

ISSN 1051-0834 ©
Volume 93 • Nos. 1 & 2 • 2009

AAC

**Journal of
Applied Communications**

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

The Journal of Applied Communications

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A Semiotic Analysis of Biotechnology and Food Safety Images in *Time*, *Newsweek*, and *U.S. News & World Report*

Jenn Norwood Tolbert and Tracy Rutherford

Abstract

This study examined the photographs and photo illustrations used in Time, Newsweek, and U.S. News & World Report biotechnology and food safety stories in 2000 and 2001. Semiotic theory provided a conceptual framework for interpreting data collected through a quantitative content analysis. The evaluation of 45 images indicated that the news magazines had relatively balanced coverage of the issues. Five categories of images were determined to be used by the news magazines: food, animals, scientists or food handlers, producers, and foreign. These results are consistent with journalism research in relationship to the use of images to create perceptions and support stereotypes. Based on the results of this study, agricultural communications and journalism programs should emphasize visual media literacy. Understanding how images support stereotypes or influence public perception, rather than providing objective information, can be used to develop communications campaigns advocating a point-of-view.

So What?

Photographs have the power to persuade public opinion. This study analyzed 45 photographs from *Time*, *Newsweek*, and *U.S. News & World Report* to evaluate differences in the quantity and nature of images used in biotechnology and food safety. Communicators can use the results to evaluate their own photograph selections to accompany agriculturally-based news stories.

Introduction

The influence of media on public perception has been researched for decades by mass communication researchers. As the general population has moved away from first-hand agriculture experience, it has become more important to study the media coverage of agriculturally-based issues. Research in agricultural communications has shown that the treatment of agricultural issues by the popular press is lacking and that there is a difference in the sources used by agricultural and popular press magazines (Whaley and Doerfert, 2003; Whitaker and Dyer, 2000). These studies focused on the text of the message and did not consider the images photographs that accompanied the story.

This study examined how images were used by *Time*, *Newsweek*, and *U.S. News & World Report* in stories about biotechnology and food safety. Images create statements. When combined with text, images dominate words and are processed in the brain to create perceptions about the subject (Barry, 1997). The visual content of *Time*, *Newsweek*, and *U.S. News & World Report* communicates to the public to create or support perceptions.

A 2005 study of eye movement (Wartenberg & Holmqvist) compared designers' predictions of reader eye movement through a newspaper spread and the actual readers' eye movement data. Statis-

tical significance was found for the factors of use of color, picture type, and picture size. Interestingly, “greyscale images were seen earlier and coloured (sic) images seen later” (p. 8) than what was predicted by designers. Photographs were found to attract the reader more than information graphics, maps, or drawings (Wartnerberh & Holmqvist). Finally, large pictures were found to have shorter viewing times than what designers would predict. This study demonstrates a need to continue to study images and their influence on readers, as the results indicated significant differences in designers’ prediction and readers’ behaviors.

Frick, Birkenholz, Gardner, and Machtmes (1995) found that inner-city high school students from Midwestern states were significantly less knowledgeable about agriculture than their rural counterparts. Both respondent groups were reported to have a positive perception of agriculture; however, it was concluded that the urban population’s perception was based on something other than personal interaction with individuals employed in agriculture. It is likely that residents of larger cities and metropolitan area rely more heavily on information presented by the media. Understanding this relationship is important when considering how to educate and inform various audiences about food and agriculture.

The field of semiotics, which guides this study, was first introduced by Saussure in 1916. Semiotics was further developed by the American philosophers Charles Peirce and Charles William Morris (Chandler, 1994). Roland Barthes’ work in the field contributed to the expanded use of semiotics in cultural studies (Chandler). More recent use of semiotics theory has been in the field of mass communication. Semiotics decodes the meaning of a visual image through examination of signs. Signs are indications of how a message is communicated to the reader and are classified into three different layers. An iconic sign represents what the object is. For example, a photograph of a car would represent the actual vehicle. An indexical sign represents a meaning that is implied through the photographed object. For example, an expensive car would indicate that the owner was wealthy. A symbolic sign is when an image represents another object or idea. The same expensive car could represent luxury or affluence.

Purpose and Objectives

Biotechnology and food safety have been highly emotional and visual topics in the news. But are these portrayals objective? Or do they support a perception by the public or media?

This study evaluated differences in the quantity and nature of images used in biotechnology and food safety articles in three popular news magazines: *Time*, *Newsweek*, and *U.S. News & World Report*. Two objectives guided the study: (a) To identify and quantify the types of messages conveyed through the images used in biotechnology and food safety stories, and (b) To classify representation of the images and decode the messages conveyed.

Marks and Kalaitzandonakes (2001) evaluated the framing and agenda setting of agrobiotechnology, which includes food safety, in three US and two UK national newspapers. The findings confirmed framing bias of agrobiotechnology issues at various times, from positive in the early ’90s to less favorable following major events. This study did not include images in the content analysis, leaving a gap in the overall evaluation of agrobiotechnology.

Agricultural issues in the media

Research in agricultural communications has extensively examined the treatment of agricultural issues in the popular press. Whitaker and Dyer (2000) examined articles in *Time*, *Newsweek*, and *U.S. News & World Report*, and the top three circulated agricultural magazines—*Farm Journal*, *Progressive*

Farmer, and *Successful Farming*. One objective of the study was to determine if the sources used in a news story affect the balance of the story. The researchers reported that both the news magazines and the agricultural publications most often used sources from educational institutions (62.2%) and governmental agencies (60.8%). A contrast in source choice was identified: Agricultural sources (36.5%) were mostly used by agricultural publications while nearly all activist sources (29.7%) were cited in the news magazines.

Whaley and Doerfert (2003) sought to quantify the nature of food safety coverage by *Time*, *Newsweek*, *U.S. News & World Report*, and *Business Week*, using content analysis. This study found that stories about food-borne illnesses appeared most frequently in the magazines, and stories about technological advances, second. The most quoted sources were governmental officials.

Whaley and Doerfert (2003) wrote:

Understanding how a major mass media channel such as news magazines reports food safety and related risks can enhance the ability of agricultural communicators and university specialists to support the news industry and increase coverage of food safety-related university research. (p.18)

Both of these studies confirmed that different news organizations seek different sources and choose different angles when presenting agricultural news stories. Continuation of this line of inquiry will strengthen the application of agenda-setting and framing theories in agricultural communication.

Stringer (1999) surveyed managing editors and reporters employed at Pennsylvania newspapers. More than 70% of those surveyed considered food safety and human health to be agricultural topics, in addition to pest and disease control, farmland development, and gardening. More than 90% indicated that they considered environment, business, and water quality to also be agricultural topics. These are all issues that have been broadly covered in news magazines, but not necessarily identified as agricultural topics.

Image-based research

Zillmann, Gibson, and Sargent (1999) used an experimental design to determine if photographs exemplifying one side of an issue were more influential than descriptive images on viewer perceptions and recall. One component of the study exposed subjects to four different news story layouts about the economics of farming: no image, poor farmer, rich farmer, and both images. The respondents were asked to recall the images at a later time. They recalled the compelling photograph of a poor farmer or a danger-projecting roller coaster ride more easily than other images (Zillmann, Gibson, & Sargent).

These studies verify that agriculture-related stories should be examined for bias and evaluated for journalists' proficiency at relaying these stories to audiences. Grunig, Nelson, Richburg, and White (1988) concluded that agricultural audiences actively seek helpful information and are in turn educating themselves. There is a need to determine the influence of images related to biotechnology and food safety based on issue representation. The lack of visual studies found in agriculture communications indicates a gap in the research.

Lester (1995) quoted Walter Lippmann as saying: "Whether right or wrong...imagination is shaped by pictures seen...consequently they can lead to stereotypes that are hard to shake" (p.100).

To fully understand how images create stereotypes, it is important to understand how media messages can be interpreted.

The process of interpreting messages is an active process. Lester (1995) wrote that to find meaning within a photograph, the viewer must actively concentrate on the subject of the photograph rather than just observing the photograph. An example of concentration on the subject is found in Griffin's (2004) visual content analysis of *Time*, *Newsweek*, and *U.S. News & World Report* to compare the photographic coverage of the Gulf War, the war in Afghanistan, and the war in Iraq. He found that the most frequently used photographs were of the military, were aligned with the government's position and did not offer fresh perspectives.

Trumbo (2000) called attention to the importance of researching the visual images used to communicate scientific information. She outlined several research studies describing the lack of public understanding of basic scientific facts despite Americans access to science issues through television, newspapers, images, and the internet. Trumbo issued a challenge to evaluate how visual communication influences public understanding of science.

Huxford (2001) found that the claims of objectivity by the media were not supported by the evidence in his analysis of visual media used by the press. He wrote that the media needed to support their stories through the inclusion of pictorial representations. This need drives news media professionals to create photographs, even when the subject does not lend itself to visual portrayal. Taylor (2000) supported this idea when he wrote that the nature of news will keep the public from having an accurate visual portrayal because pictures are used to provide sensationalized images rather than the documentary style photographs that were once highly valued.

Singletary and Lamb (1984) found, through an analysis of National Press Photographers Association winning news photographs, that images containing emotion and feature photographs depicting hardship were most frequently chosen as the winning photographs. The researchers concluded that photographs cannot be seen as reality because an expectation of what a photographer should capture exists. To become an award-winning photographer, a news photographer must be able to capture emotionally charged, negative images of violence, crime, and disasters, and feature photographers must be able to capture positive images of triumph and courage.

The NPPA code of ethics is to "promote the highest quality in all forms of photojournalism." The code creates accountability for photojournalists to capture accurate and balanced images (www.nppa.org), suggesting that consumers of mass media should be able to view the images as accurate portrayals of reality.

Semiotics

Semiotics is one of the many ways image messages are evaluated to determine if they portray reality. Chandler (1994) wrote that the shortest definition of semiotics is simply "the study of signs" (para. 1). F. de Saussure and C.S. Peirce are credited as the founders of semiotics; while Roland Barthes is a leading semiotic theorist. Barthes is well known for his work in the semiotic field and is credited with bringing the concepts to the visual communication field (Chandler).

Saussure (1959) wrote that a person lives in a world shaped by decoded signs found in images, actions, words, and more that he or she has encountered. The purpose of semiotics is to become aware of the construction of reality created by those signs (Chandler, 1994). In doing this, the researcher is able to understand how the audience will decode the message, create that reality, and give insight into the culture (Bignell, 2002).

Chandler (1994) wrote that understanding messages reveals the equality of the messages that create that reality. Moriarty (1997) added to that concept when he wrote that using semiotic methodology in visual communications is ideal because the cognitive processes and interpretive processes are parallel.

Danesi (2002) found that the semiotician is concerned with what a certain structure means, how it is able to represent what it means, and why it means what it means. In image-based research, identifying these signs within a photograph gives insight into the meaning of the photograph and what that photograph will mean to the average viewer.

The application of the Saussurean model includes interpreting images through the signifier and the signified. The meaning of a sign is not contained within it, but interpreted from it (Chandler, 1994). Therefore, the signifier is the form of the sign, and the meaning beyond the form or the concept it represents is the signified. The signified can be broken down into three modes: Iconic, indexical, and symbolic (Chandler). The iconic mode is what the signifier appears to be: what it looks like, sounds like, feels like, and smells like. The indexical mode is the direct connection between the signifier and the signified; this connection may be observed or inferred. The third mode is symbolic. The symbolic mode is a “learned relationship; the signifier does not resemble the signified” (Chandler, Signs section, para 39).

Bignell (2002) explained the three modes with the example of a Rolls-Royce. The car is a material signifier, a symbol that not only communicates the make of the car, but also communicates a mental concept of value. When the average viewer sees a photograph of this car, several messages are communicated through this single image. Each of these messages is a different mode.

The iconic mode would interpret the sign (Rolls-Royce) as a car, automobile, or mode of transportation. The interpretation of the indexical mode would attach a meaningful connection, such as wealth or ownership, to the sign. Finally the symbolic mode would interpret the sign through a learned understanding, wealthy people drive expensive cars, or it may symbolize all expensive automobiles.

Deprawt (2002) used semiotics to analyze the photographic representations of the Japanese during the attack on Pearl Harbor and the representation of terrorists after September 11, 2001, in the Washington Post and the New York Times. He found that the media played a role in developing the perception of the enemy. His findings indicated that semiotic methodology provided researchers with information about the content of the images and an understanding of how the audience would interpret the image and the effect it could have on building perceptions. He reported that the news media worked with power structures to create an image of “otherness” about an adversary of the United States.

Methods

This study employed descriptive methodology and quantitative content analysis to analyze the images in the 2000 and 2001 issues of *Time* (n=10), *Newsweek* (n=16), and *U.S. News & World Report* (n=19). A semiotic analysis was employed to meet the research objectives. Bignell (2002, p. 11) wrote: “The same principles underlie the semiotic study of visual sign and linguistic signs. In each case, there is a material signifier, which expresses the sign, and a mental concept, a signified, which immediately accompanies it.”

To decode an image, it is important that the researcher understands the culture of the photograph (Chandler, 1994). The primary researcher for this study was female, Caucasian, was completing an

advanced degree, had an educational background that included photography and graphic design, and was an active photographer from a southern U.S. state. Therefore the interpretation of the signs is based on the culture of the United States.

Codes are the rules and constraints that guide the researcher in the meaning making task, as they are used in production of the meaning as well as its interpretation (Chandler, 1994). Intra-coder reliability was established through repeated measures (Leeuwen and Jewitt, 2001). The coder identified the type of message and classified all symbols based on relevant variables. She repeated the classification one week later with 90% agreement.

Semiology often involves the study of only a few images without concern for generality. The study relies on analytical integrity and interest; therefore the results of this study are not generalizable to all popular press photographic coverage of biotechnology and food safety. Semiotic theory recognizes that different researchers will interpret signs differently based on their background, culture, and experiences. Therefore the decoding of meaning may vary from the intended or encoded meaning of the image (McQuail, 2005). An apparent weakness in semiological analysis of photographs or images in a news publication is the increasing capability to digitally manipulate photographs. "They (photographs) nevertheless always retain a visual trace of what was there when the picture was made" (Rose, p. 82).

The population for this study was all published issues of three national general interest news magazines in 2000 and 2001: *Time*, *Newsweek*, and *U.S. News & World Report*. All three publications are weeklies, distributed on Monday, with circulations of 4,109,962 (*Time*), 3,125,151 (*Newsweek*) and 2,201,351 (*U.S. News & World Report*) (Bacon's, 2004). *Time*, *Newsweek*, and *U.S. News & World Report* were chosen due to their circulation and previous usage in the Whaley and Doerfert (2003) and Whitaker and Dyer (2000) studies.

Images for inclusion in the study were selected by a committee after reviewing the contents of the population. The committee consisted of two faculty members, one high school teacher, and one student. This committee represented the readership of popular news magazines: average age of 46, predominately male, and above average incomes (Journalism.org, 2007). Stories were identified as biotechnology or food safety by committee consensus. The usable sample included 45 images: 10 in *Time*, 16 in *Newsweek*, and 19 in *U.S. News & World Report*.

The story pages were scanned into a digital file and saved in Adobe Photoshop®; the images were extracted from the story and saved in a separate folder. Only images were considered and other visual elements such as non-photo graphics, graphs, and charts were not included in the study. Captions can provide information and description of an image, but the caption may also contradict the image's message (Leeuwen & Jewitt, 2001). Therefore captions were not included in the analysis. Additionally, in one specific story family members had provided images of loved ones whose deaths were attributed to mad cow disease. These photos were not taken to illustrate the story; therefore, while they offered insight into image choice, they were determined to be incompatible with the objectives of this study.

The images were classified into categories according to the main subject of the image. Categories were developed based on generally-accepted denotations in the American culture (Leeuwen & Jewitt, 2001). Categorization provided a level of generality from which numerical description of the biotechnology and food safety images used in the magazines could be extracted. The final analysis yielded five classification categories: Food, animals, scientists/research, producers/food handlers, and foreign, and three types of messages: Positive, negative, and neutral.

The researcher used semiotic methodology to gain insight into image messages communicated to viewers by looking for signs that would communicate a message to the United States populace. The semiotic analysis consisted of decoding each image by identifying its iconic, indexical, and symbolic meaning through the signs found in the image. Those signs were then interpreted to decode the message conveyed.

Results

The 45 images were first coded into message tone – positive, negative, or neutral. The images were then categorized by content to identify and quantify the types of messages. Signs within the image were used to determine whether the message was positive, negative, or neutral toward agriculture in the articles about biotechnology and food safety.

A positive message type subject evoked a positive emotional response, reinforced a positive message, or made the viewer react positively toward the subject. Positive photographs in this study included healthy, well-cared-for animals; fresh meats and vegetables; and individuals with positive expressions. For example, the man with the Brahman cow in Figure 1 appears to be moving away from the “kiss” he is receiving, but his expression does not indicate fear. Emotionally, the viewer responds to the playful tone conveyed because the man appears to be caught off-guard and does not appreciate being licked.

Neutral message types do not communicate a message due to a lack of signs, or they convey both positive and negative emotions. An example of a neutral photograph is the fish illustration in Figure 1. The image merely depicts the size difference in two salmon, but does not portray one as better than the other.

Negative message types include such things as protestors, animals in poor conditions, and frightening pictures of piles of burning beef carcasses. In Figure 1, the cow being moved by the pallet jack evokes a negative response from the viewer. The head of the cow is not distinguishable, the driver of the pallet jack appears to be keeping the cow as far away as possible, and the background of the image is dark and empty.



Figure 1. Positive, neutral, and negative photo examples

Table 1 depicts the tone of messages that the three magazines *Time*, *Newsweek*, and *U.S. News & World Report* used in their 2000 and 2001 stories about biotechnology and food safety. The image analysis revealed that *Time* and *U.S. News & World Report* used a majority of positive pictures while *Newsweek* used a majority of negative photographs. This finding is consistent with the research of Singletary and Lamb (1984); Zillman, Gibson, and Sargent (1999); Trumbo (2000); Taylor (2000); and Huxford (2001). Media are more likely to use images that can influence perceptions rather than neutral, objective images.

Table 1
Messages Portrayed in Biotechnology and Food Safety Images (N=45)

Source Category	<i>Time</i> (n=10)		<i>Newsweek</i> (n=16)		<i>U.S. News & World Report</i> (n=19)	
	n	%	n	%	n	%
Positive	6	60	6	40.0	9	47.4
Negative	1	10	8	53.3	6	31.6
Neutral	3	30	1	6.3	4	19.0

The photographs were then categorized by the researcher and committee into five categories based on the main subject: food, animals, scientists/food industry workers, producers, and foreign. Semiotic analysis was then applied to decode the messages in the images. Messages were validated by committee members.

Table 2
Categorization of Biotechnology and Food Safety Images (N=54)

Source Category	<i>Time</i> (n=10)		<i>Newsweek</i> (n=16)		<i>U.S. News & World Report</i> (n=19)	
	n	%	n	%	n	%
Food	3	30	2	12.5	5	26.3
Animals	2	20	7	43.8	6	31.6
Scientists/ Research	1	10	2	12.5	2	10.5
Producers/Food	2	20	3	18.8	2	10.5
Foreign	1	10	1	6.3	3	15.8

Food

There were ten images of food in all forms: processed, raw, and cooked. Many of these images were positive, based on their healthful appearance. Healthful appearance could be interpreted as an indexical sign meaning the food is safe to eat. Figure 2 shows packaged tomatoes, the iconic message being packaged tomatoes sold in a grocery store. The indexical sign can be interpreted as safe and healthy, based on the color, cleanliness, and packaging. Symbolically, the viewer can interpret the image to mean that tomatoes sold by this distributor are nutritious, a message learned from previous

experience. This photograph could trigger a positive response from the viewer about the subject before the article is read. Likewise, Figure 2 includes a close-up shot of what appears to be fresh hamburger meat (iconic) in a clean environment (indexical) because we only see the white paper under the meat. The meat does not have discoloration or any other visual signs that would indicate to a viewer that the meat would be unsafe to eat; therefore it would symbolize safe food.

Figure 3 indicates a different message. The Porterhouse steak is on a clean, stainless steel surface (iconic), which would be an indexical sign indicating to the viewer the meat is in a sanitary environment. However it is wrapped in yellow caution tape with the words caution do not eat (iconic). To the reader, this is symbolic of a dangerous situation, which indicates that the meat, although healthy in appearance, should not be eaten.

The other food images included extremely oversized vegetables, raw food products, and meat hanging in a meat locker as story illustrations.



Figure 2. Positive representation of tomatoes and ground beef



Figure 3. Negative representation of steak

Animals

Images classified as animal images included both live and dead animals. Some of the 15 images included people, but the subject of the photograph was always the animal. These images included positive and negative connotations. Images such as confined chickens, a shepherd hooking a lamb, and sheep without grass are examples of negative connotations. Figure 4 shows caged chickens with their heads out of the cage (iconic sign). The large number of chickens in the small amount of space is an indexical sign indicating to the viewer that the chickens are in tight quarters and are uncomfortable. American viewers may decode this as ill treatment of the chickens.

Likewise, there were images of well-cared-for animals, also seen in Figure 4. The image of a doctor holding a small pig and a man holding a lamb can be interpreted as protected from its environment (symbolic) based on the animal's position and relationship to the person. People hold things close that are important or purposeful;



Figure 4. Positive and negative representations of animals

therefore, it is an indexical sign that the animal is important and is being cared for because it is important to that person.

Other images showed animals in unnatural situations, such as being used in science experiments. The indexical signs of wires attached to the crab shown in Figure 5 lead the reader to draw the conclusion that this crab is not in its usual environment (indexical) and is probably being used in an experiment (symbolic). The photograph of the scientist with a cat depicts a woman smiling as she holds a bobcat that appears aggressive (Figure 5). The expression of the bobcat, ears forward, mouth open, teeth exposed, is an indexical sign that the animal is unhappy. The leash is symbolic for captivity. Viewers could read the message to be a negative tone concerning wild animal captivity.



Figure 5. Representations of research and experimentation

Scientists/Research

This category included five images that involved scientists or research; some of these photos were also classified as animals. The photos in this category tended to be negative based on subject placement, subject choice, and lighting. The symbol of a white coat (iconic) indicates to the viewer that the individual has a high amount of education (indexical) or works in a sterile environment (symbolic). A viewer can interpret that the white coats represent science and medical doctors. The symbol of a white coat, as shown in Figure 5, has consistently been shown through media outlets and educational materials to be worn by doctors and scientists working in labs. It can be interpreted that these are careers involving power, education, and economic advantage.

The photos classified as research displayed instruments used for measurement or collection of information. The crab in Figure 5 appears to be wired with the blue tape and visible wires; these are iconic symbols of measurement that can indicate research (indexical) while the forward ears and bared teeth of the cat and the tight line of the leash indicate confinement (indexical) and restraint of wildlife by research. The other photos showed animal embryos with metal instruments. This can be symbolically interpreted as research related to cloning, DNA, or other research requiring collection of tissue or fluid samples.

The female scientist portrayed in Figure 6 overshadows the positive interpretation by adding a symbolic sign of danger or evil through the use of red and black. Her facial expression can be interpreted as negative because she appears to be staring at the viewer with the edges of her mouth turned down — an indexical sign of unhappiness, annoyance, or disinterest.

The photograph of the man leaning over the counter, Figure 6, is somewhat difficult to analyze. Although he may be a scientist or in a field of science as indicated by the iconic symbols in the background, bottles and tools associated with a lab, he does not immediately gain viewers' attention based on his career. His stance, expression, and hand placement lead the viewer toward a mes-

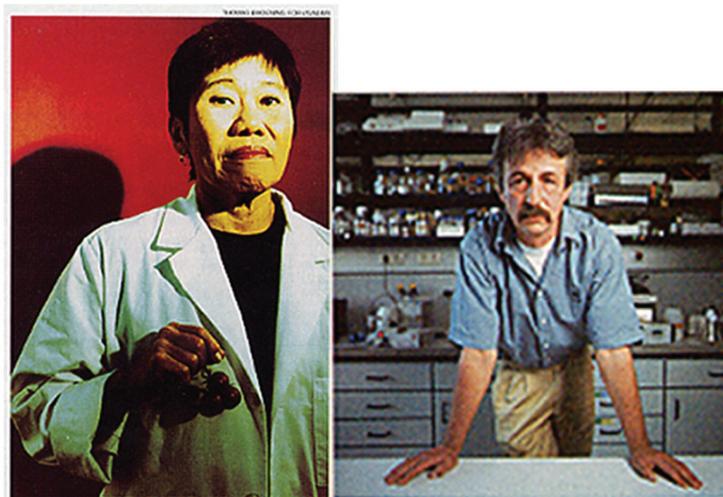


Figure 6. Images of Scientists/Researchers

sage of disinterest and confidence as he leans toward the viewer. The forward lean could be interpreted symbolically as a challenge or intimidation stance. While the iconic signs indicate scientist, the indexical signs and symbolic signs do not immediately support the iconic interpretation.

The images of scientists tended to be portrait-style photographs, as seen in Figure 5 and Figure 6. While this does not directly relate to the determination of the positive or negative value of the photograph, it could be a symbolic sign to a viewer about the importance of the individual.

Producers/Food Handlers

The workers in the meat industry were also wearing white coats, but protective items such as hairnets, gloves, and safety glasses were included. The photographs were more positive than negative based on the clean environments, the healthy color of the product, and the obvious safety measures. These indexical signs indicate to a viewer that the workers are cautious when handling food products. These images symbolically represent the safety of the food supply. Another observation was that the images of food safety workers were action shots captured while they performed their jobs inspecting or working with food, as in Figure 7. Symbolically, that image can represent the active role taken to ensure food safety.

The producer images were classified based on the inclusion of an agricultural product in the image. These images were all positive; the subjects had many similar characteristics. The subjects were all white males and were assumed to be American, based on clothing and background details. The grey hair, an indexical sign, of the subjects would lead the viewer to believe they are older individuals. Each of the subjects was dressed in protective overalls or plaid shirts with the sleeves rolled up and jeans; these can be interpreted as indexical signs for hard work and blue-collar jobs. Figure 7 illustrates an example of a producer photograph.



Figure 7. Food handlers and producers

Similar to the scientist images, all of the producer photos appeared to be posed. But in the case of these photos, the subject was obviously tied to food production: fish and corn specifically. The corn and fish were indexical signs for staples in the food supply. These are both products that are promoted as nutritionally sound components of a healthy diet. The iconic signs supporting this message are the bright colors of the product and the environment and the quantity of the product in the photo. The symbolic sign could be a safe and abundant food supply, learned from experiences of well-stocked grocery stores and product availability.

Foreign

Foreign images were classified based on qualities indicating that the photographs were taken in a country outside of the US. In four pictures, the dress and living conditions of the subjects indicate a low socio-economic status. For example a photograph of children smiling, an iconic sign, indicates they are happy. However there are holes in their clothes and they appear thin, which is an indexical sign that a viewer would link with not having a lot of money. They are standing in a tall, green field, an indexical sign that they could have a good harvest that year. Symbolically the image indicates a better future for children in other countries. The images classified as foreign in general show the people doing manual labor, such as Figure 8, which symbolizes to the reader that they are not wealthy. The other picture in Figure 8 features former British Agriculture Minister John Gummer eating a hamburger as a symbol of food safety. The iconic signs are the hamburger, Gummer, and a young girl. The indexical sign is that hamburgers are safe because Gummer and the young girl are eating them. Symbolically it again indicates a safe food supply for adults and children; the viewer does not need to be concerned about their children becoming ill.



Figure 8. Foreign agriculture

Discussion

This study found that although *Newsweek* had more negative images, while *U. S. News & World Report* and *Time* leaned more toward the positive side, all three publications were close to having balanced coverage. This is desirable since balanced news coverage is a value of the news industry. However, the number of positive and negative images does not completely reflect the messages implied to a viewer through signs and symbolism. Semiotics researchers recognize that interpretation of signs is influenced by experience and culture. When analyzed in a context other than American culture the signs could produce alternative messages.

Five categories emerged from the semiotic analysis: food, animals, scientists/food industry workers, agricultural producers, and foreign nations. The small number of categories indicates that the same types of photographs are used to illustrate biotechnology and food safety stories. Consequently, the media world that is created through the images introduced reinforces stereotypes (Potter, 2001) about agriculture, especially biotechnology and food safety issues.

For example, because of the time frame of this study and the topic of food safety, an abundance of images were extracted from stories about mad cow disease. These images included burning beef carcasses, a headless cow being moved by a pallet jack, and a motherless family. These images are

graphic and call for an emotional response from the reader. The images consistently communicate the same messages about mad cow disease before the viewer reads the article.

The Zillmann, Gibson, and Sargent (1999) study found that compelling photographs, especially danger-projecting photographs, are more easily recalled and shape viewers' perception more so than non-compelling photographs. The use of negative images will shape viewers' perceptions more so than neutral or positive images. Therefore, photographers and journalists should be held accountable for objectivity not only in reporting, but also in photograph selection.

This research supports Trumbo's (2000) view that it is important to research visual images used in stories about scientific information. Images are encoded to elicit a response from the reader. The decoding of the message, without corresponding factual information, may result in misinterpretation of the image. Therefore continuing to build the knowledge base of visual literacy will provide more detail to be applied in photography and graphic design.

Another observation was the semiotic signs used in the images. Iconic, indexical, and symbolic signs were found in the images and were utilized to create image categories. These signs communicated messages, positive and negative, to the audience about the agricultural issues. Although some would say that meaning is made from a photograph only if the viewer is actively reading it (Lester, 1995), this research found deliberate use of signs to convey specific messages, as demonstrated in the steak with caution tape illustration and the pallet jack moving the cow carcass. This information would have the most impact on the reader and, as the Zillmann, Gibson, and Sargent (1999) study found, be what the viewer remembers and uses to form their opinions.

These findings indicate that even when a content analysis portrays balanced photographic content, additional reading of the image may present a contradictory message. Therefore, a photograph should not be judged by first glance, but read with a deeper purpose. The messages that these images convey have a much greater impact on public opinion related to an issue.

This study found that there is a need for photographers to have more knowledge about the subjects that they are shooting. Their knowledge and understanding of the subject may directly impact the ability to foresee messages created in their images. Therefore, it would benefit the agricultural communications and journalism field if students were trained in photographic technique and visual image interpretation. This type of study would produce more media-literate graduates who can influence future image production.

Developing visual literacy allows individuals to understand how images impact their perception of issues. As Frick, Birkenholz, and Machtmes (1995) found, inner-city students did not have experience with agriculture, so they turned to other sources for information. The media serve as an accessible source of information. Therefore, unless consumers become media literate, agricultural communicators will make minimal progress in developing agricultural literacy.

Future research should continue to fill the gap in agricultural communications image-based research. Many studies can be found in journalism, anthropology, sociology, and communications, but agricultural communications has not entered this research arena. Visual communication research provides another tool for understanding perceptions, media influence, agricultural portrayal, and more.

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Keywords

photographs, news magazines, semiotics, biotechnology

References

- Bacon's Media Directory (52nd ed.). (2004). Chicago, IL: Bacon's Information Inc.
- Barry, A. S. (1997). *Visual intelligence: perception, image, and manipulation in visual communication*. Albany, NY: State University of New York Press.
- Bignell, J. (2002). *Media semiotics: an introduction*. New York, NY: Manchester University Press.
- Chandler, D. (1994). *Semiotics for Beginners*. Retrieved July 30, 2007 from <http://www.aber.ac.uk/media/Documents/S4B/semiotic.html>
- Danesi, M. (2002). *Understanding media semiotics*. New York, NY: Oxford University Press, Inc.
- Deprawt, W. (2002). *From "evil empire" to "extremism": Exploring enemy images and otherness in American news media*. Unpublished master's thesis, Georgetown University, Washington DC.
- Frick, M. J., Birkenholz, R. J., Gardener, H., & Machtmes, K. (1995). Rural and urban inner-city high school student knowledge and perception of agriculture. *Journal of Agricultural Education*, 36(4), 1-9.
- Frick, M. J., Kahler, A. A., & Miller, W. W. (1991). A definition and the concepts of agricultural literacy. *Journal of Agricultural Education*, 32(2), 49-57.
- Griffin, M. (2004). Picturing America's 'war on terrorism' in Afghanistan and Iraq: Photographic motifs as news frames. *Journalism*, 5(4), 381-402.
- Grunig, J. E., Nelson, C. L., Richburg, S. J., & White, T. J. (1988). Communication by Agricultural Publics: internal and external orientations. *The Journalism Quarterly*, 65, 26-38.
- Huxford, J. (2001). Beyond the referential: Uses of visual symbolism in the press. *Journalism*, 2(1), 45-71.
- Journalism.org (2007). *The State of the News Media 2007*. Retrieved July 30, 2007 from <http://www.stateofthenewsmedia.com/2007/index.asp>.
- Lester, P. M. (1995). *Visual communication: Images with messages*. Belmont, CA: Wadsworth Publishing.
- McQuail, D. (2005). *McQuail's Mass Communication Theory*. Thousand Oaks, CA: SAGE Publications Inc.
- Moriarty, S. E. (1997). *A conceptual Map of Visual Communication*. Retrieved November 28, 2004 from <http://spot.colorado.edu/%7Emoriarts/conceptmap.html>.
- NPPA: Code of Ethics. (n.d.) Retrieved April 6, 2005, from http://www.nppa.org/professional_development/business_practices/ethics.htm
- Potter, J. W. (2001). *Media Literacy (2nd ed.)*. Thousand Oaks, CA: SAGE Publications Inc.
- Rose, G. (2001). *Visual Methodologies*. Thousand Oaks, CA: SAGE Publications Inc.
- Saussure, F. (1959). *Course in General Linguistics* (trans. Wade Baskin). New York, NY: Philosophical Library.
- Singletary, M. W., & Lamb, C. (1984). News values in award-winning photos. *Journalism Quarterly*, 61(1), 104-108, 233.

- Stringer, S. B. (1999). *An evaluation of agricultural news sources*. Unpublished doctoral dissertation, The Pennsylvania State University.
- Taylor, J. (2000). Problems in photojournalism: realism, the nature of news and the humanitarian narrative. *Journalism Studies*, 1(1), 129-143.
- Trumbo, J. (2000). Essay: Seeing Science. *Science Communication*, 21(4), 379-391.
- van Leeuwen, T. & Jewitt, C. (2001). *Handbook of Visual Analysis*. Thousand Oaks, CA: SAGE Publications Inc.
- Wartenberg, C. & Holmqvist, K. (2005). Daily newspaper layout — designers' predictions of readers' visual behaviour — a case study. *Lund University Cognitive Studies*, (126). Retrieved August 21, 2007, from <http://www.lu.se/>
- Whaley, S. R., & Doerfert, D. L. (2003, June). *Is your food safe or scary? How U.S. news magazines communicated food safety issues, 1990-2000*. Paper presented at the meeting of the Agricultural Communicators in Education, Kansas City, MO.
- Whitaker, K. B., & Dyer, J. E. (2000). Identifying sources of bias in agricultural news reporting. *Journal of Agricultural Education*, 41(4), 125-133.
- Zillmann, D., Gibson, R., & Sargent, S. (1999). Effects of photographs in news-magazine reports on issue perception. *Media Psychology*, 1(3), 207-228.

Research Themes, Authors, and Methodologies in the *Journal of Applied Communications*: A Ten-Year Overview

Leslie D. Edgar, Tracy Rutherford, and Gary E. Briers

Abstract

The Journal of Applied Communications (JAC) has been a primary outlet of agricultural communications research and professional scholarship—a claim validated by a survey of professionals in the field. The purpose of this study was to assess ten years of JAC to determine primary and secondary research themes, frequent primary and secondary research themes by year, prolific authorship, and research methods and types reported, using a mixed-methods design. Analyzed in the study were 91 research and/or professional articles with research methodologies published from 1997 through 2006. The research identified twenty-one primary research theme areas and 28 secondary research theme areas. A compiled list of primary and secondary research theme areas and frequent themes identified by year are reported. JAC authors were identified totaling 222 contributors; Tracy Irani and Ricky Telg (13.2%) were the most prolific authors. A majority of the articles (65.9%) employed quantitative research methods, and survey methodology (47.3%) was the most common data collection measure. Research themes appear cyclic, with specific themes moving in and out of primary and secondary areas, which may contribute to research theme diversity. Research must continue to determine whether cycles exist; if cycles do indeed exist then focus should be placed on determining cycle depth and the influence on research in agricultural communications as an integrated specialization area of agricultural education. This research should be used comparatively with priority areas identified in the National Research Agenda: Agricultural Education and Communication, 2007–2010, to determine where future research might be focused.

Literature Review

Tucker, Whaley, and Cano (2003) indicated that some faculty may emphasize teaching at the expense of other valuable activities, such as research. They further indicated that “with its strong emphasis on education and teaching methods, agricultural education has probably improved the methods of instruction for agricultural communications students” (Tucker et al., p. 25). “Given the institutional demands of research, teaching, extension, and service, faculty often must allow one area to suffer to meet the expectations of another” (Myers & Dyer, 2005, p. 35). However, if research suffers, then every aspect of agricultural communications suffers with it.

A majority of agricultural communications programs are housed in university departments of agricultural education (historical designation) (Boone, Meisenbach, & Tucker, 2000); it is increasingly important for agricultural communications faculty to find ways to collaborate with and within these units while strengthening research agendas. Frequently, initiatives are made to incorporate agricultural communications courses into agricultural education programs. This course collaboration potential can create natural, logical collaborative research projects with agricultural communication

and education faculty. Often research is a determinate of one's prestige and acceptance in a discipline. Therefore, agricultural communications research must be at a level equal to agricultural education research, in order to more easily form, build, and expand collaboration efforts. However, research quality, continuity, and rigor in the discipline have been questioned (Buriak & Shinn, 1993; Dyer et al., 2003; Radhakrishna & Xu, 1997; Silva-Guerrero & Sutphin, 1990; Warmbrod, 1986).

Commentary in the *Journal of Applied Communications (JAC)* has focused on the need for creating research focus, cohesion, and goal-oriented vision (Doerfert, 2003; Tucker, 2004; Whiting, 2002). In an effort to strengthen research agendas, the National Research Agenda [*NRA*]: Agricultural Education and Communication, 2007-2010 was created as a guide for developing futuristic research (Osborne, n.d.). Yet, how can we be sure where we are headed with research, and if the direction is adequate and appropriate, if we are unclear as to where we have been?

The need for this research is grounded in previous research. Newcomb (1993) indicated that agricultural education programs should include agricultural communications courses. Knight (1984) wrote that a discipline's journals and magazines are good indicators of research priorities in the discipline. Radhakrishna and Xu (1997) found that research journal articles are indicators of the profession's scientific activity, philosophy, and application. Ball and Knobloch (2005) indicated that it is critical for practitioners to examine the knowledge base of the field to allow the profession to reflect upon actions and ultimately improve the discipline. Crunkilton (1988) identified the need for agricultural researchers to know where research can and should go in the pursuit to develop empirical knowledge. Doerfert (2003), Tucker (2004), and Whiting (2002) called on agricultural communicators and others to examine their discipline, focus research, create cohesion, and develop goal-oriented visions. Miller, Stewart, and West (2006) identified the need to review literature to maintain a clear sense of the discipline's research agenda. Baker, Shinn, and Briers (2007) indicated the need to examine core knowledge objects and knowledge domains. The expressed need to focus disciplines, examine their knowledge base, and review their literature creates a need to examine research in agricultural communications.

Rapid growth in research and publishing activities under the broad umbrella of agricultural education has resulted in enormous growth of agricultural education literature since the 1990s (Radhakrishna & Jackson, 1995), and new research outlets were created. This growth in literature has further strengthened the need for this study.

A review of literature identified little research focusing on examining the essence of agricultural communications discovery and procedures. By holistically examining the critical components of agricultural communications research, the discipline can deepen its understanding of the current state of its research and take a futuristic approach to knowledge pursuit, development, and examination. The agricultural communications discipline can examine many components: research theme areas, variety in research theme areas by year, prolifically-published authors, and types of research being conducted. If a discipline's journals are indicators of research priorities (Knight, 1984), then by analyzing research-based articles in *JAC* the agricultural communication discipline should be able to reflect on critical dimensions and needs in its research. Understanding research occurring in agricultural communications can assist the field and practice by offering insight into research breadth and depth. Agricultural communications research can impact other integrated specialization areas as outlined in the *NRA*; namely agricultural leadership, international agriculture, extension education, and teacher education. By identifying previous literary focus and determining if prior research initiatives are fulfilling research needs, agricultural communications researchers can focus future research

on areas of importance. This study assisted in creating a framework for agricultural communications by determining the experience base (previous research framework) of research reported in *JAC*.

Conceptual Framework

The future of agricultural communications depends on many variables, and application and acquisition of new knowledge via research are extremely important (Dyer, Haase-Wittler, & Washburn, 2003). Yet, the quality of research in agricultural education, with the inclusion of agricultural communications, has been questioned for more than two and one-half decades, and in some cases it has been identified as inferior to other disciplines (Buriak & Shinn, 1993; Dyer et al., 2003; Radhakrishna & Xu, 1997; Silva-Guerrero & Sutphin, 1990; Warmbrod, 1986).

The conceptual framework of the study (Figure 1) was grounded in previous work by scholars from integrated specialization areas supporting the big umbrella of agricultural education. Several researchers have completed various components of journal analysis in agricultural communications and agricultural education: familiarity and quality of journals and importance of faculty publishing (Miller et al., 2006; Radhakrishna, 1995; Radhakrishna & Jackson, 1993); research theme areas (Buriak & Shinn, 1993; Dyer et al., 2003; Edgar, Edgar, Briers, & Rutherford, 2008a; Miller et al., 2006; Moore, 1991; Radhakrishna & Xu, 1997; Silva-Guerrero & Sutphin, 1990); prolific authors (Harder & Roberts, 2006; Radhakrishna & Jackson, 1995; Radhakrishna, Jackson, & Eaton, 1992); and statistical methods used (Bowen, Rollins, Baggett, & Miller, 1990; Dyer et al., 2003; Mannenbach, McKenna, & Pfau, 1984).

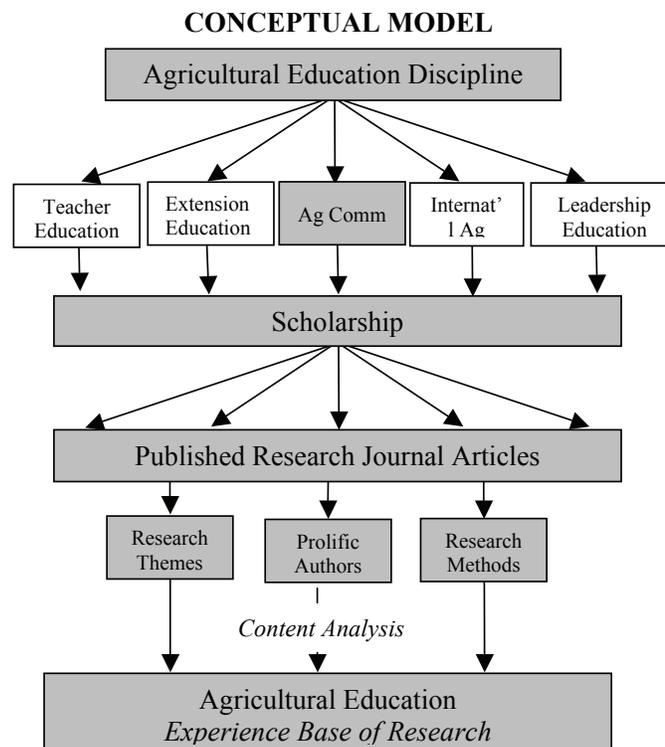


Figure 1. Conceptual base of the study.

This study examined research articles and professional articles with research methodologies published in *JAC* from 1997 to 2006. Using a content analysis approach, the study assessed primary and secondary research theme areas, authorship, and research methods and designs. This research is a step in identifying a research experience base (previous research) in agricultural communications, using the premier agricultural communications journal, as identified in a field study (Edgar, Rutherford, & Briers, 2008b). Conceptually, this research examined agricultural communications' current research role. The experience base from this research can be used as a framework to suggest future research strategies in agricultural communications.

Purpose and Objectives

The purposes of this study were to review research published in the *Journal of Applied Communications* from 1997 to 2006 and to examine the historical record of the journal to provide a base from which to direct future research. *JAC* is a research journal with authors who are teaching-based as well as practitioner-based. The specific objective was to describe and synthesize published research in *JAC* during the ten year period by (a) identifying primary (knowledge-base) and secondary (conceptual-base) research themes in published research articles; (b) identifying primary and secondary research theme areas among research articles published by year; (c) identifying the most prolific authors; and (d) identifying research methods and designs.

Research Methods and Procedures

This study employed a mixed-methods content analysis design. Content analysis as a research method has existed for decades, and the best content-analytic studies employ mixed-methods methodology (Weber, 1990). Content analysis can be used to give researchers insight into problems or hypotheses that can then be tested by more direct methods. Content analysis is a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Berelson, 1952; Krippendorff, 1980; Weber, 1990).

Content validity was maintained using both previous research as a guide and a field study to focus the research. Baker, Shinn, and Briers (2007) identified 104 individuals as active agricultural education research authors. A field questionnaire was developed and sent to 96 of those authors with valid email addresses. The contacted authors were asked to identify premier journals in agricultural education specifically in the integrated specialization areas that support the discipline (agricultural leadership, agricultural communications, international agriculture, extension education, and teacher education) and to validate or add to research theme categories. Research theme categories were created based on previous content analyses of journals in agricultural communications, teacher education, leadership education, international agricultural education, and extension education. These categories were provided to the pilot study, and it was the respondents' responsibility to compress or expound on research theme areas. The pilot study identified 37 research theme areas for the five specialization areas identified in the *NRA*.

Dillman's Tailored Design Method was implemented (Dillman, 2000), and 62 of 94 possible respondents completed the questionnaire, yielding a 66% response rate. Sixteen of the 62 field questionnaires were returned blank or partially completed and represented non-useable responses. Non-response error was controlled by comparing early to late respondents (Lindner, Murphy, & Briers, 2001). T-tests indicated no significant differences between the early and late respondents.

Research journal articles and professional articles with research methodologies from 1997 to 2006 in the identified journal, the *Journal of Applied Communications*, were used as the frame for the

study. The main focus of each article (knowledge-base) was coded as the primary research theme area. The most prevalent supporting theme (conceptual-base) was identified as the secondary theme of each article. The principal investigator and a peer independently reviewed the material and formed a checklist of information required during the review of each journal article. The researchers compared notes and reconciled differences on their initial checklists via negotiations. Researchers used a consolidated checklist to independently apply coding. The researchers then checked for agreement in coding; if reliability was not acceptable (researchers coding all content with at least 70% accuracy), then the previous steps were repeated. Once reliability had been established, the coding was applied on a large-scale basis. The final stage was a periodic quality control check (Weber, 1990). Inter-coder reliability was completed, and researcher coding was assessed using at least 10% of each researchers previously analyzed articles. Final reliability was calculated using a random sample of 5% of the analyzed articles. Reliability was assessed using Spearman's rho. Reliabilities met or exceeded the minimum standard of .70 (Bowen et al., 1990; Tuckman, 1999).

Findings

The *Journal of Applied Communications* was identified in the field study as a premier research journal by 41% of respondents. All research articles and professional articles with research methodologies published (N = 91 articles) in *JAC* from 1997 to 2006 were analyzed. Primary research themes identified in *JAC* are shown in Table 1. The research identified 21 primary research themes from the ten-year content analysis. The most frequently identified primary research theme was information sources and technology (23.1%). The second most frequent primary research theme was communications management, identified in 14.3% of the *JAC* research articles. Additional primary research theme areas are identified in the table.

Table 1
Primary Research Themes Identified in the Journal of Applied Communications 1997–2006
 (N = 91)

Research Theme	f	%
Information Sources and Technology	21	23.1
Communications Management	13	14.3
Communications of Scholarship (research methods & models)	9	9.9
Biotechnology Communications	6	6.6
Media Relations	6	6.6
Distance Education	5	5.5
Accountability	3	3.3
Consumer/Audience Response and Analysis	3	3.3
Curriculum and Program Development	3	3.3
Electronic Media	3	3.3
Food, Agriculture, Natural Resources, Health, and Family	3	3.3
Institutional Organization and Institutionalization	3	3.3
Critical Thinking	2	2.2
Framing	2	2.2
Professional Development	2	2.2
Risk and Crisis Communications	2	2.2
Agriculture Literacy	1	1.1
Instructional and Program Delivery Approaches	1	1.1
Policy Issues	1	1.1
Processes, Principles, and Styles of Learning	1	1.1
Volunteer Development and Leadership	1	1.1

Secondary research themes identified in the *JAC* are displayed in Table 2. The research identified 28 secondary research theme areas. The most frequently identified secondary research theme was food, agriculture, natural resources, health, and family (14.3%). The second most frequent theme was information sources and technology, identified in 11.0% of the research articles. Additional secondary research theme areas are identified in the table.

Table 2
Secondary Research Themes Identified in the Journal Applied of Communications 1997–2006
 (N = 91)

Research Theme	<i>f</i>	%
Food, Agriculture, Natural Resources, Health, and Family	13	14.3
Information Sources and Technology	12	13.2
Communications Management	6	6.6
Communications of Scholarship (research methods & models)	4	4.4
Diversity (culture, ethnicity, gender)	4	4.4
Institutional Organization and Institutionalization	4	4.4
Media Relations	4	4.4
Needs Assessment	4	4.4
Skill Development and Competencies	4	4.4
Accountability	3	3.3
Consumer/Audience Response and Analysis	3	3.3
Distance Education	3	3.3
Globalization and Internationalization	3	3.3
Instructional and Program Delivery Approaches	3	3.3
Perceptions and Attitudes Assessment	3	3.3
Writing	3	3.3
Academic Programs	2	2.2
Funding (resource development/needs)	2	2.2
Policy Issues	2	2.2
Agriculture Literacy	1	1.1
Appropriateness of Education	1	1.1
Career Development and Assessment	1	1.1
Community Development and Leadership	1	1.1
Curriculum and Program Development	1	1.1
Framing	1	1.1
Graphic Design	1	1.1
Leadership Development	1	1.1
Risk and Crisis Communications	1	1.1

The research identified research theme by year to determine movement/importance of literature by specific year. Table 3 identifies most frequently-occurring primary research themes by year. Number of research articles by year, theme details, frequencies, and percentages can be seen in the table.

Table 4 outlines frequently used secondary research themes, identified in the *JAC*, by year. Number of research articles by year, theme details, frequencies, and percentages can be seen in the table.

Table 3
Most Identified Primary Research Themes in the Journal of Applied Communications by Year
(N = 91)

Year	Research Theme	<i>n</i>	<i>f</i>	%
1997	Information Sources and Technology	14	4	28.6
1998	Institutional Organization and Institutionalization	9	3	33.3
1999	Information Sources and Technology	10	2	20.0
2000	Communications Management			
	Communications of Scholarship			
	Communications Technology (3-way tie)	12	2	16.7
2001	Information Sources and Technology	8	4	50.0
2002	Distance Education	6	2	33.3
2003	Information Sources and Technology	5	2	40.0
2004	Communications Management	11	3	27.3
2005	Critical Thinking			
	Information Sources and Technology (2-way tie)	12	2	16.7
2006	Accountability			
	Communications Management			
	Food, Agriculture, Natural Resources, Health, and Family			
	Framing (4-way tie)	4	1	25.0

Table 4
Most Identified Secondary Research Themes in the Journal of Applied Communications by Year (N = 91)

Year	Research Theme	<i>n</i>	<i>f</i>	%
1997	Institutional Organization and Institutionalization			
	Diversity (culture, ethnicity, gender) (2-way tie)	14	2	14.3
1998	Food, Agriculture, Natural Resources, Health, and Family			
	Information Sources and Technology (2-way tie)	9	2	22.2
1999	Information Sources and Technology	10	3	30.0
2000	Food, Agriculture, Natural Resources, Health, and Family	12	3	25.0
2001	Food, Agriculture, Natural Resources, Health, and Family	8	2	25.0
2002	Academic Programs			
	Globalization and Internationalization			
	Institutional Organization and Institutionalization			
	Media Relations			
	Perceptions and Attitudes Assessment			
	Skill Development and Competencies (6-way tie)	6	1	16.7
2003	Communications Management	5	2	40.0
2004	Communications Management			
	Information Sources and Technology (2-way tie)	11	2	18.2
2005	Food, Agriculture, Natural Resources, Health, and Family			
	Funding (resource development/needs)			
	Information Sources and Technology (3-way tie)	12	2	16.7
2006	Career Development and Assessment			
	Food, Agriculture, Natural Resources, Health, and Family			
	Framing			
	Skill Development and Competencies (4-way tie)	4	1	25.0

Prolific authors from *JAC* research articles and professional articles with research methodologies were identified and are listed in Table 5. No distinction was made between lead and supporting authorship. There were 222 authors (duplicated count) identified in the 91 analyzed *JAC* articles. Tracy Irani and Ricky Telg were identified as the most prolific authors in the journal, authoring or co-authoring 12 of the 91 analyzed articles (13.2%). Three of the four most prolific *JAC* research authors are from the University of Florida. Additional prolific *JAC* authors (authoring three or more research articles from 1997 to 2006) are identified in the table.

Table 5
Prolific Research Authorship in Journal of Applied Communications 1997–2006
(*N of Authors = 222, N of Articles = 91*)

Authors	Institutional Affiliation	<i>f</i>	% of Authors	% of Articles
Irani, Tracy A.	University of Florida	12	5.4	13.2
Telg, Ricky	University of Florida	12	5.4	13.2
Lundy, Lisa K.	University of Florida	6	2.7	6.6
Tucker, Mark	Purdue University	6	2.7	6.6
Boone, Kristina M.	Kansas State University	5	2.3	5.5
Ruth, Amanda M.	University of Florida	5	2.3	5.5
Evans, Jim F.	University of Illinois	4	1.8	4.4
Cartmell, Dwayne D., II	Oklahoma State University	4	1.8	4.4
Banning, Steve A.	Bradley University	3	1.4	3.3
Richardson, John G.	North Carolina State University	3	1.4	3.3
Sitton, Shelly P.	Oklahoma State University	3	1.4	3.3
Whaley, Sherry R.	University of Georgia	3	1.4	3.3

Research methods used by *JAC* authors were identified. Quantitative research methods were the most common at 65.9% (60 out of 91 articles), followed by qualitative in 22.0% (20 out of 91 articles); the least often used research methods were mixed (qualitative and quantitative) methods (12.1%; 11 out of 91 articles). Research designs used in the 91 analyzed articles published in *JAC* are outlined in Table 6. Surveys were the most frequently used research design (47.3%). Content analysis research was used in 15.4% of the published research. Additional research designs and procedures, in *JAC* research articles, are identified in the table.

Table 6
Research Method Designs Used in the Journal of Applied Communications
1997–2006 (N = 91)

Method Type	<i>f</i>	%
Survey	43	47.3
Content Analysis	14	15.4
Case Study	9	9.9
Interviews	6	6.6
Evaluation	4	4.4
Historical	4	4.4
Experimental	3	3.3
Correlation	2	2.2
Open-ended Questions/Reflections	2	2.2
Surveys and Interviews	2	2.2
Ex Post Facto	1	1.1
Survey and Focus Group	1	1.1

Conclusions

The *Journal of Applied Communications* was identified as a premier journal for reporting agricultural communications research (Edgar et al., 2008b). Research in *JAC* is adding to the scope and diversity of discovery occurring in the field. In the published articles a variety of research theme areas was seen. The breadth of research theme areas identified appears to contribute a lack of continuity in discovery, with 21 research themes identified as primary and 28 as secondary in the 91 analyzed articles. The theme “information sources and technology” was identified as the most frequent primary research theme area. Investigations focusing on food, agriculture, natural resources, health, and family were the most frequently identified secondary research theme areas. Research themes were cyclic, moving between primary and secondary, and moving out of primary and secondary for a time before cycling back in. An example of this phenomenon is the theme area “information sources and technology.” It is seen as the most frequent primary research theme in 1997, the most frequent secondary theme in 1998 and, again, as the most frequent primary theme in 1999, 2001, and 2003. In 2004, information sources and technology was the most frequent secondary research theme, and it was seen as the most frequent primary and secondary research theme area in 2005. These apparent research cycles may be indicators of the breadth of research occurring in the field. But are they indicators of research depth? Research themes identified most frequently may be indicators of what agricultural communicators’ value in terms of research priorities.

Few researchers contribute programmatically or consistently to agricultural communications research published in *JAC*; Irani and Telg author research in slightly more than one article per year and others much less. *JAC* is a research journal with authors who are faculty and practitioner-based, and research published in *JAC* is dominated by faculty. Quantitative research employing survey methods was most prevalent in published articles. Based on research methods and designs, agricultural communications research lacks diversity of research methodologies and scope, and perhaps depth and quality—if one assumes that depth and quality are indicated by methods that move toward cause and effect relationships.

This study was an attempt to establish an experience base (previous research framework) in research occurring in agricultural communications. It is critical to create an experience base in order to complete a comprehensive and holistic examination of a benchmark, such as the *NRA*. Numerous researchers (Ball & Knobloch, 2005; Crunkilton, 1988; Doerfert, 2003; Miller et al., 2006; Tucker, 2004; Whiting, 2002) have indicated the explicit need to examine the literature in an effort to improve research. Agricultural communications is viewed by professionals in the agricultural education field as supporting the discipline; the *NRA* adds to this evidence. Therefore, every effort must be made to understand how the field of agricultural communications affects agricultural education. Furthermore, it is important for the agricultural communications discipline to know where previous research has been focused in an effort to determine where research concentration should occur in the future (Crunkilton, 1988).

Discussion and Implications

Baker, Shinn, and Briers (2007) issued a specific call to examine the knowledge domains of agricultural education. Miller et al. (2006) identified the need to review literature to maintain a clear sense of the discipline’s research agenda. Doerfert (2003), Tucker (2004), and Whiting (2002) outlined the need for creating research focus, cohesion, and goal-oriented vision. This study was an attempt to assist with each of the above identified areas. This research identified variety, perhaps excessive variety

when looking at the relatively small number of published research articles in *JAC*. Agricultural communications research may reflect a broader view as it examines elements of numerous knowledge domains. Excessive variety in research themes may be a result of agricultural communications' attempt to find its place. For more than a century, agricultural communications programs and research have struggled to find a home in academic units and research agendas (Boone et al., 2000). Agricultural communications may still be searching to find where it fits in the context of agricultural education and communications and journalism. Even though agricultural communications has existed in academic units for more than a century, the discipline still has relatively few faculty members conducting research in numerous contextual areas and knowledge bases. The relatively small number of faculty members attempting to cover the numerous research priority areas of the discipline may be adding to research breadth, but it is unclear how this variety affects discipline depth. It is also highly likely that *JAC* is not the only premier agricultural communications journal, but it was identified as a premier journal (Edgar et al., 2008b).

Furthermore, this research discovered that few researchers add consistently to the scope and diversity of agricultural communications research; authors Irani and Telg clearly led the way in published *JAC* research. Four of the six most prolific authors either work for or graduated from the University of Florida. Because researchers bring with them a variety of interests in both research topics and strategies, this finding is an important component in research stability and diversity. Research in *JAC* may be influenced by programs with research prominence (e.g., University of Florida). Would agricultural communicators benefit from prolific authors assisting graduate students, new faculty, and practitioners interested in developing, producing personal research initiatives? Can we better utilize prolific authors by highlighting their areas of expertise and using them as specialists? Would this allow us the opportunity to move from a generalist approach in examining knowledge to becoming research area (theme) experts?

Knight (1984) and Radhakrishna and Xu (1997) indicated that published research journal articles are indicators of the profession's current state. Although this research supports Knight and Radhakrishna and Xu, it also provides a note of caution and an evident need for more variety in research methodology and design in agricultural communications research. The findings of this study indicate that a majority of research in agricultural communications is survey research. Based on the research published in *JAC* there is a clear need to focus research themes while improving and diversifying methodological research strategies beyond survey research. Criticisms have been made regarding research rigor and diversity in agricultural education; agricultural communications is often grouped in this field of study, and its research may be contributing to those critiques. There is a need to engage in research methodologies to answer the "why" questions as well as the "what is." There is a need to understand if current research is adding to depth and not just the breadth of research.

In 1993, Newcomb identified a need to transform university agricultural education programs: he encouraged universities to broaden programs by offering leadership programs, extension education, agricultural communications, and international development and to add depth to teacher education programs. As faculty members in agricultural communications continue to forge new alliances and collaborate with agricultural education, it is clear that our research must be at or above the current level of research in agricultural education. This study was a first step in determining the current state of research in agricultural communications. This research attempted to outline research priorities, strategies, and designs used during the past ten years; it calls for a comparison of the identified experience base to a futuristic framework, such as the *National Research Agenda: Agricultural Education and*

Communication, 2007–2010 (Osborne, n.d.). Although research work in agricultural communications feeds into multiple communications and journalism journals, our peers and others associated with agricultural education identified *JAC* as a premier journal. If these individuals are looking at *JAC* to assess our current level of research productivity and depth of the research, would they be pleased?

Recommendations

The *Journal of Applied Communications* must expand the breadth of researchers consistently publishing articles. The Journal might create thematic issues to reduce research fragmentation; it should also increase the number of research articles for each issue. Agricultural communication as a profession and practice must continue to reflect upon those actions that ultimately improve its field. It is imperative that professionals in agricultural communications improve research methodologies while decreasing the lack of continuity in research theme areas. This study calls for future studies to examine the essence of agricultural communications and its role under the large umbrella of agricultural education. It is imperative to understand if today's agricultural communications research is adding to the depth of our "well" of research and not merely to the breadth. Our research should strive for depth, richness and impact. We must continue to deepen our "well" of knowledge and not just expand our "pool." As an area of practice, do we have the volume and quality of theoretical underpinnings and fundamental work needed to support the field as it expands its research "well"? Or do we need to continue to move deeper before we expand in width? Reflections regarding efforts to improve and diversify the discipline must continue. Additional research must be completed to continue to determine types of and changes in research theme areas. Additional theme research would assist in determining how agricultural communications research is incorporated in agricultural education and other integrated specialization areas, as well as in other disciplines and research initiatives.

A pattern appears to exist in the primary and secondary research themes identified in this study. Further research must be completed to determine the degrees of research theme cycles, meaningfulness of cycles, and how cycles affect agricultural communications both as an area of scholarship and as an area of practice. Agricultural communications researchers must diversify their research methodological portfolios to include more variety in research methods and designs. Additional research must be completed to determine the depth and rigor of survey methods used in our research. Research must continue to determine whether current research methods are serving agricultural communications and the agricultural education discipline in an effort to advance its scholarship. Further research should provide methods and standards for exceptional, rigorous research in agricultural communications.

Reflections regarding efforts to improve and integrate agricultural communications into departments or units, historically, of agricultural education must continue. Current agricultural communications research (experience base) must be compared to emerging research priorities for agricultural communications. By using a benchmark, such as the *NRA* (Osborne, n.d.), agricultural communications can better determine if previous research is supporting emerging research priority areas and to determine where adjustments must be made.

Keywords

content analysis, research themes, research methods, prolific authors, *Journal of Applied Communications*

References

- Baker, M., Shinn, G. C., & Briers, G. (2007). Doctoral content in 2010: Perceptions of U.S. scholars engaged in agricultural education. *Proceedings of the 2007 AAAE Research Conference*. Minneapolis, MN. Retrieved July 2, 2007, from http://aaae.okstate.edu/proceedings/2007/IndividualPapers/168-Baker_etal.pdf
- Ball, A. L., & Knobloch, N. A. (2005). A document analysis of the pedagogical knowledge espoused in agriculture teaching method courses. *Journal of Agricultural Education*, 46(2), 47-57.
- Ballantine, J. H. (1989). *The sociology of education: A systematic analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Berelson, B. (1952). *Content analysis in communications research*. Glencoe, IL: Free Press.
- Boone, K., Meisenbach, T., & Tucker, M. (2000). *Agricultural communications: Changes and challenges*. Ames: Iowa State Press.
- Bowen, B. E., Rollins, T. J., Baggett, C. D., & Miller, J. P. (1990). Statistical procedures used in publishing agricultural education research. *Proceedings from the 44th Eastern Region Agricultural Education Research Meeting*, 64-71.
- Buriak, P., & Shinn, G. C. (1993). Structuring research for agricultural education: A national Delphi involving internal experts. *Journal of Agricultural Education*, 32(2), 31-36.
- Burnett, C., & Tucker, M. (2001). *Writing for agriculture: A new approach using tested ideas*. Dubuque, IA: Kendall/Hunt Publishing Co.
- Cooper, B. E., & Bowen, B. E. (1989). Agricultural communications curriculum: Perceptions of Ohio State graduates. *ACE Quarterly*, 73(2), 11-16.
- Crunkilton, J. (1988). Directing future research efforts in agricultural and extension education through a matrix. *Proceedings of the National Agricultural Education Research Meeting*. St. Louis, MO.
- Dillman, D. A. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons.
- Doerfert, D., & Cepica, M. (1991). *The current status of agricultural communications/journalism programs in the United States*. Center for Agricultural Technology Transfer (CATT), Texas Tech University, Lubbock.
- Doerfert, D. L. (2003). Skate to where others are heading. *Journal of Applied Communications*, 87(4), 39-41.
- Dyer, J. E., Haase-Wittler, P. S., & Washburn, S. G. (2003). Structuring agricultural education research using conceptual and theoretical frameworks. *Journal of Agricultural Education*, 44(2), 61-74.
- Edgar, L. E., Edgar, D. W., Briers, G. E., & Rutherford, T. (2008a). Research themes in agricultural education: Future gap analysis of the National Research Agenda. *Journal of Southern Agricultural Education Research*, 58(1). Retrieved September 28, 2008, from <http://pubs.aged.tamu.edu/jsaer/pdf/Vol58/58-01-061.pdf>
- Edgar, L. E., Rutherford, T., & Briers, G. E. (2008b). Research themes, authors, and methodologies in the Journal of Applied Communications: A ten-year look. *Proceedings of the National Agricultural Education Research Meeting*, Reno, NV.
- Harder, A., & Roberts, T. G. (2006). *Seeing the forest for the trees: Authorship in the Journal of Agricultural Education*. Poster session presented at the Southern Region Agricultural Education Meeting, Orlando, FL.
- Knight, J. A. (1984). A content analysis of The Agricultural Education Magazine, 1929-1984. *Proceedings of the 15th National Agricultural Education Research Meeting*, New Orleans, LA.

- Krippendorff, K. (1980). *Content analysis: An introduction to its methodology*. Beverly Hills, CA: Sage Publications.
- Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, 42(4), 43-53.
- Mannebach, A. J., McKenna, P., & Pfau, G. (1984). An analysis of research methodology reported in agricultural education 1974-1982. *Proceedings of the 15th National Agricultural Education Research Meeting*. New Orleans, LA.
- Marti, D. B. (1979). *To improve the soil and the mind: Agricultural societies, journals, and schools in the northeastern United States, 1791-1865*. Ann Arbor, MI: University Microfilms International.
- Miller, J. D., Stewart, D. M., & West, L. M. (2006). *Themes, authors, and citations in the Journal of Applied Communications, 2000-2004*. Paper presented at the SAAS Agricultural Communications Meeting. Orlando, FL.
- Moore, G. (1991). How firm is the foundation? A look at the knowledge base in agricultural education research. *Proceedings from the 18th Annual National Agricultural Education Research Meeting*, 151-157. Orlando, FL.
- Myers, B. E., & Dyer, J. E. (2005). Attitudes, value, and preparation of university faculty and administrators for advising. *Journal of Agricultural Education*, 46(3), 35-46.
- Newcomb, L. H. (1993). Transforming university programs of agricultural education. *Journal of Agricultural Education*, 34(1), 1-10.
- Osborne, E. W. (Ed.) (n.d.). *National research agenda: Agricultural education and communication, 2007-2010*. Gainesville: University of Florida, Department of Agricultural Education and Communication.
- Radhakrishna, R. B. (1995). Core journals used by agricultural and extension educators. *Journal of Agricultural Education*, 36(4), 48-54.
- Radhakrishna, R. B., Eaton, D., Conroy, C., & Jackson, G. (1994). An empirical analysis of literature cited in the Journal of Agricultural Education. *Journal of Agricultural Education*, 35(1), 61-65.
- Radhakrishna, R. B., & Jackson, G. B. (1993). Familiarity and quality of journals and importance of faculty publishing as perceived by agricultural and extension education department heads. *Proceedings of the 47th Eastern Region Agricultural Education Research Meeting*, 40-48. Woodstock, VT.
- Radhakrishna, R. B., & Jackson, G. B. (1995). Prolific authors in the Journal of Agricultural Education: A review of the eighties. *Journal of Agricultural Education*, 36(1), 55-63.
- Radhakrishna, R. B., Jackson, G. B., & Eaton, D. W. (1992). Characteristics of literature cited in the Journal of Agricultural Education: An empirical study. *Proceedings of the 19th Annual National Agricultural Education Research Meeting*, 272-278. St. Louis, MO.
- Radhakrishna, R. B., & Xu, W. (1997). A review of subject matter topics researched in agricultural and extension education. *Journal of Agricultural Education*, 38(3), 59-69.
- Reisner, A. (1990). An overview of agricultural communications programs and curricula. *Journal of Applied Communications*, 74(1), 8-17.
- Silva-Guerrero, L., & Sutphin, H. D. (1990). Priorities for research in agricultural education. *Journal of Agricultural Education*, 31(3), 2-13.
- Tucker, M. (1996). Ferment in our field: Viewing agricultural communication research from a social science perspective. *Journal of Applied Communications*, 80(4), 25-41.
- Tucker, M. (2004). Reply to Doerfert: A call to "skate" with caution. *Journal of Applied Communications*, 88(4), 55-57.

- Tucker, M., Whaley, S. R., & Cano, J. (2003). Agricultural education and agricultural communications: Striking a proper balance in the academy. *Journal of Agricultural Education*, 44(1), 22-30.
- Tuckman, B. W. (1999). *Conducting educational research* (5th ed.). Belmont, CA: Wadsworth Group/Thomas Learning.
- Wargo, K. L. (1993). *Professional agricultural communicators' views of selected academic programs and their graduates*. Unpublished master's thesis, Ohio State University, Columbus.
- Warmbrod, J. R. (1986). Priorities for continuing progress in research in agricultural education. *Proceedings of the Southern Region Conference in Agricultural Education*. Little Rock, AR.
- Weckman, R., Withham, D., & Telg, R. (2000). *Characteristics of agricultural communications undergraduate programs: Findings from a national survey*. Paper presented at the national meeting of the U.S. Agricultural Communicators' Congress, July 24, 2000. Washington, DC.
- Weber, R. P. (1990). *Basic content analysis*. Iowa City: University of Iowa.
- Whiting, L. R. (2002). An opinion: Trends that I hope are only trendy. *Journal of Applied Communications*, 86(1), 51-53.

Student Publications' Place in the Agricultural Communication Curricula

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Abstract

Many agricultural communication or journalism programs offer publication production opportunities as a way for students to use their writing, editing, design, and photography skills. This study evaluated the curriculum and make-up of student publications produced through these agricultural communication or journalism programs. The study also described the role advisers have in handling editorial, ethical, and legal issues. Data were collected through a questionnaire sent to members of the Academic Programs Special Interest Group in the Association for Communication Excellence. Fifteen programs identified offering a student-produced publication. The majority of these publications (n = 8) were offered as a course in an agricultural communication or journalism program, while five programs developed their publications as an extracurricular activity. Once the publication was produced, only three of the publications were reviewed and critiqued by industry professionals. While no advisers were concerned with obscenity issues, eight were concerned with a code of ethics, five were concerned with censorship, and four were concerned with libel issues. Recommendations are made for agricultural communication or journalism faculty.

So What?

Student-produced publications in agricultural communication or journalism programs can pose various challenges to advisers when they handle production issues, help students build journalistic skills, and handle budget issues. New knowledge associated with the curriculum and make-up of student-produced publications within our discipline can help advisers evaluate their courses and their roles in producing the student publications.

Introduction

Curriculum for agricultural communication programs has been explored since the 1980s (Evans & Bolick, 1982; Reisner, 1990a; Reisner, 1990b). In one such study, Reisner (1990b) conducted a mail survey of 30 universities to examine program structure and curriculum requirements. The findings revealed that each agricultural communication program determined the number and type of courses offered in skills such as writing, visual, audio, advertising, planning, internships, special problems, and information systems. Hence, administrators and agricultural communication faculty throughout the country have few guidelines for comparing programs with others (Reisner, 1990b).

Studies have focused on curriculum for agricultural communication or journalism programs; however, studies have not diversified to specific courses such as a student-produced publication experience. Publication production is one such course found in these programs that allows students to use all of the aforementioned skills such as writing, photography, design, and advertising, to create, design, publish, and distribute student-produced publications. However, publication courses pose various challenges to advisers when determining their role in producing publications, building stu-

dent journalistic skills, establishing work relationships with students, and handling budget issues (Button, 1982). Advisers hired to teach and run college publications might also handle challenging ethical and legal decisions (Lodge-Kopenhaver & Click, 1978).

No studies have investigated the specific student publications produced in agricultural communication or journalism programs or the problems advisers experience when students produce these publications. Not much research has even addressed the graphic design software used for publishing or the technologies used for placing student-produced publications online. Furthermore, limited research has been conducted on the ethics and responsibilities of advising any type of college publications (Bohman, 2005). The need for agricultural communication faculty to know the variety of publication types, curriculum covered, and how advisers of student-produced publications give student ownership and handle legal and ethical issues would help them in evaluating their own publication curriculum.

Literature Review

While no other research studies have explored student-produced publications in agricultural communication or journalism programs, studies have explored the structure of college magazine curriculum, the role of faculty advisers, and ethical issues (Frangoulis, 1993; Wheeler, 1994). Frangoulis (1993) reported results from 180 schools in the Association for Education in Journalism and Mass Communication magazine division and the Association of Schools of Journalism and Mass Communication. Of the 180 schools, 147 offered magazine journalism. Sixty-three journalism departments (43%) were responsible for publishing a student-produced magazine (Frangoulis). Another study identified 40 journalism schools out of 100 schools that published a magazine (Wheeler).

According to Wheeler (1994), the magazines in the study had a frequency of either one magazine per year or one per semester. In a similar study, Frangoulis (1993) found the frequency of publication per year was 1 time (27%), 2 times (24%), 3 times (21%), 12 times (10%), 4 times (8%), 52 times (6%), 6 times (2%), or 24 times (2%). Wheeler's study also explored the organization and compensation of the magazines. Although no statistics were provided, the magazines were produced through a course offered in the journalism school or as an extracurricular activity. Students producing the magazines were offered a variety of compensation methods such as course credit or salary.

Respondents described the graphic design software programs used more than 15 years ago to design student-produced magazines. The software program used by the majority of these journalism school publications was Aldus PageMaker (74%), followed by MacDraw/MacPrint (49%), Quark Xpress (44%), Adobe Illustrator (34%), and Ready-Set-Go (8%) (Frangoulis, 1993).

In Wheeler's study (1994), 40 advisers indicated advertising, subscription fees, student fees, and endowments as sources for funding. About half of those magazines were funded through a university subsidy, general college fund, or academic budget.

Adviser Roles

Lodge-Kopenhaver and Click (1978) define adviser as someone primarily responsible for offering guidance and advice to students who operate college publications. Publication advisers also determine their role in helping to produce student publications and building students' journalistic ability when they establish a working relationship with student editorial staffs (Button, 1982). The working relationship also depends on the staff structure and positions. Although magazine staffs complete tasks such as planning, writing, and editing articles; designing and laying out spreads;

managing production of the entire magazine; selling advertisements; and making financial decisions, little consistency is common in the job titles and roles of magazine staff (Johnson & Prijatel, 1999).

Wheeler (1994) discovered a diverse editorial structure ranging from staff editors plus non-staff reporters to staff reporters who wrote and edited everything with few or no freelancers. Even though most publication staffs have a business department and advertising sales people making financial decisions, advisers are responsible for meeting the budget (Button, 1982). Advisers must also direct students in not only the writing of the publication but also in recognizing images, choosing typography, and designing (Johnson & Prijatel, 1999).

Many publication advisers play a role in not only establishing the curriculum in a course but also making ethical and legal decisions involving student-produced publications. Few journal articles have documented the role of advisers for journalism school publications, but many make suggestions for what should be done (Wheeler, 1994). However, books have suggested that advisers of student publications need a basic knowledge of ethics, libel, censorship, and obscenity (Johnson & Prijatel, 1999; Lodge-Kopenhaver & Click, 1978). In regards to ethics, it was recommended by Lodge-Kopenhaver and Click that advisers train student journalists in knowing how local and state laws affect how they report information. Advisers should explain how to handle comments on or off the record and when to use tape recorders legally and ethically.

Advisers may face the issue of censorship at a university. One responsibility of an adviser is to educate university personnel concerned with censorship (Lodge-Kopenhaver & Click, 1978). Knowledge about the First Amendment and constitutional rights of students to conduct investigations of matters that affect their communities would help in guiding editorial staffs in handling censorship questions from administrators concerned with printed material that negatively reflects on the university (Lodge-Kopenhaver & Click). Obscenities in student publications can also cause problems for advisers (Lodge-Kopenhaver & Click).

In a professional article published in the *Journal of Applied Communications*, Hays (1990) said ethical dilemmas challenge professional agricultural journalists; therefore, professors in agricultural communication need to interact more with students about the seriousness of the problem. Hays stated that “those of us who teach and advise these young men and women have an obligation to make them more conscious not only of the severity of ethics challenges they can expect to face, but also the types of challenges” (p. 10).

Advisers of student publications can guide students in writing policies that follow the standards of the professional press. Lodge-Kopenhaver and Click (1978) encouraged student publications to establish their own strong, clear editorial policy or to adopt the existing codes of ethics or editorial policies followed by the Society of Professional Journalists, the American Society of Newspaper Editors, or the Associated Press Managing Editors.

Experiential Learning

Undergraduates may enhance their learning opportunities through agricultural publication curriculum. Studies have shown that one important key to agricultural communication curriculum is giving students the chance to practice their communication skills (Cooper & Bowen, 1989; Reisner, 1990b; Sitton, Cartmell, & Sargent, 2005). Internship and publication production courses are examples of how students get these experiences through agricultural communication curriculum. Several theorists have explained this educational practice of providing real world experiences in the classroom.

Experiential learning is one research theory applied to study agricultural education and agricultural communication or journalism programs (Roberts, 2006). Dewey (1938) and Joplin (1981) focus on learners gaining understanding through experience. Dewey proposed that learning from education occurs after observation of an experience, reflection of the experience from information or advice from more experienced individuals, and the development of concepts. Experiential learning places students in realistic situations where they can more easily comprehend and apply their coursework by imitating behavior, following procedures, and then receiving feedback (Cheek, Arrington, Carter, & Randell, 1994). Brandon (2002) found that students in experiential learning environments determine how to accomplish objectives, to refer to errors for learning opportunities, to learn new skills, to receive feedback, to test new techniques and methods, and to support actions that foster learning in classroom environments.

Purpose and Objectives

The purpose of the study was to explore the curriculum and make-up of student-produced publications associated with agricultural communication or journalism programs. The study also described the role advisers serve in regards to handling editorial, ethical, and legal issues for student-produced publications. New knowledge will result relating to how agricultural communication or journalism programs teach publication production and how advisers of student-produced publications help students handle legal and ethical circumstances that they could encounter as professional agricultural communicators. Publication advisers could use the information yielded by the research to evaluate their courses and their roles in producing the student publications. The following objectives guided this study:

1. To describe agricultural communication publication courses taught in agricultural communication or journalism curriculum across the United States.
2. To describe the business and production structure of student-produced agricultural publications.
3. To describe the ethical and legal issues advisers encounter with student-produced agricultural publications.

Method

The research design for this study was a descriptive, quantitative survey to explore and describe the demographics, curriculum, and the role of advisers for student-produced agricultural publications. The target population for this study was agricultural communications professionals or faculty who were members of the Academic Programs Special Interest Group (SIG) in the Association for Communication Excellence (ACE). Researchers selected a population of active members of the Academic SIG because it provided the most complete list of academic programs available.

Data for this study were collected with a researcher-developed questionnaire consisting of 62 items. Items related to publication demographics, funding, policies, publication staff organization, course structure, adviser's role, and legal content. Due to IRB requirements, schools remained anonymous in their completion of the study. A panel of experts reviewed the questionnaire to determine validity.

The researchers implemented online survey procedures as explained by Dillman's Tailored Design Method (TDM) to accomplish a high response rate (Dillman, 2007). Recipients received a

pre-notice letter via e-mail, a cover letter with a link to a Web form through e-mail, and three reminder e-mails. The researcher made telephone calls to non-respondents for the final wave. After data collection, researchers analyzed responses to assess the reliability of the survey, resulting in a Cronbach's alpha of .688. Reliability was affected by a small population size and the use of a researcher-developed instrument that needs more testing. To conduct the study, the researchers sent the survey to 42 schools. Of those, four schools responded that they did not have a formal agricultural communication or journalism program or are not involved with the program. Of the remaining 23 respondents, 15 indicated having a student-produced publication integrated somehow into their agricultural communication or journalism curriculum. In some cases, not all 15 responded to each item due to their unique programs.

Results

Objective 1: To describe agricultural communication publication courses taught in agricultural communication or journalism curriculum across the United States

The oldest publication indicated a start date of 1894, while the youngest publication indicated a start of 2005. Only six of the publications indicated interruptions in their magazine's yearly publication, citing reasons such as "lack of student involvement" and "World War II." Of the 15 student-produced publications, eight were published two times a year, while two were published once a year, two were published three times a year, and one was continuously published online. The majority of respondents described their publications as a magazine ($n = 8$), followed by a newsletter ($n = 4$), an online newsletter ($n = 1$), or a newspaper ($n = 1$).

More than half of the publications ($n = 8$) were developed through a course offered as part of an agricultural communication or journalism curriculum, while roughly one third ($n = 5$) of the publications were created as an extracurricular activity outside of structured curriculum. While one of the publications was part of a course, many students not in the course freelanced for the publication. For the publications developed through a course, six were developed in one course, while only one was taught through a series of courses. Roughly half of the publications ($n = 7$) had prerequisite courses in place before students could work on the publication.

Advisers for nine of the student-produced publications counted the publication as part of their teaching/course load, while three advisers ran the publication as part of their appointment and administrative duties, and one adviser ran the publication in addition to their course load and appointment. No matter how they came to teach the course, advisers of the publications were covering several topics in their curriculum. Topics covered included, design ($n = 9$), writing, ($n = 9$), editing ($n = 9$), photography ($n = 8$), the publication industry ($n = 5$), and HTML/online publishing ($n = 2$).

Respondents reported numerous audiences who made up the circulation of the student-produced publications, with 10 citing faculty and staff of the institution, 9 citing students, and 9 citing alumni. Other audiences receiving the student-produced publications included government officials ($n = 5$), industry members ($n = 5$), advertisers ($n = 5$), high school students ($n = 1$), research stakeholders ($n = 1$), and foundation donors ($n = 1$).

With such a wide range of audiences, story topics covered in these student-produced publications were just as varied. Student recognition articles were published by 12 of the publications, while 11 published profile stories. Alumni stories ($n = 11$), research stories ($n = 7$), and agricultural news and trend stories ($n = 6$) were also covered heavily by these publications. Fewer student-produced publications wrote editorials ($n = 4$) and extension news ($n = 3$) (See Table 1).

Table 1
Types of Articles Covered by Agricultural Student-Produced Publications

Article Type	n	%
Student Recognition	12	85.7
Profile	11	78.6
Alumni	11	78.6
Research	7	50.0
Agricultural News & Trends	6	42.9
Editorials	4	28.6
Extension News	3	21.4

Objective 2: To describe the business and production structure of student-produced agricultural publications

To determine the production and business structure of the agricultural student-produced publications, questions asked respondents to report on staffing, development, advertising, and industry support. More than half of the publications ($n = 8$) had less than 10 students serve as the publication staff, and three publications had staffs of 16 to 20 students. In most of these publications, the staff is involved in all aspects of production. For 11 of the publications, all students write stories to be printed, and 9 take photos for publication. Eleven of the publications have students edit each other's stories, while four publications have students critique each other's photographs.

Staff positions noted in the publications included: editor ($n = 9$), managing editor ($n = 8$), design editor ($n = 6$), photo editor ($n = 5$), ad sales director ($n = 5$), copy editor ($n = 4$), business manager ($n = 2$), web editor/developer ($n = 2$), art director ($n = 1$), and circulation director ($n = 1$) (see Table 2). Advisers assigned staff positions for six of the publications, while students assigned positions for four of the publications, the agricultural communication faculty appointed positions for two of the publications, and two publications appointed positions through an editorial board or the department chair.

Table 2
Staff Positions on Agricultural Student-Produced Publications

Staff Positions	n	%
Staff Writers	11	84.6
Editor	9	69.2
Managing Editor	8	61.5
Design Editor	6	46.2
Photo Editor	5	38.5
Ad Sales Director	5	38.5
Photographers	5	38.5
Copy Editor	4	30.8
Business Manager	2	15.4
Web Editor/Developer	2	15.4
Ad Sales Staff	2	15.4
Art Director	1	7.7
Circulation Director	1	7.7
Section Editors	1	7.7
Editorial Editor	0	0.0

Respondents described how their publication is produced. Photoshop ($n = 11$) and InDesign ($n = 9$) were the two software programs used by the majority of the publications. Other software used included: Illustrator ($n = 5$), Dreamweaver ($n = 4$), Microsoft Publisher ($n = 2$), Fireworks ($n = 1$), QuarkXpress ($n = 1$), and Freehand ($n = 1$). Two publications indicated that students do not complete production and layout or it is done off campus. However, four publications are designed by student editors, three of the publications are designed by all students, and two of the publications are designed by a student graphic editor.

As indicated earlier, one publication is online; however, six publications indicated that their publication is placed online in some way. The majority of publications place the publication online as a PDF file ($n = 4$) or as HTML pages ($n = 2$). One publication indicated having a blog as part of its publishing, while one publication does podcasts.

Respondents were asked to indicate their budget for their publications. Budget was not defined but based on results that appear to mostly include printing costs. Four of the publications indicated a single-issue budget of \$1,000 to \$3,000. Budgets of \$3,001 to \$5,000 and \$5,001 to \$7,000 were reported by two publications each. Two publications indicated a budget of less than \$1,000, while two had a budget of \$9,000 or more. Six publications indicated that they received funding from advertising sales. Funding from a department, college, or university is used by nine publications, and two get funding from student fees. No publication indicated getting funding from subscriptions.

On a scale of not at all to often (1-5), respondents reported how involved the agricultural communication industry is with the students during production. A mean of 1.36 ($SD = 1.21$) was calculated from the responses. After production, three publications are reviewed and critiqued by industry professionals. Students were also involved in the critique process during the end of production; five publications indicated that students review the press proof or blue line proof before final printing.

Objective 3: To describe the ethical and legal issues advisers encounter with student-produced agricultural publications

Questions asked the respondents to indicate which legal issues concern them as instructors/advisers of student-produced agricultural publications. While no respondents indicated they were concerned with obscenity, eight were concerned with a code of ethics, five were concerned with censorship, four were concerned with libel, and two were concerned with First Amendment issues. While only one publication reported a libel issue, many discuss this issue in their curriculum. Libel is a topic covered in six of the publications' curriculum, while censorship is covered in four of the publications. Other topics covered include obscenity ($n = 3$) and the First Amendment ($n = 2$). Three of the publications do not cover any legal topics with their student staffs.

When asked if they have an editorial policy, 10 of the publications indicated yes. While many have this policy, only five publications have an advertising policy, and only two have a business policy. The majority of publications ($n = 9$) do not have a code of ethics for their publication, while nine have their own style manual.

Conclusions and Recommendations

This study examined student-produced publications in agricultural communication or journalism programs by describing the programs' publication curriculum, by determining the business and production structure of these publications, and by explaining legal and ethical issues the advisers experience in publication production. The oldest publication still in press started in the 1894, while

the youngest launched in 2005. This shows that while these publications have been a part of agricultural curriculum from the beginning, some programs without such courses are seeing the value and adding them.

Eight of the programs printed their publications two times a year, followed by two programs with publications each printed once a year and three times a year, respectively. Funding, course schedule, and student enrollment could explain why publication frequency varied greatly among the agricultural communication or journalism programs. Only one publication continuously posted material online. This finding was surprising given the number of institutions that have computer access to web design software and the affordability of maintaining a website. With less than half of the publications publishing the publication online in any manner, it is recommended that course instructors consider adding this new form of publishing into their courses. Many popular and trade magazines have developed online presences over the last 10 years (Johnson & Prijatel, 1999), and to fully teach future agricultural communicators about the magazine industry, curriculum online publishing must be included.

Publication frequency was not the only difference discovered in this study. From type and size of publication, to budgets and where funding comes from, these publications are as unique as their universities. While the majority of the publications ($n = 8$) were created through a course in agricultural communication or journalism curriculum, five publications were published as an extracurricular activity excluded from a structured curriculum. Student-produced publications created as an extracurricular activity offer one way to give students experience in writing, graphic design, and photography, although this might not be an ideal long-term solution at all institutions.

Many different audiences received the student-produced publications. Faculty and staff were included in the circulation lists of 10 publications. Students and alumni each received issues from nine of the publications studied. Student-produced publications also distributed to other audiences, including government officials, industry members, advertisers, high school students, research stakeholders, and foundation donors. University affiliated individuals are the target audiences for these publications; this could be because the article topics reflect diverse academic programs within the institutions. This finding could also be the result of the institutions trying to communicate information about their research, community service, recognition, and the agricultural industry to a target readership that is impacted by the information.

The difference in the publication and business structure of the agricultural student publications could be related to student enrollment in agricultural communication or journalism programs. The analysis of publication staffing showed that the majority of publications ($n = 8$) had less than 10 students on staff, followed by 16–20 students on staff ($n = 3$). The number of students enrolled as agricultural communication or journalism majors would impact the size of a publication staff. Agricultural communication or journalism programs with prerequisite courses in place before working on the publication would also affect the staffing size.

Selection of publication software varied greatly depending on the publication. A majority of publications produced issues using Photoshop ($n = 11$) and InDesign ($n = 9$). Publications also used other software such as Illustrator ($n = 5$), Dreamweaver ($n = 4$), Microsoft Publisher ($n = 2$), and Fireworks ($n = 1$). This finding could be due to the type of publication an agricultural communication or journalism program has selected to produce. InDesign, Photoshop, and Illustrator are software programs frequently used for publication design and layout by professionals in the industry, while Dreamweaver and Fireworks are web design software programs, which are more commonly used for

online publications. It is important to note that these courses are working to prepare students with real-world experiences by using such software.

The involvement of agricultural communication industry in the publication process is limited. A mean of 1.36 was calculated for how involved the agricultural communication industry is with students in the publication process. Additionally, industry professionals reviewed and critiqued only 21.4% of the student publications. This finding is surprising because professional feedback could help students improve their graphics, stories, editing, and proofreading. However, the lack of professional involvement could be because agricultural communicators were either not invited to participate on an advisory board or were too busy to critique a student agricultural publication. The theory of experiential learning calls for students to have the opportunity to reflect after having a concrete experience (Dewey, 1938). One way students can get a full experiential learning experience is to allow them to receive feedback and have time for reflection at several points in the production process. With 78.6% of respondents saying students edit one another's stories, it is apparent that many are using part of this model in their classrooms. However, it is recommended that advisers add another opportunity for reflection by involving industry or alumni in critiquing the publication or in the editing process.

Publication curriculum covered a variety of legal and ethical content. Six publications discussed libel, while censorship was covered by four publications. Obscenity and the First Amendment were covered by two and three publications, respectively. Past studies have indicated the need for instructors to teach ethics in agricultural communication curriculum (Hays, 1990). These publications offer a unique environment to discuss with students these issues. Advisers must take advantage of this opportunity.

Only half of the respondents were concerned with obscenity, and less than half were concerned with libel. With only one respondent indicating that it faced any of these issues in the past, it is not surprising these are not a major concern for advisers. However, it is important that advisers of these publications give these issues thought and have plans in place in case one should occur. Only 36% of publications have a code of ethics in place. Advisers need to work toward not only having editorial and advertising policies in place, but they must also be prepared for ethical and legal issues that may occur.

Future studies should continue to look at agricultural communication curriculum and how it is preparing future communicators for the ethical issues they may face. Another study should further address the issue of whether publication advising and production provide an experiential learning experience for undergraduates. Research should also continue to explore and share the current curriculum being taught at the various institutions. Many programs are growing, and many institutions have begun to start programs in agricultural communication and journalism. A current literature base is needed to help such programs develop a successful curriculum.

Keywords

magazine, student-produced publication, agricultural communication curricula, ethics

References

- Bohman, L. (2005). Freedom of the press: How university newspapers have fared in the face of challenges from students, administrators, advertisers, and state legislatures. *Brigham Young University Education & Law Journal*, 2, 231-243.
- Brandon, W. (2002). Experiential learning: A new research path to the study of journalism education. *Journalism & Mass Communication Educator*, 57(2), 59-66.
- Button, R. (Ed.). (1982). *Managing publications: A handbook for advisers*. Iowa City, IA: Quill and Scroll Foundation.
- Cheek, J. G., Arrington, L. R., Carter, S., & Randell, R. S. (1994). Relationship of supervised agricultural experience program participation and student achievement in agricultural education. *Journal of Agricultural Education*, 35(2), 1-5. Retrieved from <http://pubs.aged.tamu.edu/jae/>
- Cooper, B., & Bowen, B. (1989). Agricultural communications curriculum: Perceptions of Ohio State graduates. *ACE Quarterly*, 73(2), 11-16.
- Dewey, J. (1938). *Experience and education*. New York, NY: Simon and Schuster.
- Dillman, D. A. (2007). *Mail and Internet surveys: The tailored design method* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Evans, J., & Bolick, J. (1982). Today's curricula in agricultural journalism and communications. *ACE Quarterly*, 65(1), 29-38.
- Frangoulis, G. J. (1993, August). *How we teach magazine journalism: An analysis of today's magazine curricula. A contemporary study of magazine journalism education in U.S. colleges and universities*. Paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Kansas City, MO. Retrieved from <http://www.eric.ed.gov/>
- Hays, R. (1990). An approach to including ethics in agricultural communications teaching. *Journal of Applied Communications*, 74(2), 9-13.
- Johnson, S., & Prijatel, P. (1999). *The magazine from cover to cover: Inside a dynamic industry*. Lincolnwood, IL: NTC Publishing Group.
- Joplin, L. (1981). On defining experiential education. *Journal of Experiential Education*, 4(1), 17-20.
- Lodge-Kopenhaver, L., & Click, J. W. (1978). *Ethics and responsibilities of advising college student publications*. Athens, OH: National Council of College Publications Advisers.
- Reisner, A. (1990a). An overview of agricultural communications programs and curricula. *Journal of Applied Communications*, 74(1), 8-17.
- Reisner, A. (1990b). Course work offered in agricultural communication programs. *Journal of Applied Communications*, 74(1), 18-25.
- Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education*, 47(1), 17-29.
- Sitton, S., Cartmell, D., & Sargent, S. (2005). Developing public relations curricula in agricultural communications. *Journal of Applied Communications*, 89(3), 23-37.
- Wheeler, T. (1994). Research review: Laboratory student magazine programs. *Electronic Journal of Communication/La Revue Electronique de Communication*, 4(2-4). Retrieved from <http://shadow.cios.org:7979/journals/EJC/004/2/004215.html>

Editor Preferences for the Use of Scientific Information in Livestock Publications

Traci L. Naile and D. Dwayne Cartmell II

Abstract

Editors of monthly livestock publications were surveyed to determine their perceptions of the amount, type, and sources of scientific information used in their respective publications. The most important scientific topics to editors were animal health, management, and breeding and genetics. Editors' identification of the most important topics agreed with previously reported audience perceptions of information needs and previous studies of information provided by agricultural journals, although lower rankings of policy and worker/employee safety information contradicted the importance of magazines identified by audiences in previous studies. The importance of certain gatekeeping criteria to editors reflected the general standards of accuracy and newsworthiness found in journalism, as well as editors' perceptions of their livestock audiences' information needs. A majority of editors recommended two to four sources be used in a scientific story, with university faculty or staff, Cooperative Extension, veterinarians and the USDA identified as the top sources. The number and sources of information preferred coincided with source characteristics as criteria for using scientific information. The specific sources most preferred by editors also demonstrated the orientation of editors with other gatekeepers and the audience in selecting appropriate information for publication. Scientific information published was similar to editors' rankings of topic importance and source preferences. Scientific information was written for the average producer, and a majority of editors reported publishing scientific stories in at least one-half of issues. The depths and overall use of scientific information also supported the importance of delivering understandable scientific information to their agricultural audiences.

Introduction

Information has become one of agriculture's most valuable resources (Maddox, 2001). Information is critical to decision-making processes, and agricultural producers' demands for information have amplified with increased market instability, increased complexity in production technologies, and an enhanced need for financial planning and control (Ortmann, Patrick, Musser, & Doster, 1993). To meet their information needs, farmers and ranchers use sources of agricultural media an average of 6.2 hours per week, with one in four using media 10 or more hours per week (Harris Interactive, 2005).

The types of media and other information sources preferred by agricultural producers are as diverse as the types of agricultural production they pursue, although print sources consistently have received high rankings as information sources (Gloy, Akridge, & Whipker, 2000; Harris Interac-

tive, 2005; Maddox, 2001; Suvedi, Campo, & Lapinski, 1999). Specifically, magazines have been shown to be an important source for various types of agricultural information across demographic and socioeconomic groups (Brashear, Hollis, & Wheeler, 2000; Brown & Collins, 1978; Bruening, 1992; Gloy et al.; Harris Interactive; Jones, Sheatsley, & Stinchcombe, 1979; Maddox; Ortmann et al., 1993; Suvedi et al.). Nearly all farmers and ranchers read agricultural magazines and newspapers at least once a month, and agricultural producers ranked magazines among the most credible, timely, knowledgeable, and respected sources of information (Harris Interactive).

Agricultural audiences have long acknowledged magazines as important sources of information related to management, production practices, and policy (Batte et al., 1990; Brashear et al., 2000; Brown & Collins, 1978; Foltz et al., 1996; Ford & Babb, 1989; Harris Interactive, 2005; Jones et al., 1979; Murphy, 1960; Ortmann et al., 1993; Schnitkey et al., 1992). Specific information needs consistently recognized by farmers and ranchers include animal nutrition, animal health, markets, management, technology, and genetics and reproduction (Foltz et al.; Murphy). Much of this information could be considered scientific, defined by Agnes et al. (2003) as “based on, or using, the principles and methods of science” (p. 1275).

Gatekeepers determine the type, usefulness, and sources of agricultural information reaching farmers (Shoemaker, Eichholz, Kim, & Wrigley, 2001). Lewin (1947) originally identified gatekeepers as people through which information or goods must pass, who in turn influence the flow of ideas through society. Today, gatekeeping in the media is described as a process or series of decision points through which numerous messages are shaped into the few that are transmitted by news media (Shoemaker et al.). That process includes reporters, editors, news executives, and managers (Dimmick, 1974), who face a variety of influences on their decisions.

Studies of gatekeepers have demonstrated that their decisions are influenced by age, education, organizational position, relations with colleagues, personal values, community integration, publisher attitudes, and the routines of news work (Donohew, 1967; Johnstone, Slawski, & Bowman, 1972; Shoemaker et al., 2001; White, 1950). Organizational forces often have more influence on gatekeeping decisions than individual forces (Shoemaker et al.), with editors and publishers making final decisions about information that reaches the public. The potential influence of organizational culture and perceptions on editors' decisions makes it imperative that editors are in tune with audiences' perceptions of their needs (Donohew; Trotter, 1975).

In the magazine industry, the influence of the editor as a gatekeeper may be particularly strong, as magazines typically have smaller staffs than newspapers. This is particularly true with agricultural publications (Fowler & Smith, 1981). Magazine editors also tend to be more cognizant of what information they want a specialized magazine audience to receive (Fowler & Smith), which makes magazine editors an ideal subject for use in gaining insights into perceptions about the use of specific information for selected audiences. Those insights then can be used to refine the media's role in inducing images, perceptions of reality, and individual uses of information (Wiegman, Gutteling, Boer, & Houwen, 1989).

This study sought to determine the use of scientific information in monthly livestock magazines to assist editors, writers, and sources of scientific information in coordinating an efficient flow of information from scientific professionals to livestock producers. For this purpose, scientific information was defined as information derived directly from a scientific research study or formal experience, or from professional training conducted by parties in either the public or private sector. The study was guided by four objectives:

1. Determine the importance of selected scientific topics to editors of livestock publications.
2. Determine gatekeeping criteria editors of livestock publications used to determine the use of scientific information.
3. Determine editors' preferences for the use of sources of scientific information.
4. Determine editors' perceptions of the amount, type, and sources of scientific information published during one complete volume of their respective publications.

Methods

Editors of monthly magazines registered as 2005 publication members of the Livestock Publications Council and those publishing more than six issues per year were selected for this study. The population size was 54 editors, and a census was used due to the small population size.

Descriptive survey methodology was used to determine the use of scientific information in livestock publications. Survey responses were obtained using a Web-based questionnaire designed according to the principles of the Dillman Tailored Design Method (2000). Questions were adapted from a survey of daily newspapers by Cartmell (2001) and a literature review of sources of information preferred by agricultural producers. Information collected using the survey included editors' rankings of gatekeeping criteria; preferences for sources of scientific information; topics of and sources used for scientific information; depth of scientific information published; frequency of publication of scientific information; and demographics related to personal characteristics, career experience, and publication characteristics.

Types of questions included ranked items, multiple choice, numeric, and scaled items. Two scales ranging from one to five were used. For the first scale, one indicated broad scientific information with few details was included in stories, and five indicated a significant amount of scientific information was included in stories. Three served as a midpoint at which technical information included in stories was written for the average producer. For the second scale, one indicated scientific stories were published two times or fewer, and five indicated at least one scientific story was published in each issue of the publication. Three was a midpoint at which scientific stories were published in approximately one-half of issues.

A panel of experts reviewed the survey instrument to establish face and content validity. In addition, the survey instrument was pilot tested using editors of weekly livestock publications that were 2005 publication members of the Livestock Publications Council. Pilot test data were used to calculate a Cronbach's alpha of 0.86 for scaled items.

Editors initially were contacted via telephone during a three-day period during a normal work week. Editors who verbally agreed to complete the survey were sent a personalized e-mail on the day of the call further explaining the survey and providing the link to the survey. A personalized e-mail reminder was sent to editors seven days after the initial phone calls, and the data collection period ended three weeks after the initial phone calls. Thirty-nine responses were obtained during the data collection period for a response rate of 72 percent.

Nonresponse error was controlled for by comparing the characteristics of early and late respondents to the survey, using the later 50 percent of respondents as the late respondents (Lindner & Wingenbach, 2002). No differences in the means of selected items were found between the early and late respondents.

Quantitative data were analyzed using the Statistical Package for Social Sciences 11.0 for Mac OS X. Descriptive statistics, including means, standard deviations, modes, ranges, frequencies, and percentages, were used to interpret the data and describe the editors' responses.

Findings

The importance of scientific topics to editors

Editors (N = 39) ranked the relative importance of 14 scientific topics from a provided list (see Table 1). Animal health was ranked first overall and received a ranking of one, two, or three from a majority of the editors. Management was ranked second and received the same number of first-place rankings as breeding and genetics, which was third. Following breeding and genetics were, in order of importance based on means, animal nutrition, marketing, commercial production, research, financial, policy/regulatory, training/education, food safety, animal welfare, worker/employee safety, and human nutrition.

Table 1
Importance of Specific Topics

Topic	<i>M</i>	Order
Animal Health	3.42	1
Management	3.83	2
Breeding and genetics	3.91	3
Animal nutrition	4.97	4
Marketing	5.34	5
Commercial production	6.06	6
Research	7.36	7
Financial	7.41	8
Policy/regulatory	8.66	9
Training/education	9.14	10
Food safety	9.31	11
Animal welfare	9.50	12
Worker/employee safety	10.36	13
Human nutrition	11.31	14

Gatekeeping criteria

Editors (N = 39) ranked the importance of eight gatekeeping criteria to their decisions about the use of scientific information in their publications (see Table 2).

Accuracy of content was the most important criteria for 30.8 percent of editors and was ranked first according to the means, followed closely by trustworthiness of sources. Interest to the audience was the third-most important criterion, followed by impact of content on the industry, timeliness of content, whether content improved the quality of information provided to the audience, quality of writing, and availability of space. Timeliness of content was the only criterion that did not receive a ranking of one from at least one editor.

Table 2
Importance of Gatekeeping Criteria

Criteria	<i>M</i>	Order
Is the content accurate?	2.64	1
Do I trust the source(s) of the information?	2.85	2
Is the content of interest to the audience?	3.79	3
Does the content have an impact on the industry?	4.05	4
Is the content timely?	4.76	5
Does the content improve the quality of information provided to the audience?	5.05	6
Is the content well-written?	6.21	7
Is space available?	6.67	8

Editors' preferences for sources of scientific information

Editors (N = 39) estimated the average number of sources they recommend a writer use when reporting scientific information. Twenty-six editors recommended two to four sources be used in a scientific story, although eight editors recommended only a minimum of one source and four editors indicated an average number of sources was not always encouraged. One editor noted the number of sources to be used was left to the judgment of the writer.

Editors (N =39) also identified from a provided list of sources those they would suggest to writers seeking scientific information (see Table 3). University faculty or staff was selected by all editors as a source of scientific information, followed closely by Cooperative Extension personnel, veterinarians, and USDA representatives. The top four sources were selected by more than 80 percent of editors. More than half of editors selected industry participants or producers and breed organizations, which were followed by agribusinesses, independent consultants, commodity groups, nonbreed industry organizations, and private interest groups. One editor indicated sources of information recommended would depend on the subject matter.

Table 3
Sources Suggested for Use in a Scientific Story

Source	<i>n</i>	%
University faculty or staff	39	100.0
Cooperative Extension (Extension Agent/Specialist)	36	92.3
Veterinarian(s)	35	89.7
USDA	33	84.6
Industry participant(s) or producer(s)	23	59.0
Breed organization(s)	21	53.8
Agribusiness(es)	19	48.7
Independent consultant(s)	17	43.6
Commodity group(s)	14	35.9
Non-breed industry organization(s)	11	28.2
Private interest group(s)	7	17.9
Other	2	5.1

Publication of scientific information

Editors (N = 39) reported the topics (see Table 4), number and type (see Table 5) of sources, depth, and overall use of scientific information in their publications.

The topic covered by the largest number of publications was breeding and genetics, followed by animal health, animal nutrition, research, management, commercial production, and marketing. More than half of the magazines included information on these topics. Slightly less than half of the publications included information about policy/regulatory, animal welfare, financial, and food safety; one-third of the publications covered training/education, human nutrition, and worker/employee safety. Two publications indicated information was provided about other scientific topics. A majority of editors indicated two to four sources were cited in scientific stories published during 2005, while about one-third of the editors reported a minimum of one source was used. Three editors did not know how many sources were used or indicated sources were not used.

Table 4
Topics Published during 2005

Topic	<i>n</i>	%
Breeding and genetics	38	97.4
Animal health	36	92.3
Animal nutrition	33	84.6
Research (animal; ongoing or specific)	30	76.9
Management	29	74.4
Commercial production	27	69.2
Marketing	25	64.1
Policy/regulatory	19	48.7
Animal welfare	18	46.2
Financial	17	43.6
Food Safety	17	43.6
Training/education	14	35.9
Human nutrition	13	33.3
Worker/employee safety	11	28.2
Other	2	5.1

All sources of scientific information in the provided list were used during 2005, according to the editors. University faculty or staff were used in the most publications, followed by Cooperative Extension, veterinarians, the USDA, industry participants or producers, agribusinesses and/or breed organizations, nonbreed industry organizations, independent consultants, commodity groups, and private interest groups. One editor indicated government sources were used, and one indicated none of the sources listed were used.

A majority of the editors indicated scientific information published during 2005 was “written for average producers” and “included technical information in a format average producers can apply in their operations.” Seven editors indicated information was more technical than information written

for average producers, and three indicated information was written more broadly than information that could be applied by the average producer. Two editors indicated published scientific information was broad and included few details, and none of the editors reported publishing scientific information that was technical.

Slightly fewer than one-third of editors reported publishing scientific information in approximately one-half of their issues, and slightly fewer than one-third of editors reported at least one scientific story was published in each issue. Seven editors indicated scientific information was published in fewer than half of issues, while five reported publishing scientific information in more than half of issues but not in every issue. Four editors indicated scientific stories were published two times or fewer.

Table 5
Sources Used in Scientific Stories Published during 2005

Source	<i>n</i>	%
University faculty or staff	36	92.3
Cooperative Extension (Extension Agent/Specialist)	35	89.7
Veterinarian(s)	28	71.8
USDA	27	69.2
Industry participant(s) or producer(s)	23	59.0
Breed organization(s)	22	56.4
Agribusiness(es)	22	56.4
Nonbreed industry organization(s)	17	43.6
Independent consultant(s)	15	38.5
Commodity group(s)	14	35.9
Private interest group(s)	9	23.1
Other	2	5.1

Discussion

The importance of scientific topics to editors

Editors agreed with audience perceptions of information needs established in previous studies (Batte et al., 1990; Brashear et al., 2000; Brown & Collins, 1978; Foltz et al., 1996; Ford & Babb, 1989; Harris Interactive, 2005; Jones et al., 1979; Murphy, 1960; Ortmann et al., 1993; Schnitkey, Batte, Jones, & Botomogno, 1992). Specific information needs consistently recognized by farmers and ranchers include animal nutrition, animal health, markets, management, technology, and genetics and reproduction (Foltz et al.; Murphy), while magazines have not been identified as a primary source for current financial information (Ortmann et al.). Editors in this study identified animal health, management, and breeding and genetics as the most important topics, while financial information was ranked comparatively lower.

Agricultural producers frequently selected topics such as animal health and nutrition as information necessities, which could have resulted in the lower importance of policy/regulatory and worker/employee safety information. The ranking of policy/regulatory lower in the list also may be due

to a perception by editors that policy information is not as scientific as the topics ranked above it, although science often plays a key role in the establishment of policies that impact agricultural producers.

Editors appeared to possess a strong understanding of livestock audience information needs. Trotter (1975) demonstrated audiences who most agree with editors tend to believe publications are edited for people similar to themselves, which would hold true for livestock publications that are generally limited by commodity or geographical interest (Schlebecker, 1983). Organizational forces, such as definitions of news and relationship to specific industries, also exert more influence on the selection of topics than editors' individual perceptions and experiences (Shoemaker et al., 2001). Communicators in livestock organizations are more likely to have accurate perceptions of specialized livestock audiences due to their respective organizations' positions within the livestock industry and their personal industry experiences, although livestock publications editors may underestimate the importance of livestock magazines in the flow of information from research origins to applicable concepts.

Gatekeeping criteria

The importance of certain gatekeeping criteria to editors mirrors the high standards for accuracy and newsworthiness found in the field of science journalism (Blum & Knudson, 1997), as well as editors' perceptions of livestock audiences' information needs. Trustworthiness of source is closely related to accuracy of content, and source credibility often dictates the caliber of a story (Blum & Knudson).

Editors appeared to realize the influence sources have on the value of a story to the audience, while the positioning of interest to the audience and industry impact of information relative to other criteria show livestock publication editors grasp the concept of providing useful information to agricultural producers. Earlier studies demonstrated audience responses to scientific information increase with relevance to the reader and timeliness (Grunig, 1980; Murphy, 1960).

Editors' experiences in agriculture and livestock industries may influence their opinions of the importance of providing content connected to audience needs. The weight given to the value of scientific content to the audience and industry may result from views intrinsic to agricultural organizations (Shoemaker et al., 2001), although editors' decisions ultimately are based on their entire collection of experiences (Fowler & Smith, 1981).

Fowler and Smith (1981) also observed the decisions of magazine editors may carry more influence than decisions of gatekeepers in other mass media because the staffs of magazines are typically smaller, which promotes more direct interaction between editors and the selection of magazine content. As the staffs of many livestock publications are considerably smaller than staffs found in the mainstream media, the role of individual experiences and opinions increases in the livestock publications industry and appears to have led editors to consider stylistic, quality of writing, and space constraint concerns less important than relevance of information.

The numerically close means of accuracy and trustworthiness of sources illustrated the nearly equal importance of some gatekeeping criteria and supported previous research that demonstrated more than one criterion often is employed simultaneously in gatekeeping decisions (Dimmick, 1974). Likewise, the comparable means of interest to the audience and impact, timeliness and quality of information, and quality of writing and space availability demonstrated gatekeeping criteria may be considered as groups composing tiers in the decision-making process, with individual criteria on a tier being of similar importance at that level of decision-making.

Editors' preferences for sources of scientific information

The number and sources of information preferred by editors complemented the value of accuracy and trustworthiness of sources as criteria for using scientific information. By requiring multiple sources, editors allow for confirmation of information by multiple sources, ensure all potential aspects of a story are presented, and may diminish readers' doubts about objectivity.

The specific sources most preferred by editors also demonstrated the orientation of editors with other gatekeepers and the audience in selecting appropriate information for publication, and the worth of certain sources of scientific information is validated by their use in both livestock publications and the mainstream media. Editors showed a considerable preference for the top four sources, including university faculty or staff, Cooperative Extension, veterinarians, and the USDA. University faculty or staff was selected by all editors in this study, and those sources have been ranked highly by audiences and gatekeepers in previous research (Brown & Collins, 1978; Stringer, 1999). As the roots of many modern agricultural production methods can be found in university research and Cooperative Extension education programs, some bias toward these sources of information may exist in agriculture similar to bias observed as science writers formed relationships with scientists (Mazur, 1981). The preference of editors for the USDA as a source of information conflicts with previous research about gatekeepers' preferences, but agrees with the value placed on government information sources by audiences (Brown & Collins; Stringer; Jones et al., 1979).

Most of the sources selected less by editors, including industry participants or producers, breed organizations, agribusinesses, consultants, commodity groups, nonbreed industry organizations, and private interest groups, have been indicated over time as important information sources by large-scale family farmers (Brown & Collins, 1978), Ohio commercial farmers (Batte et al., 1990), large corn belt farmers (Ortmann et al., 1993), and members of agricultural organizations (Harris Interactive, 2005). Similar to the results of this study, sources other than educational institutions and government agencies were ranked lower by news and agricultural periodicals (Stringer, 1999; Whitaker & Dyer, 2000), although editors of livestock publications differed from farmers and ranchers who ranked agricultural dealers and retailers highly on credibility, timeliness, and knowledge of agricultural markets (Harris Interactive).

Publication of scientific information during 2005

Based on the rankings of topic importance, editors seemed to be aware of audience information needs, and the topics published during 2005 reinforced the apparent accuracy with which editors understand their audiences. The importance of specific topics to editors and in publication also agrees with editors of dairy publications who listed breeding technologies, animal health, production practices, animal nutrition, and management as important themes about which their publications needed to provide information (Evans, 1981). The similar rankings of importance and publication of topics despite variations in responding publications' audiences also indicated a diverse general livestock industry audience has similar information needs, and editors' high rankings of interest to and impact of content on the audience as gatekeeping criteria indicated meeting these needs with accurate, credible information is a priority in the livestock publications industry.

The use of multiple sources for scientific stories supported the importance of objectivity and providing appropriate context for information so readers can be educated rather than influenced. Editors' preferred sources for information mostly paralleled sources reported to be used during 2005. The reliance of editors and writers on top sources may be due to the nature of the topics and the need for accessible, unbiased information. Breeding and genetics, animal health, animal nutrition, and re-

search information may be explained best by the originators of the information or perceived experts, such as universities or veterinarians. Gatekeepers with backgrounds or experience in agriculture also may tend to rely on traditional sources of agricultural information, as demonstrated by the preferences of editors for those sources and the use of those sources.

The level of information published during 2005 agreed with the observation of Grantham and Irani (2004) that information should be provided at a level usable by producers with average educational backgrounds. Specialized audiences, such as livestock producers, may understand scientific terms better than broader audiences due to their more frequent use of such information, although communicators still can provide concepts in lay terms with appropriate context and create applicable principles for producers.

A majority of publications used scientific information in more than half of 2005 issues, while only four published scientific information two times or fewer. Variation in the use of scientific information resulted from differences in the purpose of the publications, although their role in providing modern, usable information agrees with Schlebecker's (1983) observation that the function of agricultural journals is to bring timely, valuable items to the attention of readers. These results demonstrated the significance of science in the livestock industry and editors' comprehension of what information will best help their audiences.

Recommendations

As gatekeepers, editors of livestock publications need to maintain their awareness of audience needs. Perceptions of audience needs may be enhanced through strong connections with the livestock industry, although editors must preserve objectivity to continue providing complete, accurate information to readers. The best editors should look to the future of their industries and provide information producers need to reach production goals successfully.

In selecting topics for publication, the role of magazines in the decision-making processes of farmers and ranchers should be considered. Editors may be unaware of their publications' importance in the livestock industry relative to other media, so a review of industry studies may be useful to many gatekeepers.

Accuracy and providing useful content appeared to be the primary goals of editors' gatekeeping decisions, and editors should continue to ensure accuracy of content and avoid appearances of bias through careful selection of sources. Providing useful content also should continue to be a primary goal for gatekeepers in the livestock publications industry.

Livestock magazines should continue operating under the goal of providing knowledge to producers rather than trying to influence producers. This goal may be refined and manipulated to meet the objectives of associations and other organizations that own particular publications, but such groups should provide essential information with enough context to allow producers to develop their own attitudes.

Editors should be conscious of various organizational and personal influences on their gatekeeping decisions. Institutional perceptions will become a part of editors' personal opinions and experiences, and editors and organizations should take steps to ensure objectivity in gatekeeping decisions is maintained. Prior experiences in agriculture or the livestock industry may be particularly strong influences on editors' selection of topics and sources, and employing a system of multiple criteria for making decisions will help editors overcome innate personal biases.

Sources perceived as credible by the audience should be used to sustain the trust of magazine readers. Gatekeepers should be cautious in the selection of sources to avoid tendencies arising from

their agricultural roots so producers are presented with information they may find useful but would not normally seek.

The use of multiple sources in stories is an important tool for ensuring objectivity and gaining readers' trust, and a variety of sources adds extra dimensions to information that create a complete picture incorporating context and applicable principles. Editors need an understanding of how best to achieve this, along with an understanding of audience perceptions of sources, to facilitate efficiently the flow of information from scientific sources to producers.

The use of scientific information reported by editors demonstrated the significant impact science has in the livestock industry, further supporting the need to provide pertinent scientific information to producers. Specialized publications may not focus on topics directly related to science, but as an industry, livestock publications need to ensure producers receive adequate information to uphold the competitiveness of U.S. livestock production.

Gatekeepers and other communicators involved with livestock publications should aim to gain experiences in the livestock industry not directly related to their jobs as communicators. These experiences may enhance gatekeepers' understanding of and ability to communicate with livestock audiences.

Implications

As livestock and other agricultural industries continue to grow and technology evolves, the importance of science to agriculture and the role of magazines in disseminating the most advanced information to producers only will increase. A gap exists, however, in research about the information needs and value of scientific information to producers. This gap has created a need for more studies of producers' information needs, although the media preferred by producers has been well established. With this study, a beginning comparison now can be made between livestock publications editors and their audiences.

Editors of livestock publications may be able to compare their practices for making gatekeeping decisions and learning about their respective sectors of the larger livestock industry to the information provided by their peers. It also may create a greater awareness of the influences on their decisions, as well as how those decisions coincide with previously reported preferences of producers for information and sources of information.

This study creates a foundation for additional studies of agricultural gatekeepers and audiences, particularly if and how information needs are being met in the face of rapid advancements in the science and technology of agriculture. As communicators involved in all types of agricultural media consider the positive results of this study and the deficiencies it revealed, steps can be taken to ensure information flows efficiently from scientists to producers to bring the greatest possible benefits throughout agriculture.

Keywords

agriculture, media, gatekeeping, magazines, science

References

- Agnes, M., et al. (2003). *Webster's new world dictionary* (4th ed.) New York: Pocket Books.
- Batte, M. T., Schmitkey, G. D., & Jones, E. (1990). Sources, uses, and adequacy of marketing information for commercial Midwestern cash grain farmers. *North Central Journal of Agricultural Economics*, 12, 187-196.
- Blum, D., & Knudson, M. (1997). *A fieldguide for science writers*. New York: Oxford University Press.
- Brashear, G. L., Hollis, G., & Wheeler, M. B. (2000). Information transfer in the Illinois swine industry: How producers are informed of new technologies [Electronic version]. *Journal of Extension*, 38(1), n.p.
- Brown, T. G., & Collins, A. J. (1978). *Large commercial family farms informational needs and sources* (Report of the National Extension Study Committee). University of Missouri.
- Bruening, T. H. (1992). Useful water quality information sources: The farmers' point of view. *Journal of Applied Communications*, 76(2), 43-49.
- Cartmell, D. D. (2001). *Arkansas daily newspaper editors attitudes toward agriculture and the gate-keeping criteria used when publishing agricultural news*. Unpublished doctoral dissertation, University of Missouri, Columbia.
- Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York: John Wiley & Sons.
- Dimmick, J. (1974). The gate-keeper: An uncertainty theory. *Journalism monographs* (No. 37). Minneapolis, MN: Association for Education in Journalism.
- Donohew, L. (1967). Newspaper gatekeepers and forces in the news channel. *Public Opinion Quarterly*, 31, 61-68.
- Evans, J. F. (1981). Recent developments in dairy journalism. *Journal of Dairy Science*, 64, 933-941.
- Foltz, J., Lanclos, K., Guenther, J., Makus, L., & Sanchez, W. (1996). The market for information and consultants in Idaho agriculture. *Agribusiness*, 12, 569-581.
- Ford, S. A., & Babb, E. M. (1989). Farmer sources and uses of information. *Agribusiness*, 5, 465-476.
- Fowler, G. L., & Smith, E. J. (1981, August). *An examination of the magazine gatekeeper: Can personal/professional characteristics predict editorial involvement?* Paper presented at the meeting of the Association for Education in Journalism, East Lansing, MI.
- Gloy, G. A., Akridge, J. T., & Whipker, L. D. (2000). Sources of information for commercial farms: Usefulness of media and personal sources. *International Food and Agribusiness Management Review*, 3, 245-260.
- Grantham, S., & Irani, T. (2004). Watch your language: Translating science-based research for public consumption. *Journal of Applied Communications*, 88(1), 43-50.
- Grunig, J. E. (1980). *Research on science communication: What is known and what needs to be known*. Paper presented at the National Agricultural Science Information Conference, Ames, IA.
- Harris Interactive. (2005). [Agricultural media study]. Unpublished raw data.
- Johnstone, J. W. C., Slawski, E. J., & Bowman, W. W. (1972). The professional values of American newsmen. *Public Opinion Quarterly*, 36, 522-540.
- Jones, C., Sheatsley, P. B., & Stinchcombe, A. L. (1979). *Dakota farmers and ranchers evaluate crop and livestock surveys* (NORC Report No. 128). Chicago: National Opinion Research Center.

- Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in science; social equilibria and social change. *Human Relations*, 1, 5-40.
- Lindner, J. R., & Wingenbach, G. J. (2002). Communicating the handling of nonresponse error in Journal of Extension research in brief articles [Electronic version]. *Journal of Extension*, 40(6), n.p.
- Maddox, S. J. (2001). *Determining effective communication strategies for agricultural organizations to provide agricultural producers the knowledge necessary to promote change and adoption in the 21st century*. Unpublished doctoral dissertation, North Carolina State University, Raleigh.
- Mazur, A. (1981). Media coverage and public opinion on scientific controversies. *Journal of Communication*, 31(2), 106-115.
- Murphy, D. R. (1960). *What farmers read and like*. Ames, IA: Iowa State University Press.
- Ortmann, G. F., Patrick, G. F., Musser, W. N., & Doster, D. H. (1993). Use of private consultants and other sources of information by large cornbelt farmers. *Agribusiness*, 9, 391-402.
- Schlebecker, J. T. (1983). Agricultural journalism and the diffusion of scientific knowledge in twentieth century America. *Journal of NAL Associates*, 8, 127-135.
- Schnitkey, G., Batte, M., Jones, E., & Botomogno, J. (1992). Information preferences of Ohio commercial farmers: Implications for extension. *American Journal of Agricultural Economics*, 74, 486-496.
- Shoemaker, P. J., Eichholz, M., Kim, E., & Wrigley, B. (2001). Individual and routine forces in gatekeeping. *Journalism and Mass Communication Quarterly*, 78, 233-246.
- Stringer, S. B. (1999). *An evaluation of agricultural news sources*. Unpublished doctoral dissertation, Pennsylvania State University, University Park.
- Suvedi, M., Campo, S., & Lapinski, M. K. (1999). Trends in Michigan farmers' information seeking behaviors and perspectives on the delivery of information. *Journal of Applied Communications*, 83(3), 33-50.
- Trotter, E. P. (1975). *A coorientational analysis of gatekeeper, audience, and publisher patterns of news selection*. (ERIC Document Reproduction Service No. ED123658).
- Whitaker, B. K., & Dyer, J. E. (2000). Identifying sources of bias in agricultural news reporting. *Journal of Agricultural Education*, 41(4), 125-133.
- White, D. W. (1950). The 'gate keeper': A case study in the selection of news. *Journalism Quarterly*, 27, 383-390.
- Wiegman, O., Gutteling, J. M., Boer, H., & Houwen, R. J. (1989). Newspaper coverage of hazards and the reactions of readers. *Journalism Quarterly*, 66, 846-852.