Then, Lisa Hightower and her colleagues share lessons learned in developing the University of Florida's successful STEP Program to deliver outreach programs and help secure grants.

In our research section, Kaufman and his colleagues assess levels of consumer confidence in Florida agriculture and investigate whether and how residential differences and demographic characteristics influence levels of confidence. Cindy Christen and Robert Fetsch share results of mail survey research to help increase awareness and use of the Colorado AgrAbility Project. Finally, Shari Veil and Timothy Sellnow draw on data and experiences from a North Dakota anthrax outbreak to introduce and discuss a best practices model for crisis planning.

Rounding out this issue is a research brief by Jacob McCarthy and his colleagues that summarizes readership survey data from 750 subscribers of *Michigan Dairy Review*, a quarterly Extension publication that targets Michigan dairy producers.

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Efficacy of Blended E-Learning Tools: A Case Study

Jerold R. Thomas, Gregory A. Davis, and Myra L. Moss

Abstract

In the past 5 years, interest in distance learning has increased, and use of e-learning tools has become more widely accepted by academics. With such a wide variety of e-learning tools to choose from, what really works? How might we augment our traditional teaching tools with a blend of the new e-learning tools to better reach audiences? In this article, we discuss the efficacy of a set of blended e-learning tools — blogs, podcasts, enhanced podcasts, Internet telephony and instant messaging, news aggregators, collaborative project management software, and Web/video conferencing — used to teach Ohio State University (OSU) professionals about knowledge economy programming. We share implications of survey findings from this population and provide recommendations for others interested in initiating or improving their distance learning efforts with these tools.

Background and Objectives

Like many land-grant Extension services, Ohio State University (OSU) has recently experienced reductions in budget, personnel, and other resources. In addition to these changes, anecdotal evidence suggests that OSU's clientele base has begun to express an interest in receiving information at their convenience in asynchronous formats. Extension has struggled in adapting to these changes and in determining how to use and develop distance learning tools to meet the evolving needs of its organization and clientele. This struggle is primarily the result of (a) fiscal constraints requiring Extension administration to place priorities in areas other than technology tools and training, (b) overburdened Extension technology support offices that can be slow to respond to field faculty and staff needs, and (c) the ever-present segment of Extension personnel who believes that existing clientele prefer to receive information and communication using traditional methods. While surveys of Extension personnel indicate a growing desire to learn and use new technologies, the organizational capacity, resources, and culture to support this desire are limited.

Professional Development

In 2007, OSU Extension funded an internal pilot program to plan, produce, and evaluate a distance learning program focusing on the knowledge economy for Extension professionals. The program had two purposes (with the latter serving as the focus of this article): to teach knowledge economy concepts to Extension professionals for use with their programs and clientele, and to test and encourage the adoption of various technology tools. These technology tools were meant to not only deliver information but also to engage the users and instructors in a “community” of learning. The course, *Blended E-Learning for the Knowledge Economy*, attempted to use and evaluate a blended format of delivery tools.

Ten OSU Extension professionals were selected via a competitive process that included an initial application, screening by course faculty, and a personal interview. The desired participant profile included a willingness to commit the time needed to participate, an interest in the use of technology tools, and a general knowledge and experience beyond the basics of e-mailing and Web searches. Twenty OSU Extension professionals applied and were subsequently screened and interviewed to determine their level of interest and ability. We were especially interested in knowing the extent to which participants were committed to using technology tools in future teaching and program management situations. We ultimately selected 10 participants based on the above criteria who also represented a mix of program area expertise, geographic location, and demographic characteristics.

Six of the 10 participants were female, the average age was 43, and the average tenure with OSU Extension was 11.4 years. County-based, off-campus educators represented the largest grouping at 80% of the total, while on-campus state-level professionals made up the balance. Individuals from all four program areas were represented. Agriculture and Natural Resources had the most participants (3) while Community Development had the fewest (1). Family and Consumer Science and 4-H Youth Development both sent 2 each. The remaining 2 participants were from state-level leadership and human resource offices. Shortly after the course began, one of the participants (a 4-H Youth Development county educator) was forced to withdraw due to time and local budget constraints, reducing the number of participants to 9.

The course had two face-to-face sessions: a 1-day boot camp at the beginning of the course to receive and become more familiar with the tools and a half-day session at the end of the course where students demonstrated tool proficiency by presenting class projects. Five sessions were held in the interim using distance learning tools. These five sessions focused on

knowledge economy concepts and required the students to use the blended learning tools in order to participate.

The tools used included blogs, podcasts, enhanced podcasts, Internet telephony and instant messaging, news aggregators, collaborative project management software, and Web/video conferencing. At the conclusion of the program, participants were surveyed to determine the usefulness of the tools, the frequency of tool usage, anticipated future use, and overall satisfaction with each of the tools.

Methodology

The primary objective of the blended e-learning program was to promote and develop individual capacity to use these technology tools for program delivery by Extension professionals. Tools included software applications, hardware, and programs that could be used in a twofold manner: (1) to increase participation; reach wider, more diverse audiences; and provide cost-effective programs for Extension's external audiences; and (2) to effectively manage information flow, communications, and teamwork among an increasingly geographically distributed workforce within Extension. Table 1 provides an overview of the tools and their uses.

The methodology took into consideration the principles of program development for adult learners, recognizing that oftentimes learning opportunities are pursued by adults not just for the sake of new knowledge but to cope with changes that may affect their lives and livelihoods (Green, 1998). The blended e-learning program faculty realized the most effective way to teach tools and promote their use was to tie their use to the solution of specific problems or to the accomplishment of identified goals.

At the beginning of the course, each participant was provided with a headset, iPod, and a computer camera and was trained in their use. They were also trained in the use of Skype, a free online voice over Internet protocol messaging and video service. Participants were encouraged to use these devices for their own personal purposes, and they discovered creative ways to solve individual problems and meet personal challenges. For example, one participant used the camera with her laptop to enable her brother, who was stationed 1,000 miles away at a military base, to see in real time the birth of his first child. Another participant used the headset and Skype to talk, for free, with her daughter in Istanbul, Turkey. The majority of the participants learned to use their iPods by downloading music and podcasts to enjoy at their convenience.

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Table 1. *Challenge, Tool Used, and How Used*

Challenge

Face-to-face meetings with peers or participants in distant locations involve travel time and expenses, require flexibility of scheduling, and create difficulties in building team cohesion over long distances.

Tool used to address challenge: WebEx

WebEx is a multipoint document collaboration software that offers interactive video and screen sharing. Uses computer, Internet connection, and headset. Can use computer camera for video meetings.

How used:

1. Conducted synchronous meetings to design and discuss curriculum and manage course.
 2. Debriefed after each session to determine what worked well and what didn't.
 3. Shared and edited documents as a team.
 4. Conducted educational sessions with participants in various locations.
 5. Increased participation by providing a cost-effective, convenient, and flexible program.
-

Challenge:

Effectively managing distance learning courses with participants at various locations requires communication, information sharing, document editing, and course management time tables.

Tool used to address challenge: Basecamp

Basecamp is a Web-based collaborative project management application requiring a computer and an Internet connection.

How used:

1. Course faculty shared curriculum and course outline with students.
 2. Course faculty provided assignments, readings, and stimulated asynchronous discussion among participants.
-

Challenge:

Learners need access to information in tutorial form that is convenient and available when they need it.

Tool used to address challenge: iPod

The iPod is a portable digital audio player on which podcasts can be downloaded, stored, and listened to at user's convenience.

How used:

1. Faculty suggested sites through which educational and informational podcasts could be accessed, downloaded, and then listened to at the participant's convenience.
 2. Faculty encouraged creation of podcasts by program participants.
 3. Faculty created podcasts as an educational tool for course participants to use.
-

Challenge:

Creating quality educational materials that can be used by a wide variety of individuals (including tech-savvy and nontraditional audiences) that are convenient for the user.

Tools used to address challenge: Camtasia
Audacity

Camtasia and Audacity are applications for creating enhanced media programs, such as audio podcasts and enhanced podcasts.

How used:

1. Faculty and participants created audio and enhanced podcasts.
 2. Participants plan to create educational podcasts to reach wider, diverse audiences.
-

Professional Development

Challenge:

Vast amounts of available information require care to avoid information overload, identify and access important and needed information, and understand how to conduct effective searches for data and information.

Tool used to address challenge: Aggregator

An aggregator (sometimes called a newsreader) is a tool that allows for easy reading of blogs, Web pages, and other formats. Also allows “smart” searches. Class participants used Blogbridge as their aggregator.

How used:

1. Faculty and students used the aggregator to sort incoming information.
 2. Faculty and students conducted targeted searches.
-

Challenge:

Cost-effective and flexible communication systems are needed to enable synchronous connection with peers and clientele.

Tool used to address challenge: Skype

Skype is a free, online voice over Internet protocol providing messaging and video service. When equipped with a camera, it can be used for video conferencing.

How used:

1. Faculty maintained contact with participants by using Skype instant messaging and voice over Internet.
 2. Attempted to conduct group meeting through Skype, but the number of participants created technical difficulties. Discovered that WebEx was a much better tool for group meetings.
 3. Served as a no-cost alternative to conference calls for small groups.
-

Challenge:

Promoting dialogue with internal and external audiences, sharing information on topical areas of interest, engaging in interactive communications with clientele, targeting tech-savvy audiences, and expanding customer base for Extension.

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Tool used to address challenge:	Blogs Blogs are interactive, Web-based communication tools.
How used:	<ol style="list-style-type: none">1. Used as a means among blended e-learning participants of promoting group discussions around specific topics.2. Participants were assigned external blogs to participate in and monitor.3. Participants launched their own topical blogs.

“Just in time” training and a problem/goal-centered orientation served as the framework throughout the blended e-learning course. Projects and activities were assigned and sessions conducted that required participants to put into practice the technology tools they recently acquired. Using these and other teaching methods to implement the blended e-learning course, we were able to illustrate the efficacy of specific tools in addressing defined challenges.

Face-to-face meetings with peers and/or participants in distant locations involve the cost of time and travel, require flexibility of scheduling, and create an inconvenience in building team cohesiveness over long distances. To address these concerns, participants shared their course assignments and cultivated a sense of teamwork with each other using WebEx. WebEx is a multipoint document collaboration software that provides for interactive video and screen sharing. WebEx enabled us to provide a convenient, cost-effective, and flexible program for participants.

Effectively managing distance learning courses involving geographically distributed participants requires communication, information sharing, document editing, and course management time tables. To address this challenge, we frequently used Skype and Basecamp to conduct “virtual classroom sessions” with participants. Basecamp was used throughout the course to distribute assignments and curricula, share documents, and stimulate discussion among participants about specific topics. A separate Basecamp site, accessible only to the blended e-learning faculty, was used to manage the course and facilitate faculty communications.

Learners require access to information in tutorial form that is convenient and available to them when they need it. We encouraged the use of iPods, podcasts, and Blogbridge to better address this need. Podcasts about specific knowledge economy topics were created and shared by both faculty and

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participants. The creation of new blogs and use of existing topical blogs was also encouraged.

Results and Discussion

Usefulness of Tools

Participants found WebEx and Web blogs to be the most useful tools. Podcasts and the equipment/software application (iPod/iTunes) were also viewed favorably along with the project management application, Basecamp. Instructors and course participants struggled with Skype for video when attempts were made to integrate its use into the course, possibly due to the abilities of the user and/or Internet connection speeds.

Frequency of Use

Program participants indicated they used Web blogs and Basecamp the most. Participants reported using iTunes U (vs. iTunes) the least. Skype's video and phone features were also not used very often relative to the other tools.

Planned Future Use

Program participants indicated that the tools they anticipated using most in the future were Web blogs (both for posting and reading) and podcasts, including the hardware (headset) and software (Camtasia and Audacity) to produce them. For future podcast development, participants were more interested in using Camtasia software than Audacity (most likely due to Camtasia's ability to enhance audio podcasts with visuals.) Participants also anticipated using WebEx and Basecamp to a great extent in the future as well. There was not as much interest expressed for using Skype's phone, video, and messaging features in the future.

Overall Satisfaction With Tools

Similar to participants' opinions of tool usefulness, program participants indicated high marks for overall satisfaction with the various tools used in this pilot program. Web blogs for reading received the highest rating, followed by Web blogs for their content posting utility and the iPod/iTunes combination for downloading, organizing, and playing podcasts. Again, Skype's phone and video features were rated at and near the bottom (respectively) for overall satisfaction.

Implications

The tool receiving the highest accolades for usefulness, WebEx, provided instructors and course participants with real-time voice conversation and

document sharing as well as text messaging. If the practical solutions to common challenges offered by WebEx can be effectively communicated to potential users, technology tools like WebEx have utility beyond this distance learning application. The ability of this tool to address the increasing complexities of geographically distributed workplaces, team development, and asynchronous communications among individuals in distant locations should be encouraged and explored.

The Basecamp project management application was a tool used throughout the course, and it received high praise from participants. While course participants did not rate it as highly as other tools in terms of planned future use, Basecamp and similar project management applications serve as effective management and asynchronous communication tools that facilitate document distribution, sharing and group editing, communications, and project timeline monitoring for specific audiences. These tools play a critical role in helping geographically distributed professionals collaborate and share information. It is likely that participants found using an existing Basecamp site easier and more satisfying than the responsibility of creating and managing their own sites. This may explain the lower ranking for planned future use. Further training and experience in creating and managing Basecamp sites is needed to realize the full potential of this tool in Extension systems.

The use of Web blogs and podcasts as teaching and learning tools has far-reaching implications for the expansion of Extension's customer base to nontraditional, technology-literate audiences. However, university infrastructure is needed to support use of these tools, including simple, inexpensive, yet necessary, equipment. Additional information regarding potential customers and what they are accessing and downloading would help Extension better adapt and use tools like podcasts and blogs to meet their needs. Training beyond technical skills is also needed in writing blog posts and developing and delivering podcast content, for example.

Overall, program participants were satisfied with the various tools used in this pilot program. While some participants had prior experience with some of the tools, the majority of the tools were new to most participants. Because such tools are relatively easy to learn and provide utility for teaching, learning, and communicating with others, systems that provide formal organizational support, training, and guidance should be implemented. Organizational structures that provide access to these tools are also needed.

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Conclusion

In the past 5 years, interest in distance learning has increased and use of e-learning and various technology tools has become more widely accepted by academics (Lee, Cho, Gay, Davidson, & Ingraffea, 2003). This project aimed to encourage the adoption of various technology tools via their use in a program to broaden understanding of knowledge economy concepts among Extension professionals.

Survey results indicated that WebEx and Web blogs were the tools participants found most useful. Podcasts and the equipment/software application (iPod/iTunes) were also ranked highly, along with the project management application Basecamp. The Web aggregator application, Blogbridge, was rated the least useful for its Web blog search function. Participants indicated they used Web blogs most often, followed by the Basecamp project management application. Tools participants anticipated using most in the future were Web blogs (for posting and reading) and podcasts, including the hardware and software to produce them. Web blogs for reading received the highest rating for overall satisfaction, followed by Web blogs for their content posting utility and the iPod/iTunes combination for downloading, organizing, and playing podcasts.

Based on formal and informal participant feedback, the program was successful in encouraging the use and adoption of these various technology tools. Using these tools to address specific challenges proved to be an effective method to encourage the adoption of tools in educational programming with adult learners. Furthermore, the tools that program faculty believed would have the most direct, beneficial impact on education delivery and expansion of clientele base were the tools most accepted by participants, and participants also believed these tools will be used frequently in the future.

We are currently engaged in a 24-month logic model evaluation process to better understand postprogram tool usage over the longer term. In addition, we have plans to evaluate two similar efforts conducted subsequently to this program that used a similar blended e-learning program format. Doing so will add to our knowledge base and help to inform Extension's future strategies for distance learning.

About the Authors

Jerold R. Thomas is the leader for Innovation and Change for the Ohio State University Extension Leadership Center. Gregory A. Davis is the leader for community and business economics programs for Ohio State University Extension. Myra L. Moss is an Extension specialist for community development for Ohio State University Extension.

Keywords

distance education, e-learning tools, evaluation

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The University of Florida's Scientific Thinking and Educational Partnership Program: An Approach for Genetics Outreach

Lisa Hightower, Ricky Telg, Courtney Meyers,
Tracy Irani, Maria Gallo, and Brian Myers

Abstract

In an effort to compete for multimillion-dollar grants that require researchers to translate their findings for the general public in the form of outreach programs, the University of Florida developed the Scientific Thinking and Educational Partnership (STEP) program. This article describes the evolution of the STEP program, from the creation of a model outreach program called *ufgenetics.com*—a Web site geared toward media professionals and middle school and high school teachers—to the testing, evaluation, and promotion of that project. The STEP program has garnered over \$1 million in grants in just 2 years of existence.

Faculty members at Tier 1 research universities are in fierce competition for grant dollars to support their programs. The majority of federal research and development dollars distributed to Tier 1 research universities (80%) is distributed to just 100 institutions (Owen-Smith, 2001). Even among this elite group of universities, some universities are faring better than others. Ten universities receive 21% of federal grant dollars (Owen-Smith). University of Florida researchers are competing with other institutions for multimillion-dollar grants from agencies such as the National Science Foundation (NSF), the United States Department of Agriculture (USDA), and the Howard Hughes Medical Institute (HHMI). Social scientists interested in applying for these large grants have found themselves at a disadvantage because a majority of these grants focus on life and applied sciences.

In the past few years, USDA, NSF, HHMI, and other granting agencies have begun incorporating a new requirement into their grant projects that may be fortuitous for social scientists. These agencies are requiring grant projects to include not only new scientific research, but also a "broader impact" component, which requires researchers to disseminate their findings to the general public. Many applied and life scientists struggle to create these "broader impact" outreach programs because they feel ill equipped to relate

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their research to the public or the media (Lundy, Ruth, Telg, & Irani, 2006). While the “broader impact” component of grant projects may be an obstacle for many life and applied scientists, UF agricultural communication and education faculty members turned it into an opportunity with the creation of the Scientific Thinking and Educational Partnership (STEP) program.

The Birth of the STEP Program

Lesson Learned 1: Investigate the need to be filled at your university and develop an innovative idea that administrators will support.

Rather than leaving scientific researchers to develop outreach programs on their own for their grant projects, agricultural communication and education faculty members, along with a UF plant scientist, decided to step in and work as a team to produce effective outreach programs that could be incorporated into these grants. This group of faculty members pooled their expertise in communication, critical thinking, and plant sciences research to create the STEP program in July 2006. The faculty team members became the STEP directors and focused initially on grants dealing with genetics. UF administrators provided financial support for the program in the belief that it would help make UF researchers more competitive for grants.

Lesson Learned 2: Allow enough time to build and test the program.

At the onset of the STEP program, UF administrators committed resources for 2 years of seed money, with the hope that after the first few years, STEP would become self-sustaining through grant funding. STEP received funding from the University of Florida Genetics Institute (UFGI), the Institute of Food and Agricultural Sciences (IFAS), and the Division of Continuing Education (DOCE). The funding supported a full-time program coordinator, part-time student assistants, software, and equipment. The overall goals of the STEP program were to improve the quality of problem solving and decision making in the sciences, focusing on developing this capacity in faculty, students, and citizens, and to build bridges between UF research, teaching, and Extension faculty to collaborate on grant projects.

To determine the best way to handle this mission, the STEP team developed a needs assessment and distributed it to UFGI faculty. This needs assessment asked faculty how they developed outreach programs for grants and in which areas they would like some assistance. Approximately 56% of the faculty responded that they needed help with multimedia development, such as integrating video into Web sites. Half of the respondents stated they desired guidance communicating with media professionals. Almost half (44%) said they would like assistance with in-service teacher training.

In response to the needs assessment, the STEP team decided to focus on developing multimedia components for grant projects. Over the next 6 months, the STEP directors and program coordinator met with science faculty and developed a total of 10 grant project proposals for a variety of agencies, including the HHMI, USDA, and NSF. The grants focused on outreach, but the role of the STEP team changed dramatically for each grant proposal. In one proposal, the team members proposed holding a workshop on critical thinking for high school science teachers; in another, STEP proposed developing puzzles that would train genetics students to be better abstract thinkers; in another, videos would be developed and incorporated into a computer game for agronomy students.

The benefit of this approach to writing grant proposals was that it allowed the STEP team to interact and network with a diverse group of faculty working toward better science education and outreach at UF. It also gave the team a chance to explore different areas, including new media, mobile technology, and computer gaming. The downside of trying to create made-to-order outreach components in the various grant proposals was that it required a great deal of time from the STEP directors. While the program coordinator could focus solely on developing STEP grant proposals, the directors had other full-time duties outside of the STEP program. In the end, 3 grants were funded out of the 10 proposals, totaling over \$1 million. It is possible that more grants would have been funded if the STEP team had focused on a single approach instead of offering an array of programs.

Over the course of the next 6 to 8 months, the STEP team members found themselves heading in a variety of directions. Much to the frustration of the team, a focused direction for the STEP program did not become clear until the end of the first year. If the STEP program had been limited to a single year of funding, the program would have found its footing just as the funding ran out, and STEP would have made little return in grant dollars on the investment made by UF administrators. The 2-year funding allowed the team to find its way and determine STEP's niche. Having the time to try different approaches, determine the best funding avenues for grants, and build partnerships was essential in making STEP successful.

Lesson Learned 3: Take the time to understand the strengths and weaknesses of team members.

Part of that first-year growth process involved bringing in an advisory council that could offer a fresh perspective on the STEP program and its progress. The council consisted of faculty involved in science education throughout UF, including the College of Education, IFAS, and DOCE. The council was presented with STEP's goals and strategies. They were also

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given a list of grant proposals that had been submitted and a list of potential projects for the future. The advisory council expressed concern that the goals of STEP were too broad and the projects too diverse. The council also stated that some of the goals expressed by STEP were similar to existing programs at UF. While the council members shared their concerns with regard to the mission of the STEP program, they were able to offer few solutions.

The STEP team reviewed the comments provided by the advisory council and determined that STEP needed to have a clearer mission that would be unique at the University of Florida. The directors decided that instead of each project involving the entire STEP team, projects would now be carried out in smaller teams with only the necessary STEP members. Each STEP member would have a specialized role in the grant projects, depending on area of expertise.

Part of the frustration in developing projects through STEP stemmed from the fact that team members were performing duties outside of their specializations. Education specialists were asked to develop communication projects and vice versa. The skills of outside faculty members were also being tapped to fill gaps in expertise on individual projects. In the end, the STEP team members felt pulled in multiple directions, and the program's additional external members were becoming difficult to manage. When team members had a clear role and purpose, they could focus on their individual pieces of the puzzle effectively. Clearly delineating the roles of the STEP team members and working in small teams became even more important later, when student workers were hired to help with project productions.

Lesson Learned 4: Create a model project that can be adapted in the future for other projects.

The STEP team created a model that showcased its unique approach for outreach programs. The model included educational videos focusing on genetics that offered a simple, entertaining explanation of cutting-edge research. The videos included humor, dynamic graphics, and music to interest the general public in science. The videos were short—less than 3 minutes—and offered an entertaining overview of genetics research at the University of Florida. These videos were featured on a Web site that also included lesson plans for middle school and high school science teachers and print news stories for journalists. The idea was that this model could be adapted for future grant projects dealing with other topics.

Lesson Learned 5: Create a showcase project.

Having a tangible product that demonstrated the type of outreach program that STEP could develop also made STEP easier to promote. Advisory council members mentioned that they had a difficult time visualizing the kind of products that STEP could create. After creating this model project, promotion became much easier. During promotional meetings, the STEP team would begin by showing the model Web site and its videos. Rather than spending the majority of the time trying to explain the STEP concept, the STEP team would devote the rest of the time to a question-and-answer session.

Lesson Learned 6: Outsource specialized communication and technical development if the team members are not experts in that area.

The model project became known as “ufgenetics.com.” This Web site housed STEP-developed materials that would introduce middle school and high school science teachers as well as journalists to the innovative genetics research taking place at the University of Florida. The STEP team contracted an outside Web design company to develop the Web site because the team felt that Web sites created by UF Web designers had a very “institutional” feel to them, with blocky graphics and complicated navigation. The STEP team wanted the ufgenetics.com site to have a clean design and look similar to other science education Web sites, such as those of the Discovery Channel and National Geographic. The site included a content management system that allowed nontechnical personnel to update the text on the pages, revise navigation, and upload videos. One of the STEP directors and the program coordinator worked closely with the production company to develop the “look and feel” of the Web site, as well as to determine the features of the site.

While the decision to pay an outside company to develop the site was a difficult one at the time, in retrospect, the money and time spent on the Web site was well worth the investment. Some of the STEP team members had Web design experience and could have developed a basic site, but not at the technical level that would have given the ufgenetics.com Web site a professional appearance.

Lesson Learned 7: Integrate undergraduate and graduate students who have production experience into the development of materials for your program.

The STEP team wanted to use the ufgenetics.com site to showcase the wide range of genetics research at UF. To accomplish this, a series of interviews was conducted with genetics faculty from diverse disciplines, including entomology, veterinary medicine, microbiology, and environmental horticulture. Students were hired as reporters, videographers,

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education specialists, and graphic designers to produce materials for the ufgenetics.com Web site. During the first few weeks, the students were trained in the ufgenetics.com model of outreach. They checked in weekly with the program coordinator to review the materials they had created. The students developed a complete set of communication materials, including videos running from 1 to 3 minutes in length that highlighted interesting aspects of genetics research; news feature stories with associated photos; lesson plans with objectives, activities, and assessments; and the “This is Your Brain on Science” video series, featuring interviews with scientists explaining how they became scientists. By the end of the summer, 26 videos, 8 lesson plans, and 8 news feature stories had been produced. The ufgenetics.com Web site was unveiled in September 2007. During the summer of 2008, students produced another 19 videos, 6 lesson plans, and 6 news feature stories.

Lesson Learned 8: Take the time to evaluate your products and programs.

Through a suggestion of one of the students, the videos from the ufgenetics.com site were also uploaded onto YouTube (visit <http://youtube.com> and search for “ufgenetics” to view videos) and a similar Web site geared toward teachers called TeacherTube (<http://teachertube.com>). The STEP team also worked with the local PBS station affiliate to provide ufgenetics.com videos as fillers to be aired in between programs.

The STEP team spent the next year promoting the ufgenetics.com model to faculty members, developing grant projects, and testing the model’s viability. The STEP team was interested in not only creating effective outreach programs that translated the scientific research from UF to the general public, but also in testing those programs to determine if they effectively reached target audiences.

The team started by testing the ufgenetics.com materials with science teachers. A series of focus groups was conducted with science and agriscience teachers to determine the usefulness of the videos, lesson plans, and news stories for classroom purposes. The teachers offered suggestions for improvement, which were then incorporated into the next series of ufgenetics.com materials as they were being developed. The teachers also recommended additional science topics for use in the ufgenetics.com model.

The effectiveness of the ufgenetics.com Web site was also calculated through the program Google Analytics. As of September 3, 2008, the ufgenetics.com site had been viewed 2,298 times, with most of the national traffic from Florida, Georgia, and New York. Internationally, the site has been viewed predominantly by people in Romania, India, and Canada. A

little more than 50% of the visitors to the site are using the Internet browser Internet Explorer to view the site, followed by Firefox and Safari. YouTube video views were also tracked. The 45 ufgenetics.com videos have been viewed 79,350 times as of September 3, 2008, and 24 people have subscribed to the “UF Genetics” channel to receive updates when new videos are posted.

The overall success of the STEP program can also be measured in grant dollars. In the past 2 years, STEP has collaborated on the following grants: the Howard Hughes Medical Institute Precollegiate Science Education Program grant for \$676,000, a USDA Higher Education Challenge grant for \$145,000, and a USDA Food and Agricultural Science National Needs Graduate Fellowship Grants Programs grant for \$229,500. STEP has also collaborated on grants totaling another \$1 million that are currently under review.

The Future of STEP

The first 2 years of the STEP program were so productive and positive that UF administrators extended funding for the program coordinator for another 2 years. This is a vote of confidence for STEP, especially when it is taken into account that the University of Florida has endured 2 years of cutbacks in state funding.

Incorporating students into the production process started as a matter of convenience, but now offers interesting grant opportunities. The student workers were so successful in producing materials for the STEP project that faculty members from science departments have become interested in having their students work with STEP. The STEP directors are working on grant proposals that would teach science students to translate their scientific research for the general public and produce news stories and news releases focusing on their areas of research. Grant proposals have also been submitted that would create a formal course to bring together science students and communication students in teams to produce “ufgenetics.com” style materials highlighting their research.

The STEP team is also venturing into other types of technology to deliver outreach programs, including social networking tools such as wikis and mobile video devices such as iPods. In the future, the STEP directors will continue to collaborate on grants that work off of the ufgenetics.com model and extend the model to meet the needs of additional target audiences.

The ufgenetics.com model has been adapted to showcase UF research in the areas of small farms, environmental horticulture, and food safety. By using a model that was already developed, the STEP team was able to create

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well-developed and tested outreach programs that could be incorporated into grants. These derivative outreach programs could be reformatted to meet the goals of other grants with much less time and cost than the initial ufgenetics.com project.

In the coming months, the STEP team will turn its attention to promoting STEP to the UF administrators who have provided funding. The promotion efforts will also be directed toward faculty members who could collaborate with STEP on grant projects in the future.

Conclusion

The STEP program has been successful in generating grants by creating unique outreach programs involving social scientists, scientific researchers, and students. Ultimately, creating a successful program required the STEP team to endure a year of growing pains. It took the dedication of the STEP directors to stay committed to the program when the future was uncertain. By incorporating the following lessons learned, other universities can learn from STEP's model:

1. Investigate the need to be filled at your university and develop an innovative idea that administrators will support.
2. Allow enough time to build and test the program.
3. Take the time to understand the strengths and weaknesses of team members.
4. Create a model project that can be adapted in the future for other projects.
5. Create a showcase project.
6. Outsource specialized communication and technical development if the team members are not experts in that area.
7. Integrate undergraduate and graduate students who have production experience into the development of materials for your program.
8. Take the time to evaluate your products and programs.

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Keywords

outreach, grants, collaboration, genetics, research, YouTube

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Voter Confidence in the Agricultural Industry

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Abstract

Social scientists tend to agree that public opinion influences public policy. As the agricultural industry faces increased scrutiny from public officials and citizen advocacy groups, agricultural communication professionals are faced with the challenge of targeting messages that encourage public confidence in the industry. Research-based marketing segmentation may hold the key to effective political marketing for the industry. While some consumer research has been conducted to better understand food purchasing decisions, more is needed to better understand public attitudes toward the larger agricultural industry and to better recognize any segmentation in public opinion. This study's findings—drawn from the Agriculture Institute of Florida's 2006 survey, the 2000 United States Census of Population and Housing, and the 2002 United States Department of Agriculture Census of Agriculture—may help guide future industry messages toward the public.

So What?

When organizing campaigns to encourage public confidence in the agricultural industry, there are several important factors to consider. Segmentation may be based on geography, residential location, county population, household composition, and food purchasing behaviors. Study findings suggest that agricultural awareness campaigns targeted toward urban audiences may need to move away from economic impact stories and focus more on relationship-building, positioning agriculture as the “good neighbor.”

According to Burstein (2003), “public opinion influences policy most of the time, often strongly. Responsiveness appears to increase with salience, and public opinion matters even in the face of activities by interest organizations, political parties, and political and economic elites” (p. 29). This conclusion is supported by decades of research on public opinion and public policy. In fact, Burstein's review found that “public opinion

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affects policy three-quarters of the time its impact is gauged; its effect is of substantial policy importance at least a third of the time, and probably a fair amount more" (p. 36).

In the face of increased regulation in the agricultural industry, public opinion has increased in importance and consequence for the food and fiber industry. As agricultural communication professionals consider options for influencing and leveraging public opinion, they are first faced with the challenge of understanding it. Does the public have a favorable opinion of the agricultural industry? How and where should positive industry messages be targeted? Research-based marketing segmentation may hold the key to effective political marketing for the industry (Bannon, 2004). A review of literature is helpful in providing insight, yet questions endure. Only limited research exists on the subject of geographic differences in the public's attitudes toward the larger agricultural industry. Understanding how geography affects attitudes may be particularly important in states that are economically dependent on agricultural production and sales or where rural/urban interface issues exist. This study uses survey data from a sample of registered voters to address these questions. With data to indicate the variables that influence voter confidence in the agricultural industry, agricultural communication professionals will be better able to target messages related to public policy campaigns.

Public Interest in Buying Local Food

Three fourths of Americans rate "grown in the U.S." and "processed in the U.S." as qualities that are important to them when selecting food (Wimberley et al., 2003, p. 3). In addition to this preference for food produced in the United States, over 70% of Americans have a preference for food produced locally (Wimberley et al., p. 4), and many express a willingness to pay more for locally produced food (Brown, 2003; Food Processing Center, 2001; Harris, Burrell, Mercer, Oslund, & Rose, 2000; Wimberley et al.).

Consumers often define "locally grown" as a regional concept that can cross state boundaries, rather than a statewide concept bounded by state lines (Brown, 2003). However, research by the Food Processing Center (2001) suggests that 22% to 24% of consumers believe it is important to purchase state-grown products. Some states, like Iowa and Indiana, have an even stronger preference for state-grown products. About one third of Iowa grocery shoppers believe it is "extremely important" to purchase products that are "Iowa grown" (Food Processing Center, p. 9) and about 60% of Indiana residents indicate that they are "highly likely to purchase local food products" (Jekanowski, Williams, & Schiek, 2000, p. 48).

Patterson (2006) has summarized some of the reasons consumers prefer local foods:

Parochial interests or ethnocentric sentiments seem to influence these views, and they seem to be reinforced with state residency or length of residency. Consumers also express the view that they expect local products to be fresher or of better quality. (p. 44)

Attitudes Toward Local Agriculture

When comparing food grown in the U.S. to imported food, four out of five Americans believe that domestically produced food is fresher and safer than imported food, about half believe that it is more nutritious and tastes better, and slightly more than half believe it costs less (Wimberley et al., 2003). Among professions trusted as knowledge sources for food safety, a national survey found that farmers fare best, receiving the trust of about 70% of consumers (Wimberley et al.). However, "a 57 percent majority say that they worry about health problems due to farming methods in the United States" (Wimberley et al., p. 3) and "a 61 percent majority worry some or a great deal about the environmental problems that are caused by U.S. farming" (Wimberley et al., p. 11).

Public attitudes toward controversial agricultural food technologies, such as food irradiation and use of antibiotics and hormones, have shaped consumer attitudes toward food production and potentially influenced consumer preference for locally grown food. This preference for locally grown food stems from a desire to have a closer connection to the producer and thus more confidence in the safety of the food (Belliveau, 2005). Agricultural biotechnology has become an especially important issue for agricultural communicators and researchers studying how consumers make decisions about "risky" food technologies (Irani & Sinclair, 2004). Evidence suggests that trust and risk perceptions exert direct influence on consumer acceptance of these types of technologies (Eiser, Miles, & Frewer, 2002).

Residential Differences in Opinion

A Food Processing Center (2001) study showed that rural and small-town residents placed a higher importance on purchasing locally grown products, yet were less willing to pay a price premium for those products. In a related study, Weatherell, Tregear, and Allinson (2003) found that although 74% of urban residents were strongly or extremely likely to choose locally produced food, a greater percentage (82%) of rural residents were strongly or extremely likely to choose locally produced food.

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Although Brown (2003) also found that rural residents were more willing to seek out local products than urban residents, the study found that farm households were not significantly different from other households when it came to preferences for locally grown food. Instead, “households where someone was raised on a farm, or their parents were raised on a farm, were found to have a preference for local produce and a willingness to pay a price premium for those products” (p. 222). As an explanation for influence of farm background, Brown hypothesized that:

...for those who were raised on a farm, or who had parents raised on a farm, there may be nostalgia for high-quality products that came directly from the farm, or a desire to support family farmers by purchasing local products. (p. 220)

The finding that rural residents have a stronger preference toward locally produced food may fall in line with expectations, but contrary results have also been reported. Patterson, Olofsson, Richards, & Sass (1999) found that residents of the Phoenix metro area were 24.7% more likely to prefer Arizona-grown products over products from other areas, while no significant preference was observed for other Arizona residents. As a potential explanation, Patterson offered that the capital city residents may “more closely identify with initiatives perceived to be in the state’s interest” or may be “more concerned about product freshness and quality” (p. 190).

Some researchers have concluded that rural versus urban residence does not matter when it comes to preference for buying local products or caring where the produce was grown (Brown, 2003; Jekanowski et al., 2000). Instead, Jekanowski and colleagues argue that loyalty toward state products builds over time and that length of residence in a state is an important influence on consumer behavior.

Public perception of the agricultural industry seems to be somewhat positive, regardless of residence. Frick, Birkenholz, and Machtmes (1995) found residents from smaller cities and towns in a Midwestern state to be more knowledgeable than their urban counterparts, but this knowledge difference did not result in differences in overall attitude toward the industry. Study participants had relatively positive perceptions of agriculture, regardless of their places of residence.

Smithers, Joseph, and Armstrong (2005) conducted in-depth interviews with farm and town residents in South Huron County, Ontario, and arrived at a similar conclusion. Despite a limited knowledge of agriculture, the town residents’ perceptions of the industry were somewhat positive. In fact, a vast majority believed that the farm community was important to the area’s economic prosperity and social vitality.

Weatherell and colleagues (2003) conducted a qualitative and quantitative investigation of rural and urban differences among consumers in the United Kingdom. They found that “rural based consumers tended to give higher priority to ‘civic’ issues in food choice, reported higher levels of concern over food provisioning issues, and showed greater interest in local foods” (p. 242). However, “the survey found no significant differences between urban and rural respondents on questions relating to farming, with both groups registering sympathetic views on average” (p. 242). Unfortunately, the researchers found few other studies from which to draw comparisons. Weatherell and colleagues recommend that future studies incorporate urban/ rural residency as a demographic criterion when investigating public perceptions of agriculture.

In sum, public opinion research reports generally positive attitudes toward agriculture and local food production, with rural residents tending to have a more positive opinion. However, the reason for this residential difference remains an empirical question.

The Case of Florida

Florida is a diverse state in both its demographic makeup and its economic profile. In 2006, Florida was the fourth largest state in the nation in terms of population. The U.S. Census Bureau (2008b) estimated the population at more than 18 million at that time; the population is continuing to grow at a rate double the national average. Of Florida’s 67 counties, 38 are part of metropolitan areas, 11 are part of micropolitan areas, and the remaining 18 are neither metro nor micropolitan (U.S. Census Bureau: Population Division, 2005). (The term “metropolitan” refers to areas containing at least one core of 50,000 or more people, whereas the term “micropolitan” refers to areas containing cores of at least 10,000 but less than 50,000 people.) A core area includes a county’s urban center and the surrounding counties that are likely to commute to that urban center. Based on these classifications and estimates, “93.7 percent of Florida residents live in metropolitan areas, 4.1 percent live in micropolitan areas, and 2.2 percent live in noncore areas” (Rural Policy Research Institute, 2006, p. 1).

Even with its dense population areas, Florida maintains a productive agricultural industry. Recent research reports that Florida’s agriculture industry supports more than 750,000 jobs and has an overall economic impact of \$97.8 billion annually (Florida Agricultural Statistics Services, 2007). The United States Department of Agriculture (USDA) Economic Research Service (2004a) classifies seven Florida counties as “farming dependent,” indicating that farm earnings account for an annual average of 15% or more of total county earnings or that farm occupations account

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for 15% or more of all occupations of employed county residents. Although the number of farms and the amount of acreage farmed in the state are both declining, 2005 estimates are that the state has about 42,500 commercial farms across nearly 10 million acres, for an average farm size of 235 acres.

The Agriculture Institute of Florida, a coalition of agricultural communication specialists, conducts periodic public opinion surveys with Florida voters. In past surveys, the great majority of respondents had a favorable opinion of agriculture and believed that it was very important to Florida's economy (Agriculture Institute of Florida, 2006). However, this public opinion data set has not previously been examined for geographic segmentation and residential differences. These residential differences are important, considering the speed at which some of Florida's rural areas are disappearing and the vast differences in agricultural production across the state.

Purpose

The purpose of this study was to determine how consumers' confidence in Florida agriculture varies in relation to their location and other demographic characteristics. The specific objectives were to describe Florida voters' confidence in the state's agricultural industry, distinguish residential differences in the public's confidence in Florida agriculture, and identify demographic characteristics that predict confidence in Florida agriculture beyond residential location.

Method

The data set used for this study is from a public opinion telephone survey conducted in September 2006 and sponsored by the Agriculture Institute of Florida. The purpose of the survey was to assess voters' opinions about Florida agriculture as well as their perceptions of food and agricultural issues. The survey instrument was developed by the executive board of the Agriculture Institute of Florida in cooperation with the Florida Survey Research Center at the University of Florida, which also conducted the survey.

The sample was purchased from a commercial sampling firm and included a listed residential sample of registered voters in the state of Florida. Between September 14 and September 22, 2006, the Research Center called 2,061 phone numbers, with a maximum number of call-backs set at four. Of 6,941 calls placed, 875 actual contacts were made. Of those contacts, 494 refusals were received and 381 completed surveys were collected for a response rate of 18.5%. (See formula for Response Rate 1, The American Association for Public Opinion Research, 2008). One respondent had an out-of-

state phone and was therefore dropped from the sample. In addition, two respondents answered “don’t know” to key questions about their confidence in the agricultural industry. As a result, their data were dropped from the sample, resulting in a final sample size of 378.

For this study, the dependent variable was confidence in Florida agriculture. Study respondents’ confidence in Florida agriculture was measured through a 6-item index. Principal components factor analysis was used to confirm the unidimensionality of the index (Kim & Mueller, 1978). A single factor was extracted with an eigenvalue of 2.685. The factor accounted for 44.7% of the total variance of the items. The specific questions and factor loadings (which indicate the strength of the relationship between each item and the overall index) were as follows:

- How confident are you that farming is safe for environmental quality in Florida? (Factor loading: .652)
- How confident would you say you are that farmers in Florida use chemicals—such as pesticides, herbicides, and fertilizers—properly? (Factor loading: .567)
- How reliable is the information farm industry organizations provide about food safety? (Factor loading: .680)
- How reliable is the information farmers provide about food safety? (Factor loading: .653)
- How reliable is the information farm industry organizations provide about farm labor? (Factor loading: .726)
- How reliable is the information farmers provide about farm labor? (Factor loading: .723)

To calculate the index score for each respondent, the responses to the six survey questions were coded 1 (*not at all confident*), 2 (*somewhat confident*), or 3 (*very confident*) and then averaged across all six questions. The confidence in Florida agriculture index had an overall reliability (Cronbach’s alpha) of .787.

Because place of residence was an essential independent variable for this study, several measures of this variable were included. A geographic question was not included in the phone survey, however, so zip code, city, county, and Census County Division (CCD) were indexed using each respondent’s telephone area code and prefix. The geographic identifiers for each respondent were then connected with census data. Each respondent’s residence was identified as metropolitan, micropolitan, or neither, based on the “core based statistical area” (CBSA) classification (U.S. Census Bureau: Population Division, 2005). In addition, residence was classified using the

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rural/urban continuum codes (USDA Economic Research Service, 2004b) and the locale codes (U.S. Department of Education: Institute of Education Sciences, 2007). Each of these codes represents a different approach to the definition of rural. Population size was identified at the county level and also at the Census County Division (CCD) level. CCDs are delineated by the U.S. Census Bureau in cooperation with local governments and serve as the equivalent of minor civil divisions in other states (U.S. Census Bureau: Geography Division, 2005).

The telephone survey data were also linked with a set of county-level data collected in the 2002 Census of Agriculture (USDA National Agricultural Statistics Service, 2004). The county-level agricultural data included number of farms, acres of land in farms, and market value of agricultural products sold.

Respondents' demographic attributes were also considered. These independent variables included gender, ethnicity, education, age, length of Florida residency, presence of children in the household, food purchasing behavior (the frequency of grocery shopping, whether the respondent purchased organic foods and, if so, the frequency of organic purchases), agricultural income, and household income. The measurement of each variable is shown in tandem with the distributional statistics in the findings section of this article.

The data in this study were analyzed with descriptive statistics and multivariate procedures. Correlations were calculated to identify direct relationships among variables. Upon initial analysis, the researchers created and tested an interaction term by multiplying county population and agricultural sales. These two variables were chosen for the interaction because of the level of significance each provided in the relational analysis. Multiple linear regression analysis, with all predictors entered simultaneously, was also conducted to test for interaction effects of related measures. In the end, reduced regression models were identified based on their ability to predict confidence in Florida agriculture. *P* values are reported for the significance level of the parameter estimates (Cohen, 1992).

The demographic data collected in the study offer a limited opportunity to generalize the study by comparing demographic differences between survey participants and population estimates offered by the U.S. Census Bureau. Survey respondents were primarily non-Hispanic white (84.7%, $n = 320$), and a majority were male (63.5%, $n = 240$). In comparison, the U.S. Census Bureau (2008a) estimated Florida's population to be 62.3% non-Hispanic white and 49.1% male. However, it is important to note that the census data are for the entire population, and the population of registered

voters is likely to include fewer minorities (Jamieson, Shin, & Day, 2002). Nearly half (49.3%, $n = 186$) of all study participants were college graduates, and the median annual household income was in the range of \$50,000 to \$69,000. In comparison, the Census Bureau's 2000 estimate of Florida's adult residents with a bachelor's degree or higher was only 22.3%, and the estimated 2003 median household income was \$38,985. Although no data were available to provide a direct comparison between registered voter demographics and the sample of registered voters, consideration of the available data suggests that caution should be exercised in generalizing findings to the entire population of Florida voters. Instead, findings should be used as a starting point for better understanding relationships among voter attitudes, demographics, and behavior.

Findings

When asked about their overall opinion of Florida agriculture, 34.9% ($n = 132$) of survey participants rated it "very favorable," 46.8% ($n = 177$) rated it "somewhat favorable," and 5.0% ($n = 19$) rated it "not at all favorable," while 13.2% ($n = 50$) indicated that they did not know. In terms of the importance of agriculture to Florida's economy, 78.3% ($n = 296$) reported that it is "very important" and 20.1% ($n = 76$) reported that it is "somewhat important." Because advocates for Florida's agricultural industry generally consider the industry to be the second most important for the state's economy (after tourism), the public's perception of the industry's economic ranking was a specific variable of interest. Among respondents, 60.9% ($n = 229$) identified the agricultural industry as ranking among the two most important industries for the state's economy.

Objective 1: Describe voter confidence in Florida agriculture.

With respect to their confidence in the safety of farming for the Florida environment, 29.9% ($n = 113$) were "very confident," 51.9% ($n = 196$) were "somewhat confident," and 11.1% ($n = 42$) were "not at all confident," while 7.1% ($n = 27$) indicated that they did not know (Table 1). With regard to confidence in Florida farmers' safe use of chemicals, 19.3% ($n = 73$) were "very confident," 55.6% ($n = 210$) were "somewhat confident," and 18.0% ($n = 68$) were "not at all confident," while 7.1% ($n = 27$) indicated that they did not know. Survey participants were also asked about the reliability of information sources. For information about food safety and farm labor, the respondents generally believed farmers to be reliable sources and also believed (to a somewhat lesser degree) farm industry organizations to be reliable sources.

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Table 1. Florida Voter Confidence in the Agricultural Industry

Variable / Attitude	Frequency %	Mean (SD)
Farming is safe for FL environment		2.20 (0.63)
Very confident	29.9	
Somewhat confident	51.9	
Not at all confident	11.1	
Don't know	7.1	
FL farmers use chemicals properly		2.01 (0.63)
Very confident	19.3	
Somewhat confident	55.6	
Not at all confident	18.0	
Don't know	7.1	
Farm industry organization information on food safety		2.14 (0.57)
Very reliable	22.8	
Somewhat reliable	60.6	
Not at all reliable	9.5	
Don't know	7.1	
Farmers' information on food safety		2.34 (0.59)
Very reliable	37.6	
Somewhat reliable	51.1	
Not at all reliable	5.6	
Don't know	5.8	
Farm industry organization information on farm labor		2.06 (0.59)
Very reliable	19.6	
Somewhat reliable	60.8	
Not at all reliable	14.0	
Don't know	5.6	

Variable / Attitude	Frequency %	Mean (SD)
Farmers' information on farm labor		2.18 (0.63)
Very reliable	29.1	
Somewhat reliable	53.7	
Not at all reliable	11.6	
Don't know	5.6	
Florida agriculture confidence index		2.15 (0.42)

Note. $n = 378$. Mean is based on a 3-point scale, where 1 = *not at all*, 2 = *somewhat*, and 3 = *very*; *don't know* was not included in the calculated mean. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006.

Individual questions about confidence in Florida agriculture were combined to form the study's dependent variable. The confidence index had a mean rating of 2.15, with a standard deviation of 0.42. Within the scale, index scores ranged from the scale's minimum possible rating of one, indicating that the consumer was "not at all confident," to the scale's maximum possible rating of three, indicating that the consumer was "very confident." The index mode was 2.0, which corresponds with responses of "somewhat confident" or "somewhat reliable."

Objective 2: Distinguish residential differences.

Based upon phone number area codes and prefixes, the vast majority of survey respondents lived in metropolitan areas (92.9%, $n = 351$) (Table 2). About 6% of respondents lived in micropolitan areas (6.1%, $n = 23$). The remaining 1% ($n = 4$) lived in noncore areas. The rural/urban continuum codes placed 59.5% of respondents in metro areas with populations of one million or more people and 27.5% in metro areas with populations of 250,000 to one million people. About 5% lived in urban, nonmetro areas, and less than 1% lived in rural areas. This is in contrast to the NCES locale classification, which suggests that about 15% of Floridians live in rural areas and small towns. The locale classification also breaks the population more evenly among other categories, with 28.7% of respondents living in the urban fringe of a larger city, 26.5% living in the urban fringe of a midsize city, and 20.2% living in a midsize city. Survey respondents' county populations ranged from 13,185 to 2,363,600, with a mean of 797,622 and a standard deviation of 633,390. The Census County Division (CCD) populations for the respondents ranged from 2,862 to 850,725, with a mean of 209,186 and a standard deviation of 226,019. Although the geographic representation

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in the sample does not perfectly mirror the state, it is similar to the Florida population estimates provided by the Rural Policy Research Institute (2006).

Table 2. *Geographic Representation From the Agriculture Institute of Florida's 2006 Public Opinion Survey Respondents*

Variable	Frequency %	Mean (SD)
Core-Based Statistical Area (CBSA) classification		1.92 (0.31)
Noncore area resident (0)	1.1	
Micropolitan area resident (1)	6.1	
Metropolitan area resident (2)	92.9	
Rural/urban continuum classification		8.37 (1.00)
Rural area or less than 2,500, no adjacent metro (1)	0.0	
Rural area or less than 2,500, adjacent metro (2)	0.3	
Urban area of 2,500 to 19,999, no adjacent metro (3)	0.0	
Urban area of 2,500 to 19,999, adjacent metro (4)	1.3	
Urban area of 20,000 or more, no adjacent metro (5)	0.0	
Urban area of 20,000 or more, adjacent metro (6)	4.2	
Metro area with population fewer than 250,000 (7)	7.1	
Metro area with population of 250,000 to 1,000,000 (8)	27.5	
Metro area with population of 1,000,000 or more (9)	59.5	
Locale classification		3.76 (1.29)
Town or rural, outside CBSA (1)	5.0	
Rural, inside CBSA (2)	10.3	
Urban fringe of midsize city (3)	26.5	

Variable	Frequency %	Mean (SD)
Urban fringe of large city (4)	28.7	
Midsized city (5)	20.2	
Large city (6)	9.3	
County population (1,000)		797.6 (633)
Census County Division (CCD) population (1,000)		209.2 (226)
Local agriculture by county		
Number of farms		1,072.0 (923)
Acres in farmland (1,000)		179.7 (174)
Market value of agricultural products sold (\$1,000)		200.9 (239)

Note. $n = 378$. Mean and standard deviation of geographic areas were calculated using the number in parentheses beside each description. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006; *Geographic Areas Reference Manual*, by the U.S. Census Bureau: Geography Division, 2005; and *Table 3: Annual Estimates of the Components of Population Change for Metropolitan and Micropolitan Statistical Areas: July 1, 2002 to July 1, 2003*, by the U.S. Census Bureau: Population Division, 2005.

The data display a significant negative correlation between the study's dependent variable, confidence in Florida agriculture, and the respondents' county population size ($r = -.162, p = .002$) (Table 3). Other residential location variables lacked significance at the .05 alpha level. Still, there was a nontrivial negative relationship between the confidence index and respondents' county agricultural sales ($r = -.097, p = .061$). As a result, the researchers invested an interaction term of county population by agricultural sales and found a significant negative relationship with confidence in Florida agriculture ($r = -.129, p = .012$).

Through exploratory regression analysis, the researchers were able to further elaborate the relationships between confidence in Florida agriculture and residential location. Geographic variables considered in the full regression model included county population, Census County Division (CCD) population, number of acres farmed in the county, amount of agricultural sales in the county, and the interaction term of county population by agricultural sales. These variables were identified for their ability to control statistically for changes in other variables, thus offering

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more precise predictions. For example, agricultural sales is somewhat related to number of acres farmed; by including both, we can ensure that the observed effect of increased agricultural sales is truly from a proportional increase in agricultural sales and not just an increase in number of acres farmed. Other geographic variables were excluded from the analysis because they were considered redundant, based upon their correlations with the included variables. The adjusted R^2 for the full model was .031 (Table 4). This amount of explained variance could be replicated with a reduced model that included only county population and CCD population. Thus respondents' county population estimates, along with CCD population, explain slightly more than 3% of variance in the confidence index. Within this model of voter confidence, county population has a significant negative relationship ($B = -.212, p < .001$), and there is a nonignorable positive relationship with CCD population ($B = .110, p = .053$).

Table 3. *Geographic Correlations With Florida Voter Confidence in the Agricultural Industry*

Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) FL agriculture confidence core	-.052	-.006	-.082	-.162	.015	-.051	-.047	-.097	-.129
(2) CBSA classification		.436	.743	.271	.194	.144	.061	.155	.153
(3) Locale classification			.464	.348	.589	.060	-.017	.185	.230
(4) Rural/urban continuum class				.565	.392	.177	.018	.332	.351
(5) County population					.451	.320	-.007	.574	.757
(6) Census County Division population						.051	-.190	.138	.259
(7) Number of farms in county							.496	.530	.477
(8) Farm acres in county								.670	.375
(9) Agricultural sales in county									.906
(10) County population by agricultural sales									

Note. $n = 378$. Bold coefficients are significant at a .05 alpha level. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006.

Table 4. Standardized Regression of Florida Voter Demographics, Behavior, and Attitudes on Confidence in the Agricultural Industry

Source	Geographic Models				Comprehensive Models			
	Full		Reduced		Full		Reduced	
	Est.	α	Est.	α	Est.	α	Est.	α
County population	-.244	.009	-.212	<.001	-.186	.002	-.196	<.001
Census County Division population	.099	.092	.110	.053	.114	.053	.118	.043
Farm acres in county	-.182	.090						
Agricultural sales in county	.349	.119						
County population X agricultural sales	-.217	.267						
Gender (1 = female)					<-.001	.990		
Age					-.093	.131	-.077	.194
Length of FL residency					.029	.585		
White, non-Hispanic					.032	.553		
Education level					-.037	.518		
Children in the home (1 = yes)					-.131	.024	-.130	.024
Household income					-.071	.226	-.073	.171
Grocery shopping frequency					-.014	.803		
Organic food purchase (1 = yes)					.138	.175	.123	.210
Frequency of organic food purchases					-.194	.057	-.191	.058
Economic rank of FL agriculture					.058	.267	.064	.216
Adjusted R ²	.031		.031		.041		.052	
F statistic	3.40	.005	7.01	.001	2.20	.009	3.47	<.001

Note. n = 378. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006.

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Objective 3: Identify other important predictors.

In an effort to explain additional variance in the confidence rating, the researchers considered additional demographic and behavioral variables. A majority of the survey participants indicated that they do all (42.3%, $n = 160$) or most (16.9%, $n = 64$) of their households' grocery shopping (Table 5). With respect to organic food purchasing habits, about half of the respondents (50.4%, $n = 185$) had not purchased organic foods in the past 6 months, while 18.5% ($n = 68$) purchased organics every few months, 16.4% ($n = 60$) purchased organics a few times per month, and 14.7% ($n = 54$) purchased organics at least once a week.

Table 5. Demographic Representation From the Agriculture Institute of Florida's 2006 Public Opinion Survey Respondents

	% or Mean (SD)	Range
Male (1 = yes)	63.5	0-1
Age (years)	59.75 (15.8)	18-90
Length of FL residency (years)	31.7 (19.8)	0-90
Ethnicity: White, non-Hispanic (1 = yes)	84.7	0-1
Education (highest level)		1-8
8 th grade or less	0.8	1
Some high school	3.4	2
High school graduate	20.4	3
Technical/vocational	3.2	4
Some college	21.7	5
College graduate	30.2	6
Graduate/professional school	19.1	7
Refused	1.3	8
Children living in the home (1 = yes)	23.1	0-1
Annual Income		1-6

	% or Mean (SD)	Range
Less than \$20,000	10.1	1
\$20,000 to \$34,999	15.1	2
\$35,000 to \$49,999	17.7	3
\$50,000 to \$69,999	14.6	4
\$70,000 or more	27.5	5
Don't know or refused	15.1	6
Agricultural income (1 = yes)	4.3	0-1
Grocery shopping frequency for the household	2.79 (1.26)	0-4
None	6.1	0
Little	10.3	1
Some	24.3	2
Most	16.9	3
All	42.3	4
Organic food purchasing in past 6 months (1 = yes)	49.6	0-1
Frequency of organic food purchasing	0.95 (1.12)	0-3
None in past 6 months	50.4	0
Less than once a month	18.5	1
A few times a month	16.4	2
At least once a week	14.7	3

Note. $n = 378$. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006.

The researchers observed a significant negative relationship between the study's dependent variable, confidence in Florida agriculture, and respondents' frequency of organic food purchases ($r = -.111, p = .033$) (Table 6). In addition, the researchers observed nonignorable relationships between the confidence index and respondents' income ($r = -.095, p = .065$) and whether or not children live in the respondent's home ($r = -.099, p = .054$).

Table 6. Demographic and Attitudinal Correlations With Florida Voter Confidence in the Agricultural Industry

Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) FL agriculture confidence score	-.030	.020	.028	.044	-.082	-.099	-.095	-.043	-.031	-.068	-.111	.059
(2) Female (1 = yes)		.086	-.037	-.058	-.108	-.104	-.159	.134	.414	.080	.127	-.050
(3) Age			.186	.135	-.226	-.430	-.237	.075	.004	-.132	-.119	-.020
(4) Length of FL residency				-.019	-.068	-.024	.003	-.062	-.100	-.143	-.101	.037
(5) Ethnicity (1 = white, 0 = other)					.094	-.085	.126	-.017	-.036	-.033	-.025	.141
(6) Education level						.101	.374	.062	.019	.187	.159	.012
(7) Children in the home (1 = yes)							.149	.023	-.105	-.015	-.014	-.052
(8) Household income								-.071	-.160	.132	.132	-.004
(9) Agricultural income (1 = yes)									.156	.027	-.007	-.062
(10) Grocery shopping frequency										.060	-.066	-.032
(11) Organic food purchase (1 = yes)											-.859	.028
(12) Frequency of organic food purchases												-.022
(13) Economic rank of FL agriculture												

Note. $n = 378$. Bold coefficients are significant at a .05 alpha level. From *Public Opinion Survey Report*, by Agriculture Institute of Florida, 2006.

Through exploratory regression analysis, the researchers were able to further elaborate the relationships between confidence in Florida agriculture and available independent variables. The full comprehensive model had an adjusted R^2 of .041, thus explaining slightly more than 4% of the variance in the confidence index (Table 4). Based on the individual terms in the full, comprehensive model, the researchers were able to create a reduced model that explained slightly more than 5% of the variance in the confidence index (based on an adjusted R^2 of .052, $p < .001$). The significant explanatory variables included in the reduced model were county population ($B = -.196$, $p < .001$), the Census County Division population ($B = .118$, $p = .043$), and whether or not children live in the home ($B = -.130$, $p = .024$). Other variables were retained in the reduced model because they either presented nontrivial relationships or were important to include for their interaction effects with other variables in the model. These variables included household income ($B = -.073$, $p = .171$), respondents' age ($B = -.077$, $p = .194$), whether or not the respondents purchase organic foods ($B = .123$, $p = .210$), the frequency of organic food purchases ($B = -.191$, $p = .058$), and the respondents' perceived rank of agriculture's importance for Florida's economy ($B = .064$, $p = .216$).

Discussion, Conclusions, and Recommendations

The data collected by the Agriculture Institute of Florida suggest that Florida voters tend to be somewhat positive toward agriculture and farming in Florida. This favorable view toward the industry is reflected in the collected attitudinal measures, all of which favored confidence in Florida's agriculture. This finding supports previous research in the United States that suggests the public's perception of the agricultural industry is generally positive (Frick et al., 1995; Wimberley et al., 2003).

The study's findings do suggest residential differences in attitude toward Florida agriculture. Counties with smaller populations did tend to have a more favorable attitude toward Florida's agricultural industry. Although the effect sizes are small, the findings add to the body of research that recognizes rural residents for their positive attitudes toward local agriculture (Food Processing Center, 2001; Smithers et al., 2005; Weatherell et al., 2003). However, county subdivisions did not display the same negative relationship between population size and confidence in the agricultural industry; the CCD population estimates had a positive relationship with confidence in the agricultural industry, supporting findings by Patterson and colleagues (1999). Regression models suggest that the CCD population estimates have explanatory power beyond that of county population estimates alone. The findings may reflect a greater concern for preserving open space and retaining local food sources among people in the more urbanized areas

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within a county, which offsets, in part, the generally less positive opinion toward agriculture in large counties. Although the overall variance explained by the regression models is small, the models do offer some initial insight into factors that influence voter confidence.

Given that both county and CCD size are contextual factors influencing confidence in agriculture, this poses a challenge for communicators, who need to create information campaigns that will be effective across a diversity of settings. From a practical standpoint, the finding suggests that agricultural communicators may need to consider audience segmentation approaches to a much greater extent than before. Used extensively in mass media brand marketing, segmentation strategies are based on geographic, demographic, and lifestyle factors and can help determine which audiences would be most effective to target with specific messages (Bannon, 2004; Vyncke, 2002). These approaches, although efficient, can be expensive and may require communicators to focus more on data management and analysis of trends than the traditional communications skills set. In circumstances where resources are limited, audience segments must be evaluated and prioritized for targeting. For example, Bannon's (2004) Hierarchy of Segments Model evaluates segments on their attractiveness and their responsiveness to stimuli, categorizing the segments into four areas:

1. Primary targets: Attractive segments that are responsive to stimuli;
2. Secondary targets: Less attractive segments that are responsive to stimuli;
3. Relationship building: Attractive segments that are less responsive to stimuli; and
4. Wasteland segments: Unattractive segments that are unresponsive to stimuli.

For some agricultural communication campaigns, all segments may be attractive, but there are likely to be differences in responsiveness to stimuli.

In this study, residents in counties with increased agricultural sales actually had less favorable views toward the agricultural industry. This apparent contradiction may be because counties with the largest agricultural sales are located in the most heavily populated region of the state: South Florida. However, this finding is particularly disturbing considering the fact that there are five "agriculture-dependent" counties in South Florida (USDA Economic Research Service, 2004a). Given Burstein's (2003) review on the influence of public opinion on policy, these more negative sentiments could be detrimental, especially as agricultural policies are voted on by Florida residents who may not feel a connection to the local farms and agriculture

and may be unsympathetic where urban encroachment into rural areas is concerned. This finding has implications for states beyond Florida as well, where voter awareness and connection with agriculture may be low and urban/rural interface issues have begun to take hold. As a result, these audience segments may be categorized as “relationship building” targets in Bannon’s (2004) Hierarchy of Segments Model. Urban voters are an attractive segment because their large numbers mean they have the potential to heavily influence public policy that affects agriculture, yet they seem less aware of the economic benefits of agriculture in their surrounding communities. Agricultural awareness campaigns targeted toward these audiences may need to include different stimuli and focus more on relationship building than primary targeting. For example, successful campaigns may move away from the typical economic impact stories and more toward positioning agriculture as “the good neighbor,” “stewards of the land and preservers of green space,” and other appeals.

The findings in this study are consistent with other studies (Frick et al., 1995; Smithers et al., 2005; Weatherell et al., 2003) in that rural residents were found to have more favorable views of the agricultural industry than urban publics. However, further research is necessary to better understand the reasons for and implications of this residential difference. The relationship between population size and voter confidence should be explored in other states. In addition, the connection between voter confidence and organic food purchasing requires further investigation. Is this relationship consistent in other states? What is its driving force? Perhaps health-conscious voters have lost faith in agriculture and perceive the potential for risk in the industry’s conventional approach to providing a safe food supply. Such concerns about the safety of agricultural products may also explain the weaker confidence among households with children in the home. These are empirical questions yet to be answered. In order to better target messages that influence voter confidence in agriculture, practitioners need more information about the lifestyle typologies that influence such opinions.

From a theoretical standpoint, this study adds to the extensive literature in persuasion and public opinion that demonstrates that individual difference factors influence perceptions. More specifically, the study offers more evidence that market segmentation should consider geographic, demographic, and psychographic (or lifestyle) variables (Bannon, 2004; Vyncke, 2002). In the context of agriculture and specifically voter confidence in agriculture, it suggests that geography, residential location, county population, household composition, and food purchasing behavior are factors that need to be taken into consideration when developing a predictive model of public attitudes in this domain.

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The residential differences suggested by this exploratory study may not be significant enough to warrant geographic differentiation in agricultural awareness campaigns. However, communication professionals may use data from this study to consider differences in the approach of public campaigns. If geography is destiny, then it makes sense for industry to keep consumers' locations in mind when considering consumer attitudes toward and perceptions of agriculture. Communication professionals targeting large urban counties should consider that consumers in these areas have less positive opinions of agriculture and may be less receptive to some messages than audience segments in rural counties or small urban counties.

Likewise, communicators might consider developing messages targeted toward organic food buyers and households with children. Such messages might emphasize food quality and safety, as well as the environmental benefits of well-managed agricultural operations. This can increase confidence in the agricultural industry among these market segments.

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Keywords

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Colorado AgrAbility: Enhancing the Effectiveness of Outreach Efforts Targeting Farmers and Ranchers With Disabilities

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Abstract

The Colorado AgrAbility Project (CAP) provides farmers and ranchers who have disabilities with the information and assistive technologies needed to remain successful producers. At present, however, CAP services are underutilized, and the rate of use is declining. This study investigates awareness and attitudinal barriers that might constrain farmers and ranchers with disabilities from seeking assistance. It also identifies preferred outlets for distributing agricultural information in the hope that this will improve the efficacy of outreach efforts. Mail survey research involving 798 randomly selected Colorado farmers and ranchers was conducted in the spring of 2006. Findings suggest that lack of awareness constituted the primary obstacle to increased use of CAP services. Farmers and ranchers were more inclined to refer others in need to CAP than to seek help themselves. Participants identified other farmers and ranchers as preferred sources for information and expressed interest in the stories of farmers and ranchers with disabilities who had been helped by CAP. Based on survey findings, strategies for improving the effectiveness of outreach efforts are proposed, including mobilizing opinion leaders in the farming and ranching communities, recruiting past CAP clients as spokespeople, and placing CAP success stories in agricultural publications.

So What?

Encouraging farmers and ranchers to seek help in dealing with disabilities involves unique challenges. This study determined the information sources preferred by Colorado farmers and ranchers and identified obstacles that might deter them from seeking assistance with disabilities through the Colorado AgrAbility Project. Based on these findings, strategies are proposed for improving the effectiveness of outreach efforts to farmers and ranchers with disabilities.

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As numerous researchers have documented, farming and ranching are physically demanding and hazardous professions. In the United States, farmers and ranchers are second only to nonconstruction laborers in disability rates from work-related injuries (Leigh & Fries, 1992; National Safety Council, 2004). In 2003 alone, 110,000 people in agriculture suffered disabling injuries (National Safety Council). Having a preexisting injury, disability, or chronic health condition in turn increases the risk of subsequent work-related injuries (Beseler & Stallones, 2003; Hwang et al., 2001; McCurdy & Carroll, 2000; Sprince et al., 2003), and this risk appears to increase with age (Brison & Pickett, 1991). The cost of agricultural injuries is immense, with farming contributing direct costs of \$1.66 billion and indirect costs of \$2.93 billion to occupational injury costs in 2000—30% more than the national average of occupational injury costs (Leigh, McCurdy, & Schenker, 2001).

The challenges facing Colorado are typical of those facing agricultural states across the nation. The state derives a substantial amount of income from agriculture, with Colorado farmers reporting \$5.2 billion in total sales in 2000 (Colorado Agricultural Statistics Service, 2003) and a net income of \$367.3 million in 2002 (U.S. Department of Agriculture, 2004). Of the 31,361 farms in Colorado (National Agricultural Statistics Service, 2005), 17.2% reported work-related injuries over a recent 3-year period (Stallones & Xiang, 2003). From such studies, researchers have extrapolated that 5.7 Colorado farmers per 100 will sustain injuries each year (Stallones & Xiang). Lost income from injury, disability, or illness threatens not only the welfare of individual farming and ranching families in Colorado, but also the financial stability of the state as a whole.

Along with the physical hazards of farming and ranching, the social and emotional impacts of agricultural injuries have also been well documented (Robertson, Murphy, & Davis, 2006). Fetsch, Blackburn, and Hilleman (1986) surveyed Colorado farmers and ranchers during the agricultural crisis of the mid-1980s. They found that over 70% of the sample had negative perceptions of their overall economic situation at the time. A secondary analysis of these data revealed that more desperate or negative overall perceptions were associated with higher levels of stress and depression (Fetsch & Jacobson, 2005). Among those assisted by Colorado AgrAbility, however, only 24% had negative perceptions of their overall situations (Meyer & Fetsch, 2006).

The 1990 Farm Bill authorized the AgrAbility program to provide information and technical assistance to farmers and ranchers with disabilities so that they could remain active in agriculture (U.S. Department of Agriculture, n.d.). The USDA Cooperative State Research, Education, and Extension Service (CSREES) used a competitive grant process to award

program funds to land-grant universities who partnered with nonprofit service providers to initiate 21 projects in 24 states, providing information, education, and on-site services to farmers and ranchers with disabilities, injuries, or chronic health conditions (K. Hunter, personal communication, March, 2, 2006; U.S. Department of Agriculture).

Representative of such projects, the Colorado AgrAbility Project (CAP) is a collaborative partnership between Colorado State University Extension Service (CSUE) and Easter Seals Colorado. Initiated in 1998, CAP outreach efforts have focused on mitigating the negative effects of physical disabilities and mental health problems by encouraging Colorado farmers and ranchers to make use of CAP information and services and to inform others of the benefits available through CAP. To accomplish these objectives, CAP hosts up to 15 workshops for Colorado farmers, ranchers, and professional caregivers per year on the topic of accommodating disabilities, and provides up to 45 on-site rehabilitation assessments and individualized consultative services a year. To encourage workshop participation and use of on-site services, CAP relies primarily on direct-mail flyers, success stories, radio spots, news releases, and face-to-face contacts by CSUE agents.

CAP has largely succeeded in achieving its modest objectives for numbers of farmer and rancher referrals over the past few years, including a peak of 52 referrals in 2002-2003 (Fetsch, 2005). Workshop participation has also doubled over the past 4 years, and the number of professional caregivers accessing CAP information has tripled, reaching nearly 100 in 2004.

However, given the estimated number of farmers and ranchers with disabilities in Colorado, it is clear that CAP information and services are dramatically underutilized. According to the U.S. Census Bureau (2001), 13.8% of Coloradoans age 5 and up reported having a disability in 2000. Based on this percentage, CAP estimates that more than 13,000 of approximately 97,000 people living on farms and ranches in Colorado have a disability (Colorado Agricultural Statistics Service, 2004; National Agricultural Statistics Service, 2005) and could potentially benefit from CAP information and services. To date, however, CAP has served only 150 Colorado families. Moreover, evaluation data indicate that the number of farmers and ranchers with disabilities seeking assistance through CAP is beginning to taper off.

Anecdotal evidence suggests that Colorado farmers and ranchers may lack awareness of CAP and the information and services it offers. It is also possible that a culture of pride and self-sufficiency leads some to prefer to deal with disabilities on their own, rather than seeking outside help. Finally, the nature and severity of the disability may affect farmer

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and rancher willingness to seek assistance, with mental health issues being perceived as more embarrassing than physical disabilities. Beyond anecdotal evidence, however, reasons for the low utilization of CAP services are largely unknown. Clearly, insights into the awareness levels, attitudes, and media use habits of Colorado farmers and ranchers are needed in order to encourage those with disabilities to take greater advantage of the services available through CAP.

This article presents the results of a random-sample mail survey of 798 Colorado farmers and ranchers conducted in the spring of 2006. As a first step toward improving the public outreach strategies employed by CAP, answers to the following questions were sought:

1. Through which channels do Colorado farmers and ranchers prefer to receive news about agricultural issues?
2. To what extent are Colorado farmers and ranchers aware of and willing to use CAP services?
3. Are there attitudes that facilitate Colorado farmers' and ranchers' seeking assistance through CAP or constrain them from doing so?

Researchers used the survey findings to propose strategies for effectively communicating with farmers and ranchers who are dealing with disabilities.

Methods

Participants and Procedure

Mail survey research was conducted in the spring of 2006 to investigate awareness levels, attitudes, and media use habits among Colorado farmers and ranchers. Using a computer-generated random sampling technique, the Colorado Agricultural Statistics Service selected a sample of 798 Colorado farmers and ranchers from the population of 31,361 Colorado farms.

Using a method adapted from Dillman (2000), a first wave of survey questionnaires was distributed by mail. Each packet included a cover letter, a questionnaire, a preaddressed, postage-paid reply envelope, and a \$1 bill as an incentive to complete and return the questionnaire. Two weeks later, postcards were mailed to the entire sample, reminding farmers and ranchers to complete and return questionnaires and thanking those who had already done so. Two weeks following the reminder postcards, the questionnaire was distributed a second time to the entire sample by mail (sans the \$1 incentive).

The U.S. Postal Service returned as undeliverable 24 of the 798 survey packets. Of the remaining 774 farmers and ranchers, 395 returned questionnaires, for a response rate of 51.0%.

Two hundred and twenty-six respondents (57.4%) were 55 years of age or older, 293 (78.3%) were male, and 348 (94.8%) were white. With respect to education, 82 (21.9%) had a high school diploma or GED, 81 (21.6%) had completed an undergraduate degree, and 44 (11.3%) had completed a graduate or professional degree. The percentage of people with undergraduate degrees in the sample was high in comparison to the percentage of all U.S. citizens with undergraduate degrees (15.5%), but was representative of educational levels in Colorado (21.6%) (U.S. Census Bureau, 2001). Two hundred and thirty-seven (62.7%) had worked in farming or ranching 25 years or longer. Farms ranged in size from 1 to 40,000 acres, with a median farm size of 240 acres.

Measures

The questionnaire was four pages long and consisted of five parts. Some items were adapted from past CAP questionnaires used to evaluate the effectiveness of educational workshops.

The first part of the questionnaire asked respondents about their farming or ranching experience, including years worked, type of farm (individual, partnership, or corporate), class of farm (livestock, fruit and vegetable crops, or forage crops), location, size of farm (in acres), and perceptions of how the future looked on a scale from 1 to 5 (*very bleak* to *very good*).

The second part asked about preferred sources for information about Colorado AgrAbility and other agricultural news. From a list of 10 news sources—ranging from general-interest television, radio, and newspapers to targeted media such as agricultural publications, organizations, and Extension agents—respondents identified the source they used the most, as well as other sources they used occasionally. Respondents were also asked to write down the names of their favorite news outlets.

The third part of the questionnaire assessed awareness of and willingness to use CAP services, as well as general attitudes toward dealing with disabilities. First, using a 10-point scale, respondents indicated their general level of awareness of CAP. Then they indicated if they had heard of and would consider using each of five CAP services, including publications, a Web site, educational workshops, on-site visits, and information on assistive technologies. Finally, using 10-point Likert scales anchored by 1 (*strongly disagree*) and 10 (*strongly agree*), they indicated the extent to which they preferred to deal with physical issues on their own, would find seeking help for mental health issues too embarrassing, would seek help from CAP only as a last resort, would refer others in need to CAP, would look down on those who sought help through CAP, and other attitudinal concerns.

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After providing assurances of confidentiality and anonymity, the fourth part of the questionnaire asked respondents if they, or people they knew, were dealing with physical or mental health issues. Those who responded “yes” were asked if they had approached CAP for assistance with farming or ranching needs. Those who indicated they had utilized CAP services were asked five follow-up questions regarding which services they had used and their satisfaction with the assistance obtained through CAP. An open-ended question invited respondents to share recommendations for improving the education, services, and assistance provided by CAP.

Finally, demographic data were collected, including age, gender, race and ethnicity, and education. An open-ended question provided respondents with the opportunity to offer any additional comments about CAP or the survey.

Results were analyzed using the statistical analysis software package SPSS. Responses to open-ended questions were qualitatively analyzed to identify themes regarding CAP services, outreach strategies, and recommendations for improvement.

Results

The first research question examined the channels through which Colorado farmers and ranchers preferred to receive news about agricultural issues. As shown in Table 1, the source used most often for agricultural news was agricultural publications. Among 369 respondents, nearly half (45.5%) indicated they used agricultural publications the most, while an additional 36% indicated they relied on agricultural publications some of the time. The three most popular agricultural publications were *The Fence Post*, *Ag Journal* (two Colorado-based agricultural publications), and the *High Plains Journal*.

The second most preferred source for agricultural news was other farmers and ranchers. Nearly 26% of respondents relied on other farmers and ranchers the most for agricultural information, with another 39.4% turning to other farmers and ranchers some of the time.

Next in popularity was radio, followed by general-interest newspapers, television, family and friends, general-interest magazines, and Extension agents. Consistent with findings obtained by Suvedi, Campo, and Lapinski (1999), only 9.8% identified the Internet as the source they used the most for agricultural information.

The second research question assessed the extent to which Colorado farmers and ranchers were aware of and willing to use CAP services. General awareness of CAP was low, with a mean of 2.19 on the 10-point awareness scale. Among 369 respondents, more than half (61.7%) circled “1,” indicating that they were not at all aware of CAP.

Table 1. Preferred Sources of Agricultural News

News Source	Used the Most		Also Used	
	<i>n</i>	%	<i>n</i>	%
Agricultural publications	168	45.5	133	36.0
Other farmers/ranchers	95	25.7	145	39.4
Radio	64	17.3	130	35.2
General-interest newspaper	63	17.1	147	39.8
Television	61	16.5	131	35.5
Family/friends	51	13.8	95	25.8
General-interest magazine	50	13.6	120	32.5
Extension agents	40	10.8	116	31.5
Internet	36	9.8	102	27.6
Agricultural organizations	35	9.5	98	26.6
Other	2	.5	7	1.9

Note. Percentage points total greater than 100, as some respondents checked more than one most-preferred source.

Awareness of specific CAP services was similarly low, with 19.1% of respondents indicating they had heard of educational workshops and 18.7% indicating they had heard of CAP publications. Willingness to make use of CAP’s Web site (10.6%), information on assistive technologies (10.2%), and on-site visits (9.1%) was slightly higher than actual awareness of those services (9.2%, 9.9%, and 7.3%, respectively).

Forty-eight respondents indicated that they were dealing with physical issues, while 15 were dealing with mental health issues. Fifty knew someone else who was dealing with a physical issue, while 29 knew someone who was dealing with a mental health issue. Among these individuals, however, only 7 indicated that they had approached CAP for assistance, with 4 attending educational workshops, 3 requesting on-site visits, and 2 using information on assistive technologies. While these numbers are admittedly low, satisfaction with the information and assistance obtained through CAP was generally high, with most indicating they were extremely satisfied.

Analysis of open-ended questions indicated that many respondents had never heard of CAP, but thought CAP was a good idea and were interested in receiving more information about CAP services as a result of receiving the survey. Several ideas for raising awareness and encouraging use of CAP services were proposed, including targeting younger farmers and ranchers,

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providing true stories and first-person examples, placing advertisements in agricultural publications, and sending direct mailings to Colorado farmers and ranchers.

The final research question attempted to determine if Colorado farmers and ranchers possessed attitudes that might discourage them from seeking CAP assistance. Descriptive statistics confirmed impressions that farmers and ranchers were inclined to deal with physical problems on their own ($M = 6.74$ on the 10-point Likert scale). A one-way analysis of variance and post hoc multiple comparisons test revealed that less experienced farmers and ranchers ($M = 5.12$) were less willing to deal with physical problems on their own than were their more experienced counterparts, $F(322,6) = 2.05$, $p = .072$ (Table 2). An independent samples t -test indicated that male farmers and ranchers ($M = 6.99$) were significantly more inclined to deal with physical problems on their own than were female farmers and ranchers ($M = 6.00$), $t = 2.88$, $p < .01$.

Respondents were divided as to whether or not they would seek help through CAP only as a last resort ($M = 5.31$). Farmers and ranchers having less than a high school diploma or GED ($M = 2.50$) were significantly more likely to disagree with this notion, $F(307,5) = 2.79$, $p < .05$, as were younger farmers and ranchers (25-34, $M = 4.18$; 35-44, $M = 4.06$), $F(309,6) = 1.95$, $p = .072$ (Table 3). Respondents tended to disagree that seeking help for mental health issues would be too embarrassing ($M = 4.17$), although those with 45 years of experience or more ($M = 4.89$) were significantly more likely to feel embarrassed about seeking this type of help than those with fewer than 5 years of experience ($M = 3.00$), $F(307,5) = 2.48$, $p < .05$ (Table 2).

Very few indicated that they would look down on others who sought help through CAP ($M = 2.31$), although farmers and ranchers 75 years of age and older ($M = 4.44$) were significantly more inclined to do so, $F(315,6) = 3.29$, $p < .01$ (Table 3). Rather, respondents indicated a willingness to refer other farmers and ranchers in need to CAP ($M = 6.81$). Farmers and ranchers with fewer than 5 years of experience ($M = 8.40$), as well as those with 45 or more years of experience ($M = 7.20$), were significantly more inclined to refer others in need to CAP than those with experience levels in the mid-range, $F(300,5) = 2.54$, $p < .05$ (Table 2).

Table 2. Mean Attitudes Toward Seeking Assistance for Disabilities by Experience

Attitude	Years Working in Farming/Ranching					F	
	< 5 (n = 17)	5-14 (n = 65)	15-24 (n = 43)	25-34 (n = 60)	35-44 (n = 55)		45+ (n = 93)
Prefer to deal with physical problems on own	5.12 ^a (3.16)	6.63 ^b (2.51)	6.62 ^b (2.65)	6.60 ^b (2.49)	6.93 ^b (2.53)	7.18 ^b (2.52)	2.05
Would not hesitate to seek assistance from CAP	6.69 ^a (2.80)	5.64 ^a (2.66)	5.41 ^a (2.43)	5.36 ^a (2.73)	5.30 ^a (2.83)	5.93 ^a (3.02)	.97
Would switch to another career	5.69 ^{ab} (2.73)	6.02 ^a (2.84)	5.85 ^a (2.95)	5.12 ^{ab} (2.82)	5.31 ^{ab} (3.10)	4.66 ^b (3.20)	1.92
Would seek assistance from CAP only as last resort	5.19 ^a (3.35)	5.70 ^a (2.74)	5.05 ^a (2.19)	5.63 ^a (2.88)	4.79 ^a (2.76)	5.24 ^a (3.03)	.82
Would look down on farmer/rancher who asked CAP for help	2.13 ^a (2.22)	2.12 ^a (1.82)	1.91 ^a (1.86)	2.53 ^a (2.42)	2.32 ^a (2.28)	2.55 ^a (2.70)	.66
Would refer other farmers/ranchers to CAP	8.40 ^a (2.32)	6.51 ^{bc} (2.49)	6.91 ^{abc} (2.46)	6.04 ^c (2.83)	6.80 ^{bc} (2.60)	7.20 ^{ab} (2.86)	2.54 [*]
Seeking help f or stress/depression is too embarrassing	3.00 ^a (2.39)	4.40 ^{abc} (2.83)	3.81 ^a (2.06)	3.63 ^a (2.60)	4.04 ^{abc} (2.72)	4.89 ^{bc} (3.08)	2.48 [*]

Note. Means based on 10-point Likert scale ranging from 1 (*strongly disagree*) to 10 (*strongly agree*). Standard deviations in parentheses. Means lacking a shared letter superscript differ significantly at $p < .05$ by Tukey's procedure for post hoc comparisons. Comparisons are made only within each row (horizontally).

* $p < .05$

Table 3. Mean Attitudes Toward Seeking Assistance for Disabilities by Age

Attitude	Age at Last Birthday (Years)					F
	25-34 (n = 12)	35-44 (n = 34)	45-54 (n = 93)	55-64 (n = 99)	65-74 (n = 74)	
Prefer to deal with physical problems on own	7.00 ^a (2.33)	6.24 ^a (2.77)	6.52 ^a (2.53)	6.72 ^a (2.45)	7.20 ^a (2.61)	1.03 (3.27)
Would not hesitate to seek assistance from CAP	6.27 ^a (2.49)	6.00 ^a (2.57)	5.78 ^a (2.67)	5.55 ^a (2.75)	5.46 ^a (2.95)	.50 (3.67)
Would switch to another career	3.08 ^a (1.78)	4.27 ^{ab} (2.82)	5.80 ^c (2.55)	5.67 ^c (3.10)	5.35 ^{bc} (3.23)	2.79 ^d (3.87)
Would seek assistance from CAP only as last resort	4.18 ^{abc} (2.44)	4.06 ^b (1.85)	5.40 ^{ac} (2.57)	5.42 ^{ac} (2.94)	5.88 ^{ac} (3.11)	1.95 (3.41)
Would look down on farmer/ rancher who asked CAP for help	1.82 ^a (1.33)	1.67 ^a (1.45)	2.20 ^a (2.05)	2.46 ^a (2.50)	2.13 ^a (2.05)	3.29 ^{**} (3.72)
Would refer other farmers/ ranchers to CAP	7.27 ^a (2.94)	7.22 ^a (2.39)	6.62 ^a (2.55)	6.93 ^a (2.65)	6.71 ^a (3.06)	.80 (2.81)
Seeking help for stress/ depression is too embarrassing	4.42 ^a (2.64)	3.75 ^a (2.82)	4.20 ^a (2.66)	4.28 ^a (2.62)	3.93 ^a (2.95)	.73 (3.62)

Note. Means based on 10-point Likert scale ranging from 1 (*strongly disagree*) to 10 (*strongly agree*). Standard deviations in parentheses. Means lacking a shared letter superscript differ significantly at $p < .05$ by Tukey's procedure for post hoc comparisons. Comparisons are made only within each row (horizontally). Findings for respondents 18-24 ($n = 2$) have been omitted.

* $p < .05$. ** $p < .01$

Recommendations

The Colorado AgrAbility survey sought a clearer understanding of Colorado farmers' and ranchers' media use preferences, their awareness of CAP and the services it provides, and their attitudes toward seeking help for physical or mental health issues. Based on analysis of survey results, following are recommendations regarding public outreach strategies that can be used by CAP and other outreach organizations to encourage farmers and ranchers to seek assistance in dealing with illnesses, injuries, or disabilities.

Impact Objectives

While awareness of CAP services was low, satisfaction among farmers and ranchers who had contacted CAP for help was high. Analysis of open-ended questions validated a generally positive attitude toward CAP and an interest in receiving more information about services.

Based on these findings, the primary obstacle to increasing use of CAP services appears to be lack of awareness rather than negative attitudes. Increasing farmer and rancher awareness of CAP and its services should therefore be the primary objective of public outreach efforts in the near term so as to achieve long-term behavioral objectives regarding the number of referrals and the use of specific services. To help raise awareness and initiate word of mouth, CAP could consider augmenting its current workshops on specific health and family topics by conducting a series of workshops on the services it offers.

Target Audiences

In light of the finding that farmers and ranchers with less than 5 years of experience were less inclined to deal with physical problems on their own, greater emphasis should be placed on younger, less experienced farmers and ranchers as a primary target of public outreach efforts. Targeting members of organizations such as the National FFA Organization and 4-H could yield long-term increases both in willingness to use CAP services and willingness to refer others to CAP.

While farmers and ranchers were not always inclined to seek help themselves, they were willing to refer other farmers and ranchers in need to CAP. Hence, greater emphasis should be placed on mobilizing opinion leaders or intervening audiences (i.e., those in a position to influence farmers and ranchers who are dealing with disabilities). Intervening audiences might include female farmers and ranchers as well as highly experienced farmers and ranchers who are viewed as opinion leaders by their peers. The fact that the second most preferred source for agricultural news was other farmers and ranchers offers support for this recommendation.

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Message Strategies

Given the interest in and reliance on other farmers and ranchers, CAP could recruit one or more past clients to be the public face of the project, conveying messages to other farmers and ranchers in need through workshops, speeches to agricultural organizations, peer interventions, and success stories in agricultural and local news publications.

More research is needed to understand the communication needs of farmers and ranchers with less than a high school diploma or GED, who were more inclined to seek assistance in dealing with disabilities. The enlistment of professional writers and communicators, who are familiar with tools for determining readability level and accustomed to writing for farming and ranching audiences, is recommended to achieve impact objectives.

To address concerns among experienced farmers and ranchers about seeking help for mental health issues, communications should acknowledge the possible embarrassment involved in seeking help for mental health issues but point out that seeking assistance for stress or depression has become more socially acceptable over the years. The potential benefits of seeking such help should also be emphasized.

Media Tactics

Agricultural publications emerged as the most preferred source for agricultural news, underscoring the importance of print news sources devoted to farming and ranching (Grieshop, 1999; Oskam, 1995; Richardson, Clement, & Mustian, 1997; Suvedi et al., 1999). Efforts to place CAP messages in *The Fence Post* and *Ag Journal* should therefore continue; CAP messages should also be placed in *High Plains Journal*. A combination of uncontrolled tactics (e.g., feature news releases on CAP success stories) and controlled tactics (e.g., paid advertisements) is recommended, the former to reduce costs while enhancing message credibility and the latter to ensure that readers are exposed to messages. Repeated exposure to messages is necessary to ensure that messages will be recalled and acted upon by farmers and ranchers in need of help (Besley & Shanahan, 2005). To guide message placement and validate assumptions regarding message exposure, future CAP surveys could include questions assessing frequency of media use in addition to media preferences.

Complementing the mass media tactics noted above, which are necessary to ensure broad exposure, and taking into account the importance of personal contacts (Grieshop, 1999; Richardson & Mustian, 1994), CAP and other outreach organizations should maximize opportunities for face-to-face communications with primary and intervening audiences in the farming and

ranching communities. A specific suggestion would be to create a speakers' bureau, for which CAP could recruit past clients, Extension agents, and professional caregivers (e.g., occupational and physical therapists) to serve as spokespeople. CAP could make these clients and interveners available to speak at monthly meetings of agricultural organizations, civic events, schools, and other local venues. Face-to-face communications enhance credibility (Quandt et al., 2004; Smith, 2005; Wilcox & Cameron, 2006) and would help initiate word-of-mouth among intervening audiences attending the events. Promoting these events to agricultural and local media via press releases would likely mean free publicity, given the strong human interest inherent in clients' stories.

Of the contacts received as a result of current CAP public outreach efforts, a number came from farmers and ranchers who had received a CAP survey in the mail. Direct mailings were among the recommendations offered in response to open-ended questions. Public relations experts state that personal communications such as letters and phone calls are second in credibility to face-to-face contacts (Wilcox & Cameron, 2006). Specific recommendations include converting the current CAP brochure to a mailer and including CAP materials in survey packets if and when the present mail survey is re-administered.

Evaluation

The impact of CAP public outreach efforts on the number of referrals received, number of requests for information received, and use of specific CAP services can be evaluated fairly simply through frequency counts. To evaluate the effectiveness of outreach efforts in terms of raising awareness and bringing about the positive attitudes necessary to achieve behavioral objectives, CAP should consider readministering the survey described in this article on a regular basis (e.g., every other year). To determine the effectiveness of specific messages and tactics, measures of exposure and recall could be added to the questionnaire. The timing of survey administration is critical, as studies show that farmers and ranchers are more willing to respond to mail surveys when they are sent during January and February, so as not to overlap with production and harvest schedules (Pennings, Irwin, & Good, 2002). Monetary incentives may also be useful in increasing response rates (Pennings et al.).

Conclusions

In sum, insights derived from the survey of Colorado farmers and ranchers suggest a number of strategies, messages, and tactics that can be used to enhance the effectiveness of public outreach efforts targeting farmers

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and ranchers with disabilities. These strategies include targeting younger, less experienced farmers and ranchers; mobilizing experienced farmers and ranchers and female farmers and ranchers to act as interveners; recruiting farmers and ranchers with disabilities as spokespeople; and maximizing use of agricultural publications and interpersonal tactics to convey messages to target audiences.

Credibility is key to communicating effectively with farmers and ranchers with disabilities. A highly credible source can produce more positive attitudes toward the position advocated and induce greater behavioral compliance than sources that are less credible, particularly when the message being conveyed is perceived as valid (Nan, 2007; Pornpitakpan, 2004; Sternthal, Phillips, & Dholakia, 1978). Public relations experts concur, indicating that a credible spokesperson can enhance message effectiveness (Smith, 2005; Wilcox & Cameron, 2006).

Overall, farmers and ranchers involved in this study are interested in hearing the stories of others like themselves who have been helped by outreach organizations such as CAP. They prefer to receive information on available services from peers or through well-established, credible agricultural publications. While farmers and ranchers may prefer to deal with disabilities on their own, exposure to valid messages regarding available services may increase their willingness to refer others in need to CAP. By approaching communications strategically and taking source credibility into account, CAP and other outreach organizations should be in a better position to ensure that farmers and ranchers with disabilities receive the assistance they need for continued success in their agricultural endeavors.

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Keywords

AgrAbility, farmers, ranchers, families, disabilities, survey, public outreach

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Organizational Learning in a High-Risk Environment: Responding to an Anthrax Outbreak

Shari R. Veil and Timothy L. Sellnow

Abstract

The National Center for Food Protection and Defense, a Department of Homeland Security-sponsored Center of Excellence, identified and endorses 10 best practices for risk and crisis communication. The best practices model is designed to aid organizations of all types in preparing for and learning from crisis events. This analysis applied the best practices model to a case study of an anthrax outbreak that fostered a full-blown crisis response. This study analyzes the learning experience of the crisis cohort group that responded to the crisis. The researchers contend that by evaluating a crisis situation using best practices as a benchmarking procedure, problems within the system and new strategies can be identified.

So What?

Evaluating best practices allows an organization to learn from failures and crises by establishing alternative strategies. This case study can serve not only as an example of how to use the best practices in risk and crisis communication in a postcrisis review, but also as a vicarious learning tool for how to plan an effective crisis response.

Following the 9/11 terrorist attacks, the belief that terrorism only happens “over there” changed dramatically. The Department of Homeland Security (DHS) was established and other government agencies were restructured in order to confront an array of threats, including nuclear activity, suicide bombers, biological weapons, and attacks on the nation’s communication systems (Wilcox & Cameron, 2006). Reallocating funds to guard against specific threats of terrorism, DHS created Centers of Excellence to “bring together leading experts and researchers to conduct multidisciplinary research and education for homeland security solutions”

(Department of Homeland Security [DHS], 2008, ¶ 1). One of these centers, the National Center for Food Protection and Defense (NCFPD), was established to address “the vulnerability of the nation’s food system to attack through intentional contamination with biological or chemical agents” (National Center for Food Protection and Defense [NCFPD], 2008a, ¶ 1). The risk communication sector of the NCFPD was assigned the task of establishing best practices for “active engagement of multiple audiences in effective risk communications prior to, during and after potentially catastrophic food bioterrorism incidents” (NCFPD, 2008b, ¶1).

Drawing primarily on the work of Vincent Covello (1992; 2003), Peter Sandman (1993), Matthew Seeger (2006), and Barbara Reynolds (2002) at the Centers for Disease Control, and on research conducted by the Risk and Crisis Communication Project (a network of risk and crisis communication scholars), the best practices were developed through a series of case studies involving crisis and risk communication that included anecdotal observations, experience in crisis response, and media analysis (Seeger). An expert panel at the NCFPD then reviewed, critiqued, adjusted, and refined the practices to a final version of the nine best practices which, since this study was conducted, has expanded to include a 10th best practice (Seeger). The nine best practices at the time of this study were classified into strategic planning (planning pre-event logistics, coordinating networks, accepting uncertainty), proactive strategies (forming partnerships, listening to public concern, being open and honest), and strategic response (being accessible to the media, communicating compassion, providing self-efficacy) (Figure). The 10th practice incorporates all strategies in the form of recommending continuous evaluation and updating of crisis plans through process approaches and policy development.

This study was part of an ongoing effort to extend and refine the DHS-NCFPD best practices model. Researchers investigated the potential for the best practices model to foster benchmarks for learning from crisis situations. Specifically, the best practices model was used to guide the postcrisis review of a bovine anthrax outbreak mitigated by the Biosurveillance Working Group, a unified cohort of veterinarians, Extension agents, and university researchers.

This study introduces the best practices model as a resource for organizational learning and crisis planning and demonstrates how the model can be used to evaluate crisis planning and response efforts.

Learning Through Crisis

Organizational crisis is defined as “a specific, unexpected, and nonroutine event or series of events that create high levels of uncertainty and



Figure. The best practices in risk communication developed for NCFPD.

threat or perceived threat to an organization's high priority goals" (Seeger, Sellnow, & Ulmer, 1998, p. 233). Despite its typically negative connotation, a crisis can also be characterized as an unexpected turning point in an organization that can have a negative or positive outcome (Fink, 1986; Gottschalk, 1993; Lerbinger, 1997; Mitroff, 1988; Ray, 1999; Seeger et al., 1998; Seeger et al., 2003; Sellnow, 1993).

As an unplanned opportunity, crisis can be viewed as a trigger point to a valuable organizational learning process (Murphy, 1996). Through the natural system of renewal, crisis can effectively purge system elements that are outdated and inappropriate and create new and unexpected opportunities for an organization (Seeger et al., 2003). This natural process has been described as an awakening. "The things we fear most in organizations—disruptions, confusion, chaos—need not be interpreted as signs that we are about to be destroyed. Instead, these conditions are necessary to awaken creativity" (Wheatley, 1999, p. 21). For some

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organizations, crisis is less a gentle awakening and more a lightning bolt as it shocks organizational systems out of complacency. By acting as a stimulus for improving the organization and by legitimizing the need for transformation, crisis prepares members of an organization for change by reducing resistance and thereby heightening consideration of alternate strategies (Lerbinger, 1997). Huber (1991) notes that “[a]n entity learns if, through its processing of information, the range of its potential behaviors is changed” (p. 88) and argues that the more an organization changes as a result of an event, the more the organization has learned.

Simply put, organizational learning is a process of detecting and correcting errors (Argyris, 1982). Learning occurs when errors are identified, shared, and analyzed. This learning experience is then used by the organization to enact changes in standard operating procedures (Popper & Lipshitz, 2000). Senge (1990) posits that organizations should adapt in response to difficulties by using feedback to “change the thinking that produced the problem in the first place” (p. 95). Prototypical learning occurs during postproject reviews in which the organization reviews a process or event to determine what procedures were successful and what procedures need to be corrected (Carroll, 1995; Di Bella, Nevis, & Gould, 1996). This review process can, and often does, involve comparing an organization’s actions against what are considered the best practices for the given context (Seeger, 2006).

Best practices as a mechanism for learning.

The identification of best practices has been associated with benchmarking (Kyro, 2004), whereby organizations seek to identify and replicate best practices of other organizations (Camp, 1989; Compton, 1992; Zairi, 1998). When used strategically, this comparison of best practices can offer optimal organizational procedures. However, if they are not continuously evaluated and improved, best practices can become outdated and detrimental (Bergman, Yassine, & Roemer, 2004). Using best practices in risk communication in a postcrisis evaluation not only tests the usefulness of the model, but also provides a learning experience and helps organizations determine how to improve future planning and response efforts.

Case studies examining failure are abundant in crisis communication literature (Baum & Oliver, 1992; Brinson & Benoit, 1999; Dacin, 1997; Englehardt, Sallot, & Springston, 2001; Hearit, 1995; Ice, 1991; Massey, 2001; Ruef & Scott, 1998; Seeger et al., 1998). By using best practices in risk communication to examine a case, organizations can evaluate their crisis response strategies as well as any pre-event procedures that may have led to the crisis.

The Anthrax Case

In October 2004, a livestock producer in Dunn County, North Dakota, discovered two head of cattle had died in his pasture. Multiple breakdowns in communication and procedure delayed the confirmation of the cause of death as anthrax. In the 2 weeks following the initial deaths—amidst confusion, contamination concerns, and confidentiality leaks—the producer lost a total of 15 head of cattle (Rafferty & Donovan, 2004), which is the equivalent of almost \$20,000 (United States Department of Agriculture, 2006).

Anthrax is endemic in North Dakota, and the number of confirmed cases each year ranges from a couple to a couple hundred depending on the moisture levels in the ground. However, the deaths occurred in a region with no previously reported cases of anthrax. In addition, anthrax is rarely reported in the cooler months of the year. After consulting a veterinarian from the local research Extension center, the producer initially suspected a nutrition-related problem. Cattle continued to die even after being removed from the pasture. The following week, the producer called additional veterinarians and a university researcher who worked with Extension. Anthrax was then discussed as a potential cause. Because the producer was informed that the diagnostic lab would not run blood tests over the weekend, he waited until the following week to take in samples. No treatment was administered while awaiting confirmation.

The producer, concerned for his family's safety, turned to the Internet for information over the weekend. Post-9/11 reports of the anthrax terrorist attacks flooded his search results. Having no familiarity with bovine anthrax, the producer did not allow his daughter to leave the house for fear she might contract anthrax from the contaminated cattle. That same weekend, the rumor that anthrax was discovered in Dunn County had already reached an Extension meeting in a county on the other side of the state.

The state veterinarian was first notified following the Extension meeting—a full 2 weeks after the first cases were discovered. The next day, the diagnostic lab ran the blood samples and confirmed that the cattle had anthrax. The dead cattle were burned and buried, and the remaining cattle in the herd were treated. The anthrax outbreak had been contained, but the Biosurveillance Working Group responsible for the crisis response recognized there was a breakdown in communication and protocol that delayed the response.

Methods

While much of the literature dealing with crisis and organizational learning is geared toward corporations, by defining an organization as a unified cohort of decision-makers, the literature can be applied to

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universities, government agencies, and in this case, veterinarians, Extension agents, and university researchers brought together by a common goal. The Biosurveillance Working Group was established as part of a USDA Federal Relations Grant to review crisis-level livestock diseases with the stated goals of enhancing diagnostic capabilities, efficiently locating and working livestock, supporting field investigations, and improving communication.

During a Biosurveillance Working Group meeting at the USDA Animal and Plant Health Inspection Service (APHIS) office in Bismarck the following April, researchers with the NCFPD used the best practices in risk communication to guide an exploratory analysis of the anthrax case. The method was naturalistic (Lincoln & Guba, 1985) in that the researchers adopted “strategies that parallel how people act in the course of daily life” (Taylor & Bogdan, 1998, p.8). Because postproject reviews in which the organization evaluates an event to determine the effectiveness of its procedures are common in the field (Caroll, 1995; Di Bella et al., 1996), participants could feel comfortable revealing work-related information (Taylor & Bogdan).

Participants

Most participants were selected based on their involvement with the Biosurveillance Working Group. They included three Extension agents, three university researchers, three veterinarians from the state office, two veterinarians from USDA-APHIS, and one representative from Manitoba Agriculture and Food. While not a member of the Biosurveillance Working Group, the representative from Manitoba Agriculture and Food was invited to provide insight as to how anthrax cases are handled across the border. All members of the group were present either in person or via teleconference. Participation in the discussion was voluntary and the decision to participate in the study did not affect the standing of the participants in the Biosurveillance Working Group. If individuals decided not to participate, they were free to withdraw consent and discontinue participation at any time. Those participating in the discussion signed an informed consent form allowing the procedure to be recorded and studied. Permission to collect data was obtained from the relevant institutional review board.

Interview Guide

An interview guide was used to assure all aspects of the model would be discussed (Kvale, 1996). Moderators used open-ended questions that did not inhibit the participants from divulging more information than what was requested. Questions were based on the best practices in risk communication (Seeger, 2006). As each practice was introduced, the participants were asked

to relate what they had or had not done in the anthrax case that correlated with the practice. Additional inquiry was made when necessary to encourage clarification and elaboration (Spradley, 1979).

Procedures for Data Collection and Analysis

Thematic analysis techniques were used to analyze recurring themes within the data (Strauss & Corbin, 1990). The best practices in risk communication developed by NCFPD were used as the criterion-referenced, or anchored, material (Boyatzis, 1998). To analyze the data, researchers first followed Lincoln and Guba's (1985) recommendation to create a schema in notes while moderating the discussion. While the themes naturally followed the model guiding the discussion, the researchers noted each time comments reverted to a previously discussed practice. Next, away from the interview environment, verbatim transcripts and notes were carefully and repeatedly reviewed for themes relating to best practices other than those being discussed at that time so as to determine relationships among the themes (Glaser & Strauss, 1967). The transcripts and notes were then reviewed for barriers to the best practices. In each segment, the researchers looked for negative comments referencing the practice. For example, if participants listed reasons why they could not have adhered to that particular practice in the anthrax case, those reasons constituted a barrier to accepting that practice. Lastly, to ensure the reliability of this process, a research assistant analyzed the notes and 20% of the transcripts to determine if the same relationships and barriers were found in the data. The researchers and the assistant agreed upon each occurrence of the themes in the sample data.

Results

The discussion followed the order depicted by the DHS-NCFPD model (Figure). The findings indicate the Biosurveillance Working Group recognized the presence of the best practices in risk communication. As each practice was introduced, the participants were able to relate what they had or had not done in the anthrax case with regard to each practice. Discussion time was evenly distributed among the three broad categories of strategic planning, proactive strategies, and strategic responses. The discussion regarding strategic planning was more holistic in that as the participants discussed planning pre-event logistics, coordinating networks, and accepting uncertainty, they consistently referred to the other categories, demonstrating the connectivity of the three practices. While references were made to other practices throughout the discussion, the connectivity of the practices was not as prominent as it was during strategic planning discussions.

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Accepting uncertainty, listening to public concern, and being accessible to the media were not initially seen as priorities for the test group. Discussion regarding the presence of uncertainty was followed by discussion about how to remove uncertainty from the process. The discussion pointed to uncertainty as a barrier in the flow of communication for the Biosurveillance Working Group. Listening to public concern and being accessible to the media were discussed secondarily in that the most essential task at hand was dealing with the outbreak rather than what people were saying about the outbreak. The other practices were discussed without negative comments.

Throughout the discussion, three themes emerged as barriers to the best practices in risk communication: a) lack of education on the process of disease mitigation, b) ambiguity in the acceptable communication protocol, and c) fear of repercussions based on action or inaction following a trigger point. While other barriers were discussed, including short response time and geographical distance, these barriers were not seen as surmountable by adhering to best practices or enhanced communication protocols and are therefore outside the realm of this study.

Pre-Event Logistics

In discussing pre-event logistics, participants sought to determine the trigger point to activate disease mitigation procedures. Discussion revealed that individuals within the mitigation network recognized different triggers, depending on experience with a particular disease in a geographic location. Participants did not agree on a single trigger point and recognized a need for education on determining trigger points in enacting the mitigation process. A veterinarian commented about why a producer might not contact a veterinarian when needed: "That would probably be lack of awareness of what may be going on in the area or lack of awareness of what the symptoms are." Participants described Extension agents as essential to the education system that ensures producers are aware of potential diseases in the area. However, the Extension agents participating in the discussion stated they were unaware of the trigger points.

A major barrier identified in establishing a predetermined trigger point was that there was no protocol to follow in the case of a disease outbreak, and if a protocol did exist, those involved in the mitigation process were not aware of it. A university researcher commented:

That was one question we asked of the Extension director, and his response was, you give us a protocol to follow, and that's what the agents will do.... If we had the same trigger points that we just listed here, and that went into a protocol to Extension agents, whether they

were nutritionists, Extensionists, or veterinarians, or whatever, that might help.

As the discussion progressed, the state veterinarian produced a book of statutes explaining which diseases should be reported to state and federal veterinarians; however, the participants stated that they were unaware of the statutes.

Coordinating Networks

Participants associated the coordination of networks with establishing pre-event logistics. Participants felt that the communication protocol in the disease mitigation process was ambiguous, in that multiple routes of communication could be taken from the producer to the state veterinarian, including routes through local veterinarians, free veterinarians, multiple individuals within Extension services, and technicians at the diagnostic lab. Because some producers in remote areas do not have a veterinarian within a 150-mile radius, multiple people may be contacted and crucial time may be lost before a disease is diagnosed. The participants viewed the multiple communication routes as a barrier to mitigating the disease quickly. A university researcher commented, "They [the veterinarians] may be, oftentimes, a long ways away. Therefore, you get more people in that, just by necessity, there are more people that get involved and muddy up the chain." In assessing this particular anthrax case, another university researcher stated:

I don't think there was any flow. I think it was just a haphazard combination of people being visited..... I'm not trying to be negative, I'm just saying, I think that compilation of contacts is not in an organized manner.

The producer must start the mitigation process by following one of the routes of communication within the established networks. However, the participants were concerned that fear might inhibit producers from reporting a disease. A veterinarian said:

I was just going to say, maybe, when we are talking about other things that might inhibit people from reporting previously, and I think fear might be part of that, too; in that, what if there is something truly going on here and the federal government comes along and kills all my cows because I have a highly contagious disease?

Just as fear might prevent the producer from contacting a veterinarian, so too may fear affect whether or not a veterinarian acts in the event of a potentially dangerous disease. A veterinarian said, "We've never required that the lab confirm it [a field diagnosis]; we went ahead and quarantined

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and recommended vaccinating.” Without lab verification of a disease, the producer may experience undue expenses if the veterinarian makes an incorrect field diagnosis. At the same time, a correct field diagnosis can save crucial time that would have been spent waiting for lab results. If, however, the veterinarian does not report a disease because he or she is uncertain of the severity of the situation, he or she may face repercussions. A veterinarian commented, “There, again, this is like developing something like the best management processes so that you end up being the one responsible for not having reported something.” While the participants agreed that a veterinarian must accept uncertainty at some level to determine when to report a disease, they viewed this practice as an unfortunate byproduct of a crisis.

Accepting Uncertainty

The participants also recognized uncertainty as a potential trigger point. A university researcher stated, “To me, maybe a trigger point is when you’ve got producers, the veterinarian, or anyone else involved uncertain as to what the next thing to do is. They should contact someone to help them with making that decision.” Uncertainty was also seen as a barrier in the flow of communication for the Biosurveillance Working Group by providing multiple routes of communication from the producer to the state veterinarian. One veterinarian commented that the multiple routes of communication they encourage to ease the flow of information actually increase the uncertainty in the communication process. Regardless of the Biosurveillance Working Group’s dislike for uncertainty in strategic planning, the participants did recognize that most crises inherently involve uncertainty.

Forming Partnerships

It was evident that the many different individuals involved in the process between the time the producer discovered the situation and the time word reached the state veterinarian (such as local veterinarians, veterinarian medical officers, and Extension agents) were essential in gathering the information required for mitigation. Because the producer may be unsure of the process and may be apprehensive about what could happen if a communicable disease were to be found in the herd, he or she may feel more comfortable working with local sources rather than involving the state veterinarian. When asked if a producer would contact the state veterinarian, the state veterinarian’s answer was, “It is very unlikely. Clients who call do not tell you everything. They are fearful of what might happen. I just refer them back to their local vet.” The participants agreed that without the

partnerships between individuals who the producer deems trustworthy and the state veterinarian's office, some diseases would go unreported. Once a disease has been confirmed, however, there is direct communication from the state veterinarian's office to the local veterinarian and producer. The state veterinarian said, "Rather than reporting it down through the masses and turning it into gossip, you pull it up, and then there is a decision there." The participants stated that everything is urgent to the producer, so having a short communication route helps reduce unwarranted concern.

Listening to Public Concern

The Biosurveillance Working Group did not initially consider listening to public concern to be part of its role in mitigating a disease outbreak. A veterinarian said, "Our decisions are probably not influenced by public concern because we are just doing what we know needs to be done." When it was discovered that the previously discussed producer would not allow his daughter to leave the house because he was afraid she might contract anthrax, the discussion turned to how the Biosurveillance Working Group can strengthen partnerships with public health services to provide information as to whether or not bovine diseases can infect humans. The participants expressed concern that by providing that sort of information, they would overstep their bounds and take on the role of caring for the producer's health, when their actual role is to care for the animals.

Being Open and Honest

While the participants all agreed there is no reason to hide information, the fear of inciting panic caused some to question how much to say. A university researcher commented:

It was a fear of mine in this particular case; surely, you don't want to cause panic out there. Because, do we know what panic in this particular case we're talking about? I know it went through my mind Sunday evening when I heard about it. I don't want people to panic because of the fact that we have a case here.

A veterinarian said, "You've either reported too much, in somebody's mind, or you've reported too little, and a lot of that, there again, has to do with the level of what you know about the situation." The participants became even more guarded when the media were asking questions.

Being Accessible to the Media

The participants viewed the media as a resource for disseminating essential information. A veterinarian said, "We have a responsibility to the health system to let people know immediately...quarantine or to stop

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rumors.” However, in the anthrax case, the story was not released to the media until the middle of November. In the article, the state veterinarian said she chose not to publicize the information right away in order to avoid an unnecessary scare. Being accessible to the media was not considered a priority. A veterinarian said:

Really, it is more important that you are spending all your time and effort on communicating to people you need to and not on press releases. And we’re trying to delegate that within our department so that we don’t talk to and visit with the media on the phone, and have a preplanned press release for review.

According to the Biosurveillance Working Group, the media usually want a local twist, so they contact local veterinarians or Extension agents instead of using comments from the state office. Extension agents commented that there is no guarantee media calls will be returned. No guidelines are in place for who should and should not speak to the media; however, at the time of the meeting, they had not experienced any bad publicity due to individuals responding to reporters.

Communicating Compassion

After discussing the case of the producer who feared for the safety of his family, the discussion on communicating compassion was very short. The Biosurveillance Working Group understood it was a very difficult time for the producer in question. An Extension agent stated, “These people are suffering. They didn’t necessarily bring this upon themselves. It’s a misfortune.” Neighbors are often concerned about their own well-being. The participants said they try to educate neighbors to alleviate their concerns; however, the outcome is not always positive. A veterinarian said, “It doesn’t always go the way you want, because once you give the information, you can’t control it. . . . They [the neighbors] called meetings; they had several town hall-like meetings.”

The representative from Manitoba Agriculture and Food experienced a worse scenario in another case:

It went so far as people with connected farms were not welcome to come to church. If you ever needed to go to church...when your property is populated with whatever animal disease, that’s a time when you need your church community the worst. And they were not welcome at church, and neighbors would phone up and disinvite their children to things like birthday parties because they’re farmers.

Considering the potential repercussions associated with reporting a livestock disease, the Biosurveillance Working Group indicated that it

understood why so many producers are afraid to initiate the call to start the mitigation process. The participants saw communicating compassion as an essential role, though it may not be one they are qualified to play.

Providing Self-Efficacy

The Biosurveillance Working Group discussed how giving producers something meaningful to do can help alleviate some of the fears brought on by a disease. In this anthrax case, participants found that it was best to allow the producer to communicate with neighbors as a form of self-efficacy, thereby reducing concern and backlash from neighbors and providing a learning opportunity for the surrounding ranching community. An Extension agent said, "The producer went from wanting to hide the fact that they were buying penicillin, to calling neighbors as they got more comfortable with what was happening and knew more about it." Other procedures, including cleaning and disinfecting, vaccinating, and coordinating records, were discussed. The participants also recognized how surrounding producers stepped up disease mitigation efforts, including using radio frequency identification (RFID) tags to track cattle. An Extension agent said:

Some of the producers are resisting traceability with RFIDs and those kinds of things, and this particular producer said to me, he said, after you've explained this to me, if you need somebody to speak up for the fact that we need to do a better job with RFIDs, he said, I'll be more than willing to do it. Because, he said, that's evidence that we need to be able to follow them [the cattle].

Continuously Evaluating and Updating Crisis Plans

The remainder of the discussion centered on how the Biosurveillance Working Group was going to proceed in updating the mitigation process. Suggestions were made to create a communication flow chart and a set of best practices specific to the Biosurveillance Working Group. A veterinarian commented, "I think we have a list of good ideas and possibilities we might do differently next time and prepare for it." Other suggestions included educational meetings organized by Extension agents to help alleviate uncertainty and fear. Though the best practice of continuously evaluating and updating crisis plans was not part of the discussion, the Biosurveillance Working Group embraced this practice, as was evident in the group's willingness to evaluate the crisis in order to improve its processes.

Discussion

Although the best practices in risk communication established at the time of the meeting were all discussed in this case, participants did not

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view accepting uncertainty as a best practice and did not initially view listening to public concern and being accessible to the media as priorities. The Biosurveillance Working Group repeatedly discussed how to remove uncertainty from the process and pointed to the practice as a barrier in the flow of communication. The group also determined the most essential task at hand was dealing with the outbreak, rather than dealing with what people were saying about the outbreak. Seeger (2006) contends that accepting some level of uncertainty is critical, as warnings are often needed before the full nature of the harm is known. "Organizations must demonstrate respect, concern, commitment, and aligned interests with the concerned publics" (Heath, 2006, p. 246). The state veterinarian specifically cited not wanting to create a scare as the reason why she waited to report the case to the media, but withholding information from the public actually decreases the probability that it will respond appropriately (Sandman & Lanard, 2004). Venette (2006) notes that many of the best practices are counterintuitive: "When pressure to present accurate, timely information is high, the tendencies to guard information, over-reassure the public, and deny responsibility often increase" (p. 230).

Three themes emerged as barriers to the best practices: a) lack of education on the process of disease mitigation, b) ambiguity in the acceptable communication protocol, and c) fear of repercussions based on action or inaction following a trigger point. Seeger (2006) notes, "...if information about a crisis is not shared openly by the organization engaged in the crisis, the public will obtain information from other sources" (p. 239). Sandman (2006) stresses the importance of acknowledging fear in risk and crisis: "If the crisis itself arouses fear—as it often does—the job of the crisis communicator is to help us bear our fear, and to guide the choice of precautionary actions our fear motivates" (p. 258). To address the barriers identified in the discussion and standardize communication (Bergman et al., 2004; Cohen & Sproull, 1996), the Biosurveillance Working Group intends to create a communication flow chart and a set of best practices specific to the disease mitigation process.

The Biosurveillance Working Group took part in a prototypical postproject review to determine what procedures were successful and what procedures needed to be corrected (Carroll, 1995; Di Bella et al., 1996). The discussion of the anthrax case acted as a stimulus for change (Huber, 1991; Lerbinger, 1997; Seeger et al., 2003), and the participants were strategically adaptive in learning from the failures illuminated by the discussion (Argyris, 1982; Senge, 1990; Sitkin, 1996).

Conclusions

Evaluating best practices allows an organization to learn from failures and crises by establishing alternative strategies and thereby potentially preventing future crises. When used strategically, best practices can offer optimal organizational procedures. This study suggests that the DHS-NCFPD best practices for risk communication offer a means for organizations to engage in a thoughtful and thorough postcrisis evaluation of their communication. In doing so, a crisis event can serve as a turning point, as it did for the Biosurveillance Working Group. Organizations from all genres can make use of this best practices model to facilitate positive change in response to crises.

For agriculture educators and communicators, this case study can serve not only as an example of how to use the best practices model in a postcrisis review, but also as a vicarious learning tool for veterinarians and Extension agents. We cannot assume all veterinarians, Extension agents, and university researchers understand the necessity of accepting uncertainty, listening to public concern, and being accessible to the media based on this case. Potential barriers to adhering to the best practices in risk communication have now been identified. This case demonstrates that communication is essential in disease mitigation and can be used to support education and research collaboration with veterinary and Extension services.

To prevent livestock markets around the world from plummeting due to naturally occurring livestock disease outbreaks and the potential of agroterrorist attacks, organizations within the high-risk industry of agriculture need to examine disease mitigation processes. And as our world continues to become more uncertain and complicated, other organizations should embrace the opportunities to learn by assessing past cases and the experiences of similar organizations. By evaluating a crisis using best practices as a benchmarking procedure, an organization can not only determine problems within the system, but also identify strategies that do not align with established recommendations.

Keywords

crisis communication, risk communication, organizational learning

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Digital Versus Printed Publication: Results From an Agricultural Extension Readership Survey

Jacob E. McCarthy, David K. Beede, and Annie Edgecomb

While research demonstrates that most agricultural producers prefer to receive research and other educational information in printed forms, such as newsletters and magazines, acceptance of the Internet is increasing. As publishers of the *Michigan Dairy Review* (MDR) — a quarterly, peer-reviewed Extension publication targeting Michigan dairy producers — we continually evaluate our readers' access to online information sources and their preferences for receiving information.

MDR was started in 1996 by coauthor Beede and the Michigan State University Extension Dairy Team. The publication serves as the primary communications vehicle for research findings, Extension programming, and teaching between faculty and staff in MSU dairy programs and the dairy industry and its associated businesses and agencies. This research brief summarizes major findings from a 2006 readership survey with nearly 6,000 MDR subscribers.

Methods

Printed copies of MDR are mailed quarterly to 5,800 Michigan dairy producers and allied-industry professionals. Notifications are e-mailed on the same schedule to the 165 subscribers who have opted to receive MDR electronically rather than in printed form. In spring 2006, all print subscribers received a survey in the U.S. mail, while digital subscribers received an identical survey by e-mail. The survey of 5,965 readers yielded 756 responses for a 13% response rate. Descriptive statistics were calculated using SPSS software.

Findings

- Respondents did not favor the Internet over print sources for obtaining information about their dairy businesses. More than one third (36%) of respondents said they use the Internet for this purpose very often or often, compared with 88% who use magazines, newsletters, and bulletins with the same frequency.
- Respondents expressed the least favor with downloading PDF files to read — more than half said they never access PDF files and just 6% said they do so “very often.”

Research Brief

- When given the opportunity to opt out of the printed publication in favor of e-mail updates, nearly one fourth (23%) of respondents provided an e-mail address, more than doubling the previous e-mail subscriber list.

Discussion

The most immediate change we made in response to these findings was to reduce our reliance on PDF files. While converting documents to PDF for posting online is a common and convenient method for building Web content, we recognize this practice is likely not an effective way to communicate with our audience. Making more MDR content available in HTML in addition to PDF forms was followed by an increase in Web site traffic greater than 125%.

The survey findings also encouraged us to build e-mail subscriber recruitment into our communications strategy. Inviting respondents to switch from print to digital subscription immediately more than doubled our list of e-mail subscribers, but growth of the e-mail subscriber list has since been modest. This suggests that attempts to convert print subscribers to e-mail subscribers might require periodic contact with print subscribers to give them the opportunity to switch. We plan to make this contact semiannually and expect to see the e-mail subscriber list continue to grow.

Perhaps the greatest result of this research, however, is that it demonstrates that both the printed and digital versions of MDR are relied upon by our audience of dairy producers and allied-industry professionals. This survey provided us with audience data that we used not only to strengthen our Web presence, but also to demonstrate the necessity of communicating our message through traditional media. If we wish to further expand the MDR Web presence, we'll need to keep in touch with our readers' perceptions of digital versus printed communications and continue making informed upgrades to both versions of our publication. Doing so gradually, yet actively, will help us reach all of our subscribers without favoring one group over the other.

We welcome discussions with fellow communicators about their experiences managing print and digital Extension publications. We can be contacted at mdr@msu.edu, beede@msu.edu, and mccar244@msu.edu.

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online, publishing, preference, readership

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