The communication needs and behavior of Iowa's apple and cider producers

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The communication needs and behavior of Iowa's apple and cider producers

by

Andrew Stephen Zehr

A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Journalism and Mass Communication

Program of Study Committee:
Lulu Rodriguez (Major Professor)
Barbara Mack
Lester Wilson

Iowa State University
Ames, Iowa
2003

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Graduate College
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This is to certified that the master's thesis of

Andrew Stephen Zehr

has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
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CHAPTER 1.

INTRODUCTION

The state of Iowa is typically associated with agricultural products such as corn and soybeans. Iowa does have a small population of apple growers, and an even smaller group of cider producers. Most apple and cider producers in Iowa are considered small producers when compared to industry leaders such as the states of Washington and Michigan. According to the FDA, “Small businesses employ fewer than 500 persons (FDA, 2003). Very small businesses must meet one of the following three criteria: annual sales of less than $500,000, total annual sales greater than $500,000 but total food sales less than $50,000, or operations that employ fewer than an average of 100 full-time equivalent employees and sell fewer than 100,000 units of juice in the United States” (FDA, 2003). Economies of scale present Iowa farmers with serious threats to profitability. In addition, a tremendous amount of hail and herbicide damage in recent years has crippled some of Iowa’s largest orchards (Erb, 2000). For the small number of apple cider producers in the state, the requirement of an FDA approved warning label for unpasteurized cider has also meant stringent measures that will considerably increase production cost.

The U.S Food and Drug Administration has proposed and implemented new regulations concerning the manufacturing of juices and apple cider. The proposed regulations are a result of public concern over the safety of apples and fresh cider spawning from reported incidents of serious illness in 1996 and 1999 caused by microbial contamination. The culprit was later identified as E. coli 0157:H7, one of a group of E. coli bacteria found in the intestines of warm-blooded animals. Currently, cider mills are expected to voluntarily improve their manufacturing practices to decrease the likelihood of E. coli
contamination. However, the FDA is requiring apple cider producers to meet a controversial standard of a 5-log reduction of microbial contaminants. Going into effect in 2003 for small and 2004 for very small operations as defined by FDA, this regulation will require producers to achieve a 100,000-fold reduction of the most resistant pathogen in their finished products compared to pathogen levels of untreated juice. The FDA rule does not regulate how to achieve this reduction, as juice processors could choose between pasteurization and alternative technologies such as UV irradiation (Reitmeier, Glatz, Gleason, Boylston, Briggs, Jensen, Mendonca, and Wilson, 1999). It is no small wonder that, according to the Iowa Fruit and Vegetable Growers Association, there has been a 10% decrease in certified cider producers since 1998. Sales of unpasteurized cider have decreased by 80%, perhaps due to a combination of fewer cider producers and existing growers adopting pasteurization as a production technique.

In response to this situation, Iowa State University scientists from food science, microbiology, plant pathology, agricultural and biosystems engineering, and economics have created an integrated research project designed to study the safety, quality, and sustainability of small-farm production of apples and cider. The investigators of the project have four main objectives. The first is to assess the microbial content of apples and cider and to develop programs to improve manufacturing practices. Hazardous Analysis Critical Control Point (HACCP) plans are created as a resource to guide producers in safe manufacturing practices. The second objective is to analyze the effectiveness of sanitizing washes in reducing *E. coli*. Sanitizing washes essentially involve dipping harvested apples in a sequence of chemical baths. A third objective is to assess the economic and social viability of irradiating apple cider. The final objective of this program is to inform an array of audience groups about the
project’s scientific findings. This includes educating producers, consumers, students and researchers about the latest developments in apple and cider production (Reitmeier et al., 1999).

As results from these extensive tests become available, it will be essential to communicate such findings to producers of apples and cider. The results can guide decisions made by these producers to ensure safe and high-quality products. However, because there are fewer than two hundred Iowa apple and cider producers, many of these findings may not be cost effective. For example, small apple cider producers simply cannot afford to pasteurize their product much less incur the cost of irradiating it. The unique characteristics of this audience group present challenges about how to communicate most effectively with them.

Apple and cider production in the state of Iowa faces serious threats to its sustainability. The reasons for this are varied, but maintaining stable communication links among producers, scientists, and consumers is certainly a nagging concern.

Iowa’s apple and cider producers must have open lines of communication with the scientific community that works on their behalf. For example, Iowa State University scientists share and interpret industry trends with federal agencies such as the FDA who regulate the industry. They are also the main source of improved production practices. This task requires them to always be in touch with apple and cider producers whose first-hand inputs are invaluable in research.

Iowa's apple and cider producers must also communicate among themselves. Insights on whether to adopt new technology and new practices are learned by interacting with peers. Preliminary findings of a study that surveyed producers indicated that three of the six most
pressing issues that face them involve difficulties in operating their orchards. These issues include (1) safety of their product, (2) low profit margins, and (3) production problems such as shortage of labor. Communicating well with others means that they can solicit each other's advice on these practical matters.

Finally, Iowa's apple and cider producers must communicate better with consumers and food retailers. In the same study of producer needs, apple growers are concerned with how to market their product. This strongly suggests that they must have the capacity to assess the demands of the consumer group. They must also be able to inform consumers of their products and the benefits consumers can derive from them.

Therefore, an assessment of the communication needs of Iowa's apple and cider producers is necessary. The purpose of this study is to evaluate their current communication practices so that recommendations can be made to strengthen their communication links with different groups.

Specifically, this study asks: How do producers use media to distribute and acquire information? For example, are producers likely to use computer-mediated communications such as e-mail to discuss successful practices with other producers?

Iowa State University scientists are conducting experiments testing the ability of sanitizing dips to kill bacteria on the skin of apples. The results of such studies may be useful in growers' day-to-day operation. How do producers obtain such new information?

This study also addresses the issue of trust. Who and what communication sources do apple and cider producers trust?
An understanding of the communication needs and behaviors of Iowa's apple and cider producers is an essential part of solving some of this dwindling industry's major problems.

There are numerous groups that would benefit from improved communication in this industry. The most obvious beneficiaries are the apple and cider producers of Iowa. However, it can be assumed that the difficulties encountered by the small-scale producers in fulfilling the new requirements are not confined to this particular state. For example, Nebraska, South Dakota and Kansas are primarily agricultural states with small to very small apple orchards much like Iowa. To compete with the industry giants such as Michigan and Washington, small apple growers and cider producers from other states could potentially use what is learned from this study to improve their production practices.

Research and outreach institutions such as Iowa State can use the results to communicate more effectively with this and other small-grower industries within the state. The same can be said about other states in which university scientists maintain agricultural extension programs. Although Iowa's apple and cider industries are small and well defined, some of the results may be generalized to other similar small-scale agricultural industries.

Consumers of apples and apple cider would also benefit, as they will better understand their food choices. In addition, a stronger market for apples and cider equates to an improved state economy. In the end, stable communication networks in the apple and cider industries should ultimately lead to safer, higher-quality products for the consumer.
CHAPTER 2.
THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This study focuses on the communication needs and behavior of Iowa’s apple growers and cider producers, which are of practical importance to the state’s developing apple industry. An examination of their communication requirements and how they consume information also demands a look at how they perceive the pressing risk-related issues pertaining to their industry and how they think their cohorts see or think about the same issues. Such an investigation calls for an examination rooted on the third-person effects hypothesis. Finally, it is expected that most of their communication behavior could be explained by the extent to which they view their information sources as credible.

The Communication Behavior

As with most people engaged in farming, Iowa’s apple and cider producers have an abundant supply of information. An exploratory survey of their communication sources indicated that they have access to and use a variety of media (Rodriguez & Zehr, 2002). This section presents the results of three other studies of farmers’ media use. One of these is McNeil-Sanders’ 1991 survey of Iowa farmers’ use of agricultural information sources. The second (Jo, 1999), conducted eight years later, surveyed a random sample of Iowans to determine the information sources they trust on environmental issues. The third is the Ag Media Report: 1998-1999, released by the National Association of Farm Broadcasters (NAFB) that analyzed how farmers and ranchers in the United States use farm media.

A previous study of Iowa farmers’ use of agricultural information sources (McNeil-Sanders, 1991) suggested that television use is strictly a form of entertainment. While the
majority of people have access to television, McNeil-Sanders reported that only 26 percent of the Iowa farmers surveyed watched farm-related television programs "often" or "very often." Although 56 percent answered "sometimes," this would indicate that they are not regular users of the television medium. Another Iowa State University study found nearly identical results. The study, which looked at the sources of environmental information of Iowans, found that 28 percent of the respondents preferred to use television as an information source (Jo, 1999). Both sets of findings show low levels of TV use compared to national responses from the NAFB (1999). In this study, the Association notes that 59 percent of the respondents indicated they had watched television for farm information.

McNeil-Sanders' (1991) study found radio to be one of the most important sources of agricultural information to Iowa farmers. She found that 10 percent of her respondents reported listening to radio farm programs "very often," while another 28 percent reported listening "often." Again, the more recent ISU study (Jo, 1999) of Iowan's use of communication channels found similar results. In this study, 8 percent of the respondents preferred radio to all other media for information about the environment. This nearly matches the heavy user category of McNeil-Sanders' study. The NAFB (1991) survey, on the other hand, indicated the importance of radio to farmers nationwide. According to the survey, 70 percent of the respondents listen to radio for farming information. The survey found that not only did respondents listen to radio, but also that they did so almost on a daily basis.

Previous studies have found newspapers to be of great importance to Iowa farmers and citizens. In McNeil-Sanders' (1991) study of Iowa farmers' information sources, newspapers were also a frequently utilized medium. Farmers who read newspapers "very
often" made up nearly 13 percent of newspaper users who were farmers. Another 35 percent of the farmers reported using newspapers "often." Jo (1999), on the other hand, showed newspapers to be the most important source of environmental information among Iowans. According to this study, 44 percent of the respondents indicated they preferred newspapers as an information source. The National Association of Farm Broadcasters did not present survey questions about newspaper use.

McNeil-Sanders' (1991) study found that 29 percent of farmers indicated that they read farm magazines "very often," while another 45 percent reported reading them "often." However, the results may have been skewed by the fact that the sample was drawn from a list of subscribers to Wallace's Farmer. Regarding sources of environmental information, Jo (1999) found magazines to be important. According to this study, 10 percent of the respondents preferred magazines to other media. The NAFB (1999) study indicates the importance of magazines as well. Grouping Farm Journal, Progressive Farmer, Successful Farming, and farm progress state magazines (such as Alabama Farmer, Michigan Farmer, and others from each of the states), the survey found that 77 percent of the respondents indicated reading at least one of these publications in the last 30 days.

Because online information sources are relatively new, it is understandable that this medium is progressing through the early stages of adoption. It may be for this reason that in McNeil-Sanders' survey (1991), 84 percent of the farmers indicated that they did not own a computer. NAFB's (1999) survey indicated that only 46 percent of the farmers surveyed had computers. Ownership of a personal computer does not equate to using online sources, as only 16 percent of the survey respondents reported using farm-related web sites. Jo's (1999) study did not address computer use as a source of environmental information. Perhaps this is
due to the difficulty in classifying computer-mediated communication as an interpersonal or a mass medium.

Considering the vast array of information sources available, this study asks:

*RQ1*: Where do Iowa cider and apple producers get information about food safety in the production of apples and cider?

**Third-Person Effects in Communication**

Iowa apple and cider producers spend considerable amounts of time doing “market research” by talking with their customers at such locations as farmers markets because assumptions about the most pressing issues involved in their enterprise are made based on what they think their customers or target product users think about these same issues. In other words, apple and cider producers maintain the relationship with their customers based on what they think the customer may want or what they think is a concern to the customer. With the introduction of new technologies and industry practices comes controversy. A person’s conception of controversial subjects and how he/she perceives how others look at such controversial topics illustrate what is known as the third-person effects phenomenon.

Davison introduced the third-person effects hypothesis as one that “predicts that people will tend to overestimate the influence that mass communication have on the attitudes and behavior of others” (Davison, 1983, p. 3). In other words the third-person effect is demonstrated when one considers oneself as *not* affected by the mass media message, but others are.

When a topic or issue is one of considerable controversy, Davison also suggests that people have a tendency to perceive the media as being biased toward the opposing viewpoint.
He hypothesized that the combination of this perceived media bias and the third-person effect would result in a misinterpretation of the “other” person’s attitudes (1983:11).

Iowa’s apple and cider industries have their own collection of controversial topics. Irradiating food to eliminate harmful pathogens is one of them. Research efforts are being done to determine whether or not irradiating apple cider would be effective and economically viable. Its adoption by the cider industry may depend, in part, upon the findings of these studies. Unquestionably, cider producers will decide to adopt or reject this technology based on their attitudes about the technology. These attitudes will be heavily influenced by their perceptions of their consumers’ attitudes about the practice to be. If the cider producer thinks that irradiation is a worthwhile technology but perceives that messages opposing irradiation will have an adverse influence the consumer, the decision to adopt this expensive new technology is made more difficult. The cider producer does not want to alienate an audience he or she perceives to be influenced by the media’s coverage of a controversial issue.

In a review of third-person research, Perloff (1993) indicated that effects are likely to vary according to specific situations. In his review, he divided previous studies into several conditions that facilitate the third-person effect. Perloff calls these conditions message topic, ego involvement, perceived source bias, and social distance.

The first of these conditions, into which Perloff states “an overwhelming majority of third-person effects studies” falls, is message topic. These studies focus on messages with negative outcomes, such as defamatory news advertisements, pornography, or negative political ads. Such negative messages, according to Perloff, will create a more significant third-person effect, while messages with more desirable effects will not. An example is a
study that looked at the nature of the American public's objection to sexually explicit or violent television programs (Lometti, Ashby, & Welch, 1994). Here, the researchers found that respondents objected to violent and sexual programming because they think such programs would be "inappropriate for children" or fear that people would "get ideas," "accept," or "imitate" the negative messages in these programs.

For Iowa apple and cider producers, media messages containing negative aspects of irradiation, for example, would hurt their business the most. Cider producers would also demonstrate a significant third-person effect on their perceptions of consumer attitudes if there were news articles about an \textit{E. coli} contamination of apple cider causing serious illness. Such a message would lead to consumer distrust of apple cider, therefore leading to decreased sales. On the other hand, a story about the nutritional value of apple cider would cause a less significant third-person effect.

Perloff (1993) also illustrates the impact of ego-involvement on perceptions of media effects in his studies of pro-Israeli and pro-Palestinian perceptions of televised news coverage of the war in Lebanon. In this study, the ego-involved partisans were more likely to believe that the televised messages would persuade "others" to sympathize with their counterpart's position. Gunther (1988) supports this position, saying that people who are highly involved in an issue are less likely to change opinions about the issue. They may also think more often about the issue, talk or argue more about the issue, and take more personal interest in the issue. Iowa apple and cider producers may be conceived as being very highly involved in issues that concern their livelihood. The mere fact that so much is at stake may produce a greater third-person effect.
A third condition that enhances the third-person effect is perceived source bias. Perloff (1993) notes that studies have shown that the third-person effect is more significant when a person perceives a message to be negatively biased or when the audience realizes the persuasive intent of the source. Perloff suggests that because of ego-involvement, a person is more likely to perceive a source bias. The coupling of these conditions creates a greater third-person effect on perception. For apple and cider producers this means that, because of their heavy involvement, they will be more likely to perceive a source bias should they be involved in a controversy. If a source were to link *E. coli* contamination to Iowa apple cider, the apple cider producer would perceive such a source to be biased. This perceived negative bias of the source would contribute to the apple cider producer’s third-person effect.

The fourth and final facilitator of the third-person effect, according to Perloff (1993), is the concept of social distance. In his review, he illustrates three studies that found that the perceived differences between communication effects on others and the self increases as the definition of “others” is explained in more broad terms. For example, in the three studies of agricultural and environmental information source use previously cited, the samples studied ranged from very specific (McNeil-Sanders’ study of Iowa farmers) to less specific (Jo’s study of Iowa citizens) to more general (NAFB’s study of farmers and ranchers across the United States). Hypothetically speaking, if Iowa’s apple and cider producers were to identify each of these three groups as the “others” (or the third-person), social distance would predict that Iowa apple producers would perceive a greater impact of communication on farmers and ranchers across the United States than on other Iowa farmers.

In a study that differentiated social distance along the three dimensions of generality, age, and education (Eveland, Nathanson, Detenber, & McLeod, 1999) an alternative to the
social distance corollary was offered. Eveland et al. suggested that perceived likelihood of exposure is a better predictor of a third-person effect. Essentially they hypothesized that the perceived social difference between the first and the third person was not as important as the first person's perception of how likely the third person would be exposed to the message.

Another study examining differences in media use of the first and third persons takes a limits/possibilities perspective. Peiser & Peter (2001) suggested that, "basically, people’s potential for third-person perception is increased or reduced by various individual characteristics that are pertinent to the social perception involved" (p. 157). This would indicate that individual differences contribute to the third-person effects hypothesis.

Price, Huang, & Tewksbury (1997) conducted a study to establish connections between specific individual differences. The study examined political factors, media schemas, and media uses as independent variables. Although the study did not find any of these variables to be strong predictors on their own, Price et al.'s findings (1997) suggest that the third-person effect may be based on differences in situations.

Controversial topics, such as the irradiation of food, will create opposing viewpoints. According to Herrod and Sapp (1992), people gauge the opinions of others through debate. Therefore, negative comments made during group discussion can influence opinions more than favorable comments. In Herrod and Sapp's study (1992), subjects who were allowed to discuss irradiation in groups following education about it had more extreme attitudes than subjects not allowed discussion time.

The controversial topics facing Iowa’s apple and cider industries are very diverse. So diverse, in fact, that industry concerns can be applied to any of Perloff’s (1993) facilitators of the third-person effect hypothesis. Research, though it has yet to pinpoint individual
variables that cause it, has for the most part confirmed that in some situations, the third-person effects occur. As such, this study asks:

*RQ2*: *Is there a third-person effect evident on Iowa apple and cider producers’ perception of the public’s concern about food safety issues?*

**Trust and Credibility Perceptions**

To understand apple growers’ and cider producers’ media choices and their implications on the third-person effects hypothesis, their perceptions of source credibility must be examined. Such an examination involves issues of trust, expertise and believability.

Buzby and Ready (1996) found that U.S. survey respondents reported high media use for obtaining food safety information. Respondents indicated that 70 percent obtained food safety information from newspapers while 71 percent reported using television. However, when asked how much they trust these sources of information (with ratings ranging from “no trust” to “trust completely”) they found that less than 60 percent reported trusting both television and newspapers. In fact, newspapers had the largest percent of respondents who reported trust, exceeding the other categories of government publications, food labels, television, magazines, store brochures, and advertisements. (Buzby & Ready, 1996).

Hovland, Janis, and Kelly (1953) conducted a study that suggests that the credibility of a source depends upon the message receiver’s perception of the source’s expertise of the subject and his or her trustworthiness. In this study, respondents reported being more persuaded by those they perceived to be highly credible than those who were less credible even when the information was exactly the same. McGuire (2001) agreed, further explaining what constitutes the attributes of expertise and trustworthiness. According to McGuire
(2001), “perceived source expertise derives from characteristics such as the source’s general education level, familiarity with the subject matter, and speaking in an authoritative tone,” (p. 24). Perceived trustworthiness, McGuire (2001) said, comes from a source’s “general reputation for honesty,” “being in a trustworthy profession,” “not standing to profit personally from convincing the audience,” and “emitting nonverbal cues that indicate honesty.”

Atkin (2001) reinforces the importance of perceived source expertise and trustworthiness as described by McGuire, only adding emphasis on presentation style. To him, the presentation style and the ideas presented must be attractive and entertaining. To influence behavior, the audience must also be able to apply information to their personal lives. Finally, the information source and message must be understandable (Atkin, 2001).

Jo (1999) found in her study that respondents' credibility perceptions could predict their preferred information source. The results indicated that Iowans who found mass media to be credible preferred to use mass media.

Given conflicting results on who or what people find credible based on subject matter or message content, this study asks:

RQ3: Who and what communication sources do Iowa apple and cider producers find most credible?
CHAPTER 3.

METHODOLOGY

The research questions and hypothesis posed in this study were answered and tested using data gathered through a mail survey.

The communication needs and behavior of Iowa’s apple growers and cider producers were assessed with data from a questionnaire. As a pretest, the questionnaire was administered to 18 apple growers and cider producers attending the 2002 Iowa Fruit and Vegetable Grower Association meeting in Marshalltown, Iowa on January 25, 2002. After minimal revisions, the same questionnaire was administered to a list of Iowa apple growers and cider producers by mail. Two mailings were performed, with the second wave sent to those who did not return a completed questionnaire during the initial mailing.

Sample Selection

The small population under study presents the researcher with some advantages. Because Iowa’s apple and cider producers comprise a continually shrinking group, reliable results are obtainable from a small sample. The sample of Iowa apple growers in this study was taken from a mailing list provided by the Iowa Fruit and Vegetable Growers Association. This list contained 169 growers recognized by the state of Iowa. Although this list may not include every grower of apples in the state, it includes the majority of those producing apples for commercial purposes.

In addition, the sample includes Iowa’s apple cider producers. The list of 27 state certified cider producers was provided by the Iowa State University Food Science and
Human Nutrition Department. Again, this list does not include every person who produces apple cider in Iowa, but does include almost every commercial producer.

Therefore, Iowa's apple and cider producers are considered the population being studied. It would be technically incorrect to classify this research as a census, however, because it would be nearly impossible to identify every Iowan who grows apples or produces apple cider. The sample, therefore, is composed of nearly all of the apple and cider producers in the state most likely to rely on these products as a source of income.

**Questionnaire**

The questionnaire was seven pages in length, consisting of four sections. The first of these sections was designed to descriptively indicate the respondents' media habits. These include what media the apple and cider producers use to obtain food safety and production information, how often each medium was used, and how closely they monitor production and food safety information on each medium. These questions were asked about newspaper, magazine, television, radio, and on-line sources.

The questions in this section were mostly close-ended. The respondents were asked to indicate that they did not use a medium. If they did use a medium, respondents were asked to indicate the hours or days per week they used a medium, and choose appropriate answers from several Likert-like scale items.

In the on-line sources section, a checklist of features or content items for a potential website addressing their needs was provided, followed by an option for an open-ended response. The checklist was a list of options that were found on other states' apple industry-
related websites. The open-ended option allowed the respondents to list other desired website features that were not on the checklist.

The second section of the questionnaire focused on producer and consumer issues. This section started off with an open-ended question asking what the three most important issues confronting the apple cider industry were. The rest of the questions in this section were close-ended Likert scales asking about various food safety technology and policy issues. One section dealt specifically with questions related to food irradiation.

The third section of the questionnaire asked respondents to evaluate the level of trust they confer upon a number of information sources and industry groups. First the respondents were asked Likert-scale questions about the level of trust they place on various sources of food safety information. Then they were given multiple-choice questions asking them to evaluate several industry groups' competency in protecting the safety of America's food supply.

The final section of the questionnaire was intended to collect demographical information about the respondents. This section consists of mostly multiple-choice questions about race, gender, income, and education level. The respondents were asked to indicate whether they were an apple grower, an apple cider producer, or both. Respondents were also asked to indicate the number of acres they had devoted to apples, the number of years they have been in the industry, and their age. It was explained that this information was intended for statistical purposes only and would be kept confidential.

Based on the recommendations of Wimmer and Dominick (2000), the questionnaire was printed on green paper to increase the response rate. Also, in an effort to improve
response rates, the questionnaire included a cover with pictures of apples that indicated the purpose of the survey and the involvement of Iowa State University.

A cover sheet explaining the study and the goals of the research was sent with the survey. It was indicated that results would be used to help apple and cider producers improve their enterprise to serve as an incentive for respondents to complete the questionnaire. The cover letter was printed on Iowa State University letterhead, as Wimmer and Dominick (2000) have found that university sponsorship increases the response rate of surveys. The official university envelope containing the survey materials was stamped with outgoing postage, rather than bulk rate, as suggested by Wimmer and Dominick (2000). The envelope provided for the return of the survey was a postage-paid Iowa State University business reply envelope.

Variables

This study is concerned with descriptively identifying the current communication behaviors of the target audience groups, analyzing producers’ perceptions of what they think consumers think about certain food safety issues to test the third-person effect hypothesis, and descriptively identifying levels of trust they hold about various information sources.

Communication Behavior

The first research question which aims to elicit communication behavior, is:

*RQ1*: Where do Iowa cider and apple producers get information about food safety in the production of apples and cider?
Communication behavior, for the purpose of this study, involves exposure to and attention paid to each potential mediated source of production and food safety information.

To measure mass media exposure, a filter question was posed, asking whether or not each medium was used. This yielded a dichotomous nominal variable. Those who indicated that they did not use a particular medium were instructed to skip to questions about another medium. Those who used a medium were asked to describe how often they use that medium. These questions were asked about television, radio, magazine, newspaper, and on-line sources.

For example, to measure exposure to television, respondents were asked, “On an average day, about how many hours of television do you watch?” The respondents could choose the answer, “Generally, I do not watch television.” (Please skip to question below about radio.) If they did not select this answer, respondents were to indicate how frequently they used television. Then, respondents were asked to indicate frequency of use by writing the “number of hours I watch television on an average day.”

Following the questions about exposure, respondents were asked how often they used each medium as a source of information about food safety. Question wording varied for each medium, as each medium has its own unit of analysis. For example, for television, respondents were asked, “When you watch television, about how often do you watch news, talk shows, or other programs about food safety?” Although wording was slightly different for each medium, in every case respondents were to choose one of these response categories: “Hardly ever,” “Once in a while,” “Somewhat often,” “Often,” and “Every day.”

The next question measured attention to food safety information on each medium. Like the previous variable, question wording varied for each medium but the available
answers for each medium were uniform. For example, in the newspaper section, the question was asked, "When you read a newspaper and come across articles about food safety, how closely do you read them?" Respondents were to select one of these possible answers: “No attention at all,” “Very little attention,” “Fair attention,” “Close attention,” and “As closely as I can.”

Third-Person Effects on Producer and Consumer Issues

The second research question is:

*RQ2: Is there a third-person effect evident on Iowa apple and cider producers’ own perception of and how they think the general public perceives food safety issues?*

To study a possible third-person effect, this study rated the Iowa apple and cider producers’ concern about several food safety technologies and policy issues and compared it with what they perceive to be the level of consumer concern on these same issues.

Specifically, the food technology and policy issues asked about were: bacteria in foods, growth hormone residues in food, genetically modified foods, pesticide residue in foods, irradiated food, naturally occurring toxins in food, antibiotic residues in food, food preparation when people eat out, and food preparation in the kitchen.

For each of these food issues, the respondents were asked, “How worried are you about the following food safety technology and policy issues related to apple growing and apple cider production? On a scale of 1 to 5, where 1 is “not worried” and 5 is “very worried,” where do you position yourself on each of these items?” The answers in each issue could categorically be named producer concern about that specific issue.
On the following page, the same issue categories were given with the same range of responses. The only thing different was the wording of the question. Respondents were asked, “How worried do you think the general public is about the following food safety technology and policy issues related to apple growing and apple cider production? On a scale of 1 to 5, where 1 is “not worried” and 5 is “very worried,” where do you position the public on each of these items?” The answers in each issue are the producers’ perception about the public’s concern for that issue.

With this collection of eighteen variables (the producers’ perception of the nine issues and how they think the public perceives such issues), a third-person effect was tested for each issue as well as the collective levels of concerns for apple industry-related issues. The collective levels of producers’ concern was also be calculated by adding their responses to each 1 to 5 scale of worry. The higher the score, the more concerned about apple industry-related issues the respondent will be. Similarly, the scores of their perception of the public’s level of worry will be added to indicate how worried the respondent perceives the public to be. These overall scores will also be tested for a third-person effect. Third-person tests can be done because the questionnaire will have already indicated media use.

It is hypothesized that individuals who use media more frequently (as measured in the communication behavior section of this study) are more likely to have a third-person effect on their perceptions of the public’s concern over food safety issues.

Trust of Various Food Safety Information Sources

The third research question is:

*RQ3: Who or what communication sources do Iowa apple and cider producers trust?*
This question will be answered descriptively by asking the respondents, "About how much do you trust the following sources of food safety information? Please indicate your response on a scale of 1 to 5, where 1 means you do not trust the source at all and 5 means you trust it very much."

The sources provided are a collection of interpersonal, mass media, and institutional sources. The media sources include: magazines, newspapers, radio news programs, and television news programs. The interpersonal sources include family, doctor or primary health-care provider, farmers, university scientists, friends, and public health officials. The institutional sources include: the US Department of Agriculture, consumer advocacy groups, the American Medical Association, food processing corporations, health/natural food stores, supermarkets, the US Food and Drug Administration, Iowa State University, the US Environmental Protection Agency, and the American Dietetic Association.

A trust index was computed for each source category by adding the trust assessments given to the sources constituting each category. As such, this study compared trust assessments indicated for interpersonal, institutional and mediated sources.

**Method of Data Analysis**

This study consisted of two sections that will contain descriptive analysis. The first section looks at the communication behavior of Iowa’s apple and cider producers. To aid interpretation of the respondents’ media behaviors, frequency distributions and analysis of means were conducted. Frequency distributions were useful to show the number of respondents who use particular media as well as aggregate mass media use trends. The mean was calculated to represent the average number of hours, days, or times the respondents
use each medium, as well as attention paid to information sources. Since the questions are asked on a 1 to 5 scale, a mean score near 5 will indicate frequent use of and reliance on that medium as a source of food safety and production information as well as a high level of attention to food safety information.

The second descriptive section indicated the food safety information sources Iowa’s apple and cider producers find credible. Again, the mean score described how credible, on average, Iowa apple and cider producers view their information sources to be.

Finally, this study tested the third-person effect hypothesis. A paired-sample t-test was used to analyze the difference between the apple and cider producers’ concerns about food safety risk issues and their perception of the general public’s concern for these same issues.

A t-test is a statistical procedure used to compare two groups of mean scores (Wimmer & Dominick, 2000). A paired sample test was used because it allows for the comparison of the mean worry scores about the same topic for the groups of data. One group of data consisted of the producers’ mean worry score of a given issue. The other group was the mean worry score that the producers perceive the general public to have. So there was one paired sample t-test for each issue asked about on this section of the questionnaire.

Once the paired sample test was performed, a regression test was conducted to see if media use affects levels of concern. Regression estimates the strength of the relationship of the two variables by computing for a correlation coefficient and indicates whether the independent variable indeed causes a change on the dependent variable.
CHAPTER 4.

RESULTS

Description of the Population

One hundred and eight of the 196 apple and cider producers who received questionnaires returned them, giving a response rate of 55 percent. The producers generally seemed to understand the directions given and gave clear, insightful answers to questions asked.

Seventy-two percent of the respondents were male. The mean age of the respondents was 55 years, with an age range of 20 to 83 years. The majority had spent an average of 16.6 years in the apple and/or cider industry, with the mode at 15 years.

Aside from being experienced in the apple business, the respondents also tended to be well educated. Twenty-eight percent indicated they had vocational or technical schooling or some college, 21 percent graduated from college, and 20 percent had post-graduate education.

More than half of the respondents (64.2 percent) categorized themselves as apple growers while 35.8 percent described themselves as both an apple grower and cider producer. None claimed to be cider producers who rely exclusively on imported apples.

The respondents' average combined household income for 2001 was between $25,000 and $49,999. Thirty-four percent claimed their yearly income fell within this range, while another 25 percent indicated that they made between $50,000 and $74,999 in 2001. Table (1) provides a summary of the demographic information about the respondents.
Table 1. Demographics of study sample

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number</th>
<th>Percent</th>
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<td>20-30</td>
<td>2</td>
<td>2.04</td>
</tr>
<tr>
<td>31-40</td>
<td>9</td>
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<td>41-50</td>
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<td>27.55</td>
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<td>51-60</td>
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<td>28.57</td>
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<td>61-70</td>
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<td>71-80</td>
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<td>11.22</td>
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<tr>
<td>81-90</td>
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<td>3.06</td>
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<table>
<thead>
<tr>
<th>Experience in Industry (years)</th>
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<th>Percent</th>
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<td>0-10</td>
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<tr>
<td>11-20</td>
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<td>21-30</td>
<td>15</td>
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<tr>
<td>31-40</td>
<td>5</td>
<td>5.20</td>
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<tr>
<td>41-50</td>
<td>3</td>
<td>3.12</td>
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<tr>
<td>51-60</td>
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<table>
<thead>
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<tr>
<td>Female</td>
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<td>21.20</td>
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<thead>
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<th>Percent</th>
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<td>80.60</td>
</tr>
<tr>
<td>Native American</td>
<td>3</td>
<td>2.80</td>
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<tr>
<td>Other</td>
<td>8</td>
<td>7.40</td>
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<table>
<thead>
<tr>
<th>Type of Producer</th>
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<th>Percent</th>
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</thead>
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<td>Apple Grower</td>
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<td>64.2</td>
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<tr>
<td>Grower and Cider Producer</td>
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<td>35.8</td>
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<table>
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<th>2001 Earned Income</th>
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<td>13.00</td>
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<td>$25000 to $49999</td>
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<td>40.20</td>
</tr>
<tr>
<td>$50000 to $74999</td>
<td>28</td>
<td>30.40</td>
</tr>
<tr>
<td>$75000 to $99999</td>
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<td>8.70</td>
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<tr>
<td>$100000 or more</td>
<td>5</td>
<td>5.40</td>
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<tr>
<td>Do not know</td>
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<td>2.20</td>
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<table>
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<th>Highest Level of Education</th>
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<th>Percent</th>
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<td>Less than high school</td>
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<td>4.00</td>
</tr>
<tr>
<td>High school graduate</td>
<td>20</td>
<td>20.00</td>
</tr>
<tr>
<td>Voc/tech school or some college</td>
<td>31</td>
<td>31.00</td>
</tr>
<tr>
<td>College graduate</td>
<td>23</td>
<td>23.00</td>
</tr>
<tr>
<td>Post graduate education</td>
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Table 1. (continued)

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<th>Values</th>
<th>Percentage</th>
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<td>Less than 5</td>
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<td>51.06</td>
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<tr>
<td>5 to 10</td>
<td>22</td>
<td>23.40</td>
</tr>
<tr>
<td>11 to 20</td>
<td>12</td>
<td>12.76</td>
</tr>
<tr>
<td>21 to 30</td>
<td>1</td>
<td>1.06</td>
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<tr>
<td>31 to 40</td>
<td>8</td>
<td>8.51</td>
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<tr>
<td>41 to 50</td>
<td>2</td>
<td>2.12</td>
</tr>
<tr>
<td>More than 50</td>
<td>1</td>
<td>1.06</td>
</tr>
</tbody>
</table>

N=108  
Total number values do not equal 108 due to non-responses

Data Analysis

Communication Behavior

To examine the communication behavior of Iowa apple and cider producers, this study asks: Where do Iowa cider and apple producers obtain information about food safety and the production of apples and cider? This question can be answered by describing the frequency of exposure to as well as amount of attention paid to different media information sources.

Frequency of exposure was measured on a 5-point scale, with 1 meaning the respondent is "hardly ever" exposed to food safety issues on that particular medium and 5 indicating that the respondent is exposed to such messages "every day." In all but one case, respondents reported using mass media channels "once in a while" for food safety information. Figure (1) compares the producers' assessments of exposure to the various information sources.

Iowa apple and cider producers indicated they are most frequently exposed to food safety messages via the television as opposed to any other medium. Their mean television
Figure 1. Producer assessment of mean media exposure
exposure was 2.879, which means they are exposed to food safety messages "once in a while."

Their newspaper exposure is at the same "once in a while" level (mean=2.505), although newspapers registered the second most frequently used medium for food safety messages. Magazines are also a source of food safety information "once in a while" for apple and cider producers (mean=2.422), as is radio (mean=2.148).

Respondents had the least amount of exposure to on-line sources, producing an exposure mean of only 1.540. This selection means that apple and cider producers "hardly ever" went on-line to find food safety information.

Finally, to measure aggregate exposure to food safety information sources, the responses to these questions were added to determine mean media exposure. Because the mean exposure for online sources was dramatically lower than other media sources, it was eliminated from the computation, giving a score more representative of traditional media (mean=11.410). This indicates that the producers are exposed to traditional media "somewhat often."

With ratings of exposure almost exactly in the middle of the scale, the amount of attention paid to the media increases in importance. To measure this, producers were asked to indicate how closely they pay attention to media on a scale of 1 (meaning "no attention at all") and 5 (meaning "as closely as I can"). In every case, producers indicated that they paid "fair attention" with attention means above 3. Figure (2) compares the producers' assessment of attention paid to various information sources.
Figure 2. Producer assessment of mean media attention
Magazines were given the largest amount of attention, with a rating of 3.648. Newspapers closely followed, with a rating of 3.646. Broadcast information sources, television and radio, were given similar amounts of attention. Television was rated 3.596 while radio was rated at 3.591. Again, on-line sources received the least attention (mean=3.117).

The discrepancy between exposure and attention paid may have been affected by the level of trust the producer has in a particular medium as illustrated by Figure (3). The issue of trust is explored further in RQ3.

Third-Person Effects on Producer and Consumer Issues

The second research question of this study asks: *Is there a third-person effect evident on Iowa apple and cider producers’ own perception of and how they think the general public perceives food safety issues?*

The first step necessary to answer this question is to calculate the producers’ level of worry as well as their perception of the general public’s level of worry. A significant difference in the means of the two levels of worry is necessary to detect any third-person effect.

Paired sample t-tests were performed to compare the mean worry scores that the producers gave each of our ten food safety issues. The results were as follows:

Apple and cider producers indicated that they were not very worried about bacteria in foods (mean=2.937) and that the public is slightly more worried about this food safety issue.
Figure 3. A comparison of producer assessment means for mass media use and trust.
(mean=3.187) than they were. However, this finding was not statistically significant (t= -1.660; p= .101).

The producers were even less worried about growth hormone residues in foods (mean=2.712). They estimated the public’s level of worry as just slightly higher at 2.840. This difference was still not statistically significant (t= -0.830; p= 0.408).

The producers’ level of worry and their perception of the public’s worry differed significantly, however, when asked about genetically modified foods. Producers felt that the buying public is more worried about genetically modified organisms (mean=3.087) than themselves (mean=2.703) (t= -2.340; p= 0.022).

Producers again predicted that the general public was more worried than themselves about pesticide residue in foods. Producers gave themselves a worry rating of 3.333 when it comes to this food safety issue, while the average worry score producers assessed for the public was 3.562. Although both were slightly higher than other paired scores, these scores were not statistically significant (t= -1.580; p= 0.117).

The controversial topic of food irradiation elicited another significant difference between the producers’ level of worry and their perception of the public’s level of worry. Producers gave themselves a worry score of only 2.466 while estimating the public’s level of worry about irradiated food at 2.888 (t= -2.800; p= 0.006).

Of the food safety issue topics asked, producers were least worried about naturally occurring toxins in food (mean=2.372). They also predicted that consumers were least worried about this topic (mean worry=2.500). Several producers denied the existence of such toxins, writing phrases such as “no such thing” in the comment column of the
questionnaire. There was no statistically significant difference between these two scores (t= -1.000; p= 0.32).

Likewise, the producers indicated they were not very worried about antibiotic residues in food, giving it a mean worry rating of 2.837. They surmise, however, that the public is slightly more worried (mean=2.869) about this food safety topic although this difference was not statistically significant (t= -0.190; p= 0.847).

Producers were more worried about food preparation when people eat in restaurants (mean level of worry=3.302). Interestingly, they predicted the public to be less worried about this topic than themselves (mean level of worry=3.197). This was the only instance of this reverse third person phenomenon occurring. Still, this difference was not statistically significant (t= 0.72; p= 0.471).

Producers worry much less about food preparation in their home kitchen (mean level of worry = 2.419). They estimated the mean level of worry for the public to be at 2.559. Again, this difference was not statistically significant (t= -1.100; p= 0.276).

Finally, to assess overall level of worry about food safety technology and policy issues related to apple growing and apple cider production, a “worry score” was computed by adding up the producers’ level of worry about all of these food safety issues. Then, their estimations of the public’s level of worry were also computed. Out of a possible score of 45, producers rated themselves 24.375 on the worry scale. Producers thought that the public had more food safety concerns overall, giving them a score of 26.412. The results indicate that there is a statistically significant difference in the producers’ level of worry and what they perceive the public’s level of worry to be (t= -2.100; p= 0.039).
Table 2. A comparison of producers' worry and perceived public worry

<table>
<thead>
<tr>
<th>Food safety issue</th>
<th>Producers' level of worry</th>
<th>Producers' perception of public's level of worry</th>
<th>T value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>2.937</td>
<td>3.187</td>
<td>-1.660</td>
<td>0.101</td>
</tr>
<tr>
<td>Hormone</td>
<td>2.712</td>
<td>2.840</td>
<td>-0.830</td>
<td>0.408</td>
</tr>
<tr>
<td>GMOs</td>
<td>2.703</td>
<td>3.087</td>
<td>-2.340</td>
<td>0.022*</td>
</tr>
<tr>
<td>Pesticides</td>
<td>3.333</td>
<td>3.562</td>
<td>-1.580</td>
<td>0.117</td>
</tr>
<tr>
<td>Irradiation</td>
<td>2.466</td>
<td>2.888</td>
<td>-2.800</td>
<td>0.006**</td>
</tr>
<tr>
<td>Toxins</td>
<td>2.372</td>
<td>2.500</td>
<td>-1.000</td>
<td>0.320</td>
</tr>
<tr>
<td>Antibacteria</td>
<td>2.837</td>
<td>2.869</td>
<td>-0.190</td>
<td>0.847</td>
</tr>
<tr>
<td>Food Preparation</td>
<td>3.302</td>
<td>3.197</td>
<td>0.720</td>
<td>0.471</td>
</tr>
<tr>
<td>in Restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Preparation</td>
<td>2.419</td>
<td>2.559</td>
<td>-1.100</td>
<td>2.76</td>
</tr>
<tr>
<td>At Home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>24.375</td>
<td>26.412</td>
<td>-2.100</td>
<td>0.039*</td>
</tr>
</tbody>
</table>

* indicates p<.05  ** indicates p<.01

Trust of Various Food Safety Information Sources

The third question in this study asks: *Who or what sources do Iowa apple and cider producers trust for food safety information?*

In assessing the apple and cider producers' level of trust in information sources, answers were selected from a scale of 1 to 5, with 1 meaning the producer does not trust the source at all and 5 meaning the producer trusts the source very much. Mean trust scores were calculated for each information source.

Iowa's apple and cider producers gave their family the highest trust assessment of all possible sources, with a score of 4.010. The family doctor, with a score of 3.687, and University scientists, with a score of 3.677, had the next highest trust assessments. All three of these are interpersonal information sources. Other interpersonal sources received favorable trust scores as well. The producers gave other farmers a 3.38 trust rating while
public health officials were assessed a 3.278 rating. Friends received the lowest trust rating of the group of interpersonal information sources with 3.082. However, this rating is higher than the ratings awarded to all of the mass media sources and better than half of the institutional information sources. Figure (4) compares the producers’ trust ratings of the various interpersonal information sources.

Iowa State University was given the highest trust assessment for an institutional source at 3.670. This rating is the same as that awarded to university scientists in the interpersonal group. Besides ISU, the American Medical Association (trust rating of 3.500), the United States Department of Agriculture (3.420), the American Dietetic Association (3.327), and the U.S. Food and Drug Administration (3.263) were the highest rated institutional sources of information. Figure (5) compares the producers’ trust ratings of the various institutional information sources.

The trust scores for media sources were consistently low. The producers reported trusting magazines the most of the media information sources with a trust rating of 3.092. This score was lower than most interpersonal information sources as well as all of the non-profit institutions. Radio was given the next highest trust rating of 2.818. The producers’ low trust level of 2.619 for newspapers was followed only by television’s rating of 2.515. Figure (6) compares the producers’ trust ratings of media information sources.

At an aggregate level, producers gave interpersonal information sources higher trust scores while mass media channels and institutions received lower trust scores. The mean
Figure 4. Trust assessment means for interpersonal information sources
Figure 5. Trust assessment means for institutional information sources
Figure 6. Trust assessment means for mass media information sources
score for interpersonal sources was 3.517 on a scale of 5. Institutional sources were trusted slightly less, with a mean score of 3.001. This figure may be slightly misleading as this category contained both government agencies and for-profit industries. The mean score for government institutions only was slightly higher at 3.330. The combination of health food stores, food processing corporations, supermarkets, and consumer advocacy groups produced a mean trust score of 2.497. Figure (7) illustrates the discrepancy between levels of trust in government or non-profit institutions and those seen to be stakeholders such as supermarkets and consumer groups.

Finally, the mean score for mass media sources was 2.761. This score was the lowest of the three information source categories and only slightly more trustworthy to the producers than for-profit corporations and consumer advocacy groups. A comparison of the levels aggregate levels of trust in mass media, interpersonal, and institutional information sources is provided in Figure (8).

To uncover what variables influenced levels of trust in media, institutional, and interpersonal information sources at an aggregate level, stepwise multiple regressions were performed. The multiple regressions were performed with demographical data such as age, gender, level of education, amount of income from apple industry, type of producer, years of experience, and the size of the farm in acres. In addition, the calculated levels of media attention and media exposure were also tested.

This study found that education was the only predictor variable that was statistically significant in affecting any rate of trust. The data showed that the level of education of the producer was statistically significant in predicting the level of trust in media information
sources. None of the other variables significantly influenced the producers' levels of trust in institutional, interpersonal, or media sources.
Figure 7. Trust assessment means for two institution types
Figure 8. Comparing trust in mass media, institutional and interpersonal information sources
CHAPTER 5.

CONCLUSIONS

Discussion and Summary

This study examined the communication needs and behaviors of Iowa’s apple and cider producers. Specifically, it measured the levels of exposure and attention to mass media messages about food safety within the context of apple growing and cider production. It also examined the levels of trust that the producers had in mass media, interpersonal, and institutional sources of information. Finally, this study tested whether the use of mass media resulted in a third-person effect on the producers’ perception of the general public’s level of worry about food safety issues.

Communication Behavior

Not surprisingly, it was found that Iowa’s apple and cider producers are frequently exposed to mass media messages about food safety on every medium except online information sources. The producers reported using magazines, newspaper, radio, and television “once in a while” to gather food safety information. These rankings were near the middle point of five-point scales that asked about their frequency of exposure to food safety information through a host of channels. However, the producers reported “hardly ever” using online sources for food safety information.

Although apple and cider producers indicated that they obtain food safety information “once in a while” from the media, they report that they pay “fair attention” to these messages. All investigated media channels (except online sources) were given a rating above 3 on a
five-point scale. The producers were most attentive to information from print sources, giving newspapers and magazines nearly equal ratings. Radio and television were slightly less attended to while online sources of food safety information were rated the lowest.

These findings, coupled with their media trust assessments provide insights on the development of a communication strategy designed to transmit information to Iowa’s apple and cider producers. The evidence indicates, for example, that magazine articles about food safety should be a priority for any such campaign, as the producers trust these publications more than any other medium. When one looks at the high levels of trust in and attention to magazines and compares it to the relatively low levels of exposure to this medium, the data seems to imply a producer demand for increased magazine coverage of food safety issues.

Newspaper coverage of food safety issues provides its own set of challenges for apple and cider producers. Producers indicated that they are more frequently exposed to and pay greater attention to newspaper articles perhaps because newspapers are an affordable and timely source for information. However, the producers’ trust in this medium trails magazine and radio news. Some of the producers, in an open-ended section of the questionnaire, blamed media sources such as newspapers for allocating too much space to food safety disasters, thus reinforcing a public perception that is already wary about the risks involved in eating foods that can get contaminated from the farms to their tables. Newspaper coverage that is less sensationalistic but more factual will certainly provide a more realistic framework for producers and consumers alike to make rational food choices.

To accomplish this, it is essential that media practitioners, particularly newspaper reporters, be in contact with credible and readily accessible spokespersons at all times. Proactive contact with the media is the best way of presenting up-to-date information,
creating trust among the producers and countering the negative impact of any food safety crisis.

Iowa’s apple and cider producers indicated that they have a high degree of trust in radio as a source of food safety information. Unfortunately, they report having the least amount of exposure and attention to food safety information from this medium. Therefore, it is difficult to envision using radio as a key source of food safety information. Although limited amounts of information can be communicated via agricultural programming, there are few programs that would deliver industry specific information to apple and cider producers. Since radio is a trusted medium, occasional food safety messages that are relevant to producers have potential to be powerful.

Television is a tricky medium for small apple and cider producers. Although this is the medium they are most frequently exposed to, it is also the medium they trust the least. The producers pay slightly more attention to television than they do radio, but the high exposure combined with low levels of trust implies that television is more of an entertainment source than one for gathering information. Food safety information has potential to be disseminated on agricultural or news programs, but again this medium should be reserved for food safety information of the utmost importance.

Despite low exposure levels paid to them, it is surmised that online sources of food safety information will continue to grow in importance among this particular target audience. The respondents report that they pay consistent attention to online sources of food safety information when it is available. As such, as these sources become increasingly accessible they will grow in importance among the producers. Also, apple and cider producers demonstrated high trust levels for public institutions and interpersonal information sources.
The ability of online platforms to present timely, relevant food safety content from these types of sources will be a great asset in any effort to communicate with this group of producers. Online platforms also have potential to facilitate interpersonal communication among a network of similar producers so that organization and cooperation can occur to strengthen the local industry as a whole.

Third-Person Effects on Producer and Consumer Issues

The demonstrated frequent exposure to mass media sources prompts a further research question: Did this level of exposure lead to a third-person effect? That is, could there be a difference between what Iowa apple and cider producers think about food safety issues and how the general public perceives these same issues? Likert scale responses in seven of the nine food safety issues addressed in the questionnaire did not show any evidence of this phenomenon occurring.

The two issues in which there was a significant difference in the producers’ perception of their own level of worry and what they thought to be the public’s level of worry could be considered the two most controversial in the list. Food irradiation and genetically modified organisms are indeed the most intensely debated of the topics in the media. Perhaps not surprisingly, these were the ones that demonstrated evidence of a third-person effect. As far as these two issues are concerned, producers estimated the public’s level of worry about irradiation and GMOs to be significantly greater than theirs.

When combining the levels of worry about all nine of the food safety issues into an overall measure or a “worry index”, it was found that there is a significant difference in the producers’ assessments and their perception of the general public’s level of worry about food
safety. Much like with the controversial topics of irradiation and GMOs, the producers thought that the general public was more worried about food safety issues in general than themselves.

These results strengthen previous findings concerning self-reported levels of trust in mass media channels. For topics that are portrayed in the media as being complex and controversial, such as the use of irradiation and genetically modified organisms, the general public as well as the producers rely on media for information. Therefore, it is fitting that a group that places little trust in the various media sources should expect the media to inadequately inform the public. In this case, the producers seem to be saying that they think that food and the technologies used to produce it really are safe but the media somehow persuade the public into thinking that it is not.

Although the food safety issues were general in nature and not exclusively in the domain of apple and cider production, it is assumed that perceptions of public worry about these and other issues would play a part in the producers’ business strategy. For example, if a producer feels that consumers are very worried about pesticide residues and therefore abandons pesticide use, the results could have negative effects on crop production and marketing. Failure to implement a proper organic pest management system in this case could lead to a severe crop reduction. Assessing the market accurately is a priority for producers.

A third-person effect may impair the producers’ abilities to effectively market their products. Therefore, information gathering and constant orientation to the business are critical aspects of a producer’s life. This points to the importance of university extension and
interpersonal information sources to supplement what the producers learn from media sources.

Trust of Various Food Safety Information Sources

This study found that Iowa's apple and cider producers place the greatest amount of trust on interpersonal information sources. They trust institutional information sources slightly less while generally reporting a low level of trust in the media for food safety information.

Although the respondents frequently use media for gathering information about food safety, their level of trust in the media to provide this information would suggest that communication strategists must select their media and tailor their message carefully. With low levels of trust, the media cannot be relied upon exclusively to communicate the very specific and unique information apple and cider producers need. This calls for a communication strategy that integrates mass media messages with interpersonal ones.

When communicating with apple and cider producers via the media, magazines are essential because they are the most trusted media source. Because magazines can specifically target a group, the relevance and utility of the information is greater to the reader. Magazines can also provide more detailed, in-depth and more contextualized information than other media.

Newspapers may also be utilized when communicating with the apple and cider producers, though not as effectively as magazines. The producers indicated that they do not trust newspapers as much as magazines. But for messages in which timely dissemination is
necessary, newspaper is the best choice for this group given the amount of exposure and attention paid to it.

Radio can be used to transmit occasional messages of great importance to apple and cider producers because the respondents indicated a greater level of trust on this medium.

There are several factors that make television impractical for communicating specific food safety information to apple and cider producers, not the least of which is their low level of trust in the medium. Other factors include the cost and the strategic lack of ability to target this small group.

According to the respondents, institutional sources are more trustworthy than media. Government-funded agencies such as the United States Department of Agriculture and Iowa State University are seen as authorities – and thus enjoy tremendous credibility -- in the realm food safety information. Therefore, these agencies' endorsement of food safety products and procedures are more likely to lead to the adoption of such recommended practices. In short, messages are looked upon more favorably if they originate from familiar institutional sources.

Conversely, institutions seen as being for profit (such as supermarkets) are trusted much less than government-funded or supported institutions. Also, apple and cider producers find consumer advocacy groups and the Environmental Protection Agency less trustworthy than other institutions. These groups will obviously have a difficult time communicating with Iowa's apple and cider producers.

The producers' most important source of food safety information comes from interpersonal contact. Therefore, to effectively transmit information to the producers, communication strategies must exploit the full potential of opinion leaders. Respondents
claim they trust doctors, university scientists, other farmers, public health officials, and their friends most. If one wishes to communicate specifically with the apple and cider producers of Iowa, one must therefore facilitate their interpersonal interactions with actual representatives of these institutions. University extension projects, demonstrations and clinics, panel discussions, and farm visits are examples of how information can be presented to apple and cider producers. A main advantage of interpersonal communication is that, unlike the mass media, the communicator can also collect information from producers.

The theoretical and rhetorical debate is still on: Are online sources forms of interpersonal or mass communication media? Indeed they possess characteristics and contain elements of both forms of communication. As access to and use of these sources increase, the potential for more efficient communication with such targeted groups as Iowa’s apple and cider producers dramatically increases. Online sources have the advantage of being a relatively efficient ways of disseminating an abundance of information to large groups (much like the mass media). On the other hand, they also offer ways for institutions to both transmit to and receive information from producers. Finally, online communication can facilitate efficient interaction among interpersonal sources.

**Implications for Further Study**

This study examined a very specific population of individuals. Because there is a limited number commercial apple and cider producers in Iowa, the results should reflect the perceptions and communication needs of this local industry fairly accurately. To some extent, the study was available to nearly all of the state’s commercial apple growers and cider
producers. The findings, therefore, are particularly robust because they dealt with population parameters rather than statistical inferences.

The findings, however, cannot be generalized to other apple growing regions, particularly industry-leading states such as Michigan and Washington where the number of producers is much greater and may possess different characteristics pertinent to apple growing and cider making. Consequently, this study precludes a comparative analysis of the communication and information needs of apple growers and cider producers of a nascent apple-producing state such as Iowa where the apple industry is far less essential to the overall state economy, and those in the industry’s titan states such as Washington and Michigan.

It would have strengthened internal validity further, for example, if the communication behaviors of small, medium, and large-scale apple producers could be compared. It would have been of interest to communication strategists, for instance, to know if there is a difference in the communication requirements of those in the apple and grape industries.

Communication Behavior

The study did not ask respondents exactly what magazines or newspapers they subscribe to, what radio channels they listen to, what TV programs they watch, and what online sites they frequently log on to. Valuable information might have been gathered by analyzing such specific selections. Knowing which magazines the producers read or which radio station/programs they listen to would be helpful in further targeting this group in an integrated communication plan.
The findings do suggest the continuous monitoring of online access and use of online information sources. Learning more about when and how they use online information will allow for better communication using this medium.

Third-Person Effects on Producer and Consumer Issues

This study found a significant third-person effect on the producers’ perceptions of consumers’ worry only on issues thought to be highly controversial, especially in the local context: food irradiation and the consumption of genetically modified foods. These may not, however, be the topics for which consumers and producers may demonstrate divergent levels of worry. In another area of the country, or even the world, these may be non-issues at all. For example, a primarily agricultural state such as Iowa may simply not worry about pesticide residues in foods while people from more industrialized states may find pesticides more worrisome. Additional third-person effect research might investigate the local levels of controversy surrounding these and/or other producer and consumer issues as a predictor of the strength of the third-person phenomenon.

Trust in Various Food Safety Information Sources

Additional qualitative research may be helpful in uncovering the reasons behind the differences in levels of trust in informational sources. One good example would be to determine the reasons why respondents seem to trust the Environmental Protection Agency significantly less than the others.
Conclusion

Small agricultural industries, such as the apple and cider industry in Iowa, face great challenges as ownership becomes more concentrated to the wealthiest few. Adding to this challenging competitive structure is an increased demand for safe apple cider. Small and large apple and cider producers alike are concerned with providing a safe, quality product. But the fact remains that quality standards and regulated practices add to the cost of production. With more money available for product development, large apple and cider producers can afford to implement these standards and practices. Meanwhile, the small producers must find a way to offset the rising costs in their smaller budgets.

Research institutions such as Iowa State University are working to develop affordable solutions for both large and small producers to meet the quality demands of the public. As results become available, those who can access information and put it into practice will hold a definite advantage. In this changing agricultural environment, information is a key to survival.

With the results of the media usage portions of this study, communicators may better understand how to target this specific group through the media. With the trust portions of this study, communicators may better understand how to supplement mass media communications with interpersonal interactions. Finally, the third-person effects portions of this study shows communicators how controversial food safety issues can become distorted by media messages. This points to the importance of integrated communications strategies.

As information is a key to industry survival, communication with and among Iowa apple and cider producers is essential. Perhaps the main advantage that a small, localized industry has is the potential for more efficient communication. Interpersonal ties with fellow
producers and university scientists can result in the transmission of helpful advice and information pertinent to the production of a safe, high-quality product. In the budding apple and cider industry in Iowa, as with any small business, future success hinges upon the ability of this group to communicate.
TELEVISION: On an average day, about how many hours of television do you watch?

___ Generally, I do not watch television. (Please skip to question below about radio.)

___ Number of hours I watch television on an average day.

When you watch television, about how often do you watch news, talk shows, or other programs that talk about food safety?

Hardly ever  Once in a while  Somewhat often  Often  Every day

When you watch television and come across programs about food safety, how closely do you watch them?

No attention at all  Very little attention  Fair attention  Close attention  As closely as I can

RADIO: On an average day, about how many hours of radio do you listen to?

___ Generally, I do not listen to the radio. (Please skip to question next page about newspapers.)

___ Number of hours I listen to the radio on an average day.

When you listen to the radio, about how often do you listen to programs that talk about food safety?

Hardly ever  Once in a while  Somewhat often  Often  Every day

When you listen to the radio and come across programs about food safety, how closely do you listen to them?

No attention at all  Very little attention  Fair attention  Close attention  As closely as I can
NEWSPAPERS: In an average week, about how many days do you read a newspaper?

____ Generally, I do not read newspapers. (Please skip to question below about magazines.)

____ Number of days I read a newspaper in an average week.

When you read a newspaper, about how often do you see articles about food safety?

Hardly ever  Once in a while  Somewhat often  Often  Every day

When you read a newspaper and come across articles about food safety, how closely do you read them?

No attention at all  Very little attention  Fair attention  Close attention  As closely as I can

MAGAZINES: In an average week, about how many days do you read a magazine?

____ Generally, I do not read magazines. (Please skip to question next page about on-line information sources.)

____ Number of days I read a magazine in an average week.

When you read a magazine, about how often do you see articles about food safety?

Hardly ever  Once in a while  Somewhat often  Often  Every day

When you read a magazine and come across articles about food safety, how closely do you read them?

No attention at all  Very little attention  Fair attention  Close attention  As closely as I can
ON-LINE SOURCES: In an average week, about how many times do you access websites?

_____ Generally, I do not read websites or go to other on-line information sources.

_____ Number of times a week I read websites or other on-line information sources.

When you access websites, about how often do you see articles about food safety?

When you access websites and come across articles about food safety, how closely do you read them?

Iowa State University is proposing the creation of a website devoted to the Iowa apple growing and apple cider industry. Do you agree that this is a good information vehicle for apple growers and cider producers?

Should Iowa State create a website devoted to the Iowa apple industry, what should this website contain? Below is a list of the possible contents of this website. Please circle the items you think should be included in the website.

[1] Scientific reports  [7] Trade links (i.e., to shippers and processors)
[6] Links to Iowa State University  [12] Others (Please specify.) _________________________

__________________________

__________________________

__________________________
II. Producer and consumer issues

Of all the problems confronting you as an apple grower or apple cider producer, what are the three issues that you consider most important?

1. 

2. 

3. 

How worried are you about the following food safety technology and policy issues related to apple growing and apple cider production? On a scale of 1 to 5 where 1 is not worried and 5 is very worried, where do you position yourself on each of these items?

<table>
<thead>
<tr>
<th>Not worried 1</th>
<th>Very worried 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Bacteria in foods</td>
<td></td>
</tr>
<tr>
<td>b. Growth hormone residues in food</td>
<td></td>
</tr>
<tr>
<td>c. Genetically modified foods</td>
<td></td>
</tr>
<tr>
<td>d. Pesticide residue in foods</td>
<td></td>
</tr>
<tr>
<td>e. Irradiated food</td>
<td></td>
</tr>
<tr>
<td>f. Naturally occurring toxins in food</td>
<td></td>
</tr>
<tr>
<td>g. Antibiotic residues in food</td>
<td></td>
</tr>
<tr>
<td>h. Food preparation when people eat out</td>
<td></td>
</tr>
<tr>
<td>i. Food preparation in the kitchen</td>
<td></td>
</tr>
</tbody>
</table>
How worried do you think the general public is about the following food safety technology and policy issues related to apple growing and apple cider production? On a scale of 1 to 5 where 1 is not worried and 5 is very worried, where do you position the public on each of these?

<table>
<thead>
<tr>
<th>Issue</th>
<th>Not worried</th>
<th>Very worried</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria in foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth hormone residues in food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetically modified foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticide residue in foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irradiated food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naturally occurring toxins in food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic residues in food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation when people eat out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation in the kitchen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How much do you agree or disagree with these statements about food irradiation?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most persons will be in favor of eating irradiated food.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating irradiated food will be safer than eating non-irradiated food.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating irradiated food will increase my likelihood of contracting cancer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I trust public health officials who support food irradiation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More research needs to be done on food irradiation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The idea of eating irradiated food frightens me.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the US Food and Drug Administration approves of food irradiation, then I can go along with it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irradiating food will decrease the income of farmers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating irradiated food will decrease the nutritional value of my diet.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### III. Trust and evaluation

About how much do you trust these sources of food safety information? Please indicate your response on a scale of 1 to 5 where 1 means you do **not trust the source at all** and 5 means you trust it **very much**.

<table>
<thead>
<tr>
<th>Source</th>
<th>Do not trust at all</th>
<th>Trust very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magazines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The US Department of Agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio news programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your doctor or primary health-care provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer advocacy groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Television news programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The American Medical Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food processing corporations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health/natural food stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supermarkets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The US Food and Drug Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University scientists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public health officials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The US Environmental Protection Agency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newspapers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The American Dietetic Association</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are the following groups doing a good, fair, or poor job of protecting the safety of America’s food supply?

<table>
<thead>
<tr>
<th>Group</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Not responsible for food safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government agencies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer advocacy groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University scientists</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supermarkets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food processing corporations</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
IV. Tell us a little about you.

We have just a few questions about you and your household. Your responses will be used for statistical purposes only and will be kept confidential.

1. What best describes you?
   [1] an apple grower
   [2] an apple cider producer (Please skip to Question 3 below.)
   [3] both (apple grower and cider producer)

2. If you’re an apple grower, how many acres devoted to apples do you own, rent or lease? _______ acres

3. How long have you been an apple grower or apple cider producer? _______ years

4. What is the highest formal education you have completed? (Please circle one.)
   [1] less than high school graduate
   [2] high school graduate
   [3] Vocational school/ technical school/ some college
   [4] college graduate
   [5] post graduate education

5. What was your age on your last birthday? _______ years

6. How much total income before taxes did your household earn in 2001? Please estimate the combined income for all household members from all sources.
   [1] Less than $25,000
   [2] $25,000 to $49,999
   [3] $50,000 to $74,999
   [4] $75,000 to $99,999
   [5] $100,000 or more
   [6] Don’t know


8. Which of these categories best represents your race/ethnic background? (Please mark all categories that apply to you.)
   [1] African American
   [3] European American
   [4] Native American
   [5] Hispanic /Latino /Latina American
   [6] Other (Please specify.) ____________________

Thank you very much for your time!
REFERENCES


ACKNOWLEDGEMENTS

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I would also like to thank my friends, family and those at the Greenlee School who have always been there to help along the way. A special thanks goes to Jane Peterson, a colleague and friend who re-sparked my interest in communicating about science and opened doors of opportunity to me. Without her, I would never have had the chance to study this topic.

I would also like to express my appreciation to the survey participants and the food scientists with whom I worked on this project. Both were extremely patient and always willing to share and teach me about something I once knew very little about.

Last but not least I wish express sincere gratitude toward my wife Sara, who had the patience to support me through the last two years. She is always there to share in both the excitement and frustration of this and every experience I encounter. She always believes in me and never allows me to take things too seriously. Like everyone else on this list, I learn much from her and I could not have finished this thesis without her.