A National Evaluation of the Beef Cattle Industry’s Use of Communication Channels to Obtain Information Regarding Food Safety

Category: Research Paper

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Abstract

*Beef is the number one protein in the United States and the beef industry contributes millions of dollars to the United States’ economy (NCBA, 2004). One important issue facing the beef industry is food safety. This study sought to determine the most effective communication methods for delivering information regarding food safety to individuals involved in the beef industry. A researcher-developed instrument was used to gather information at the 2006 National Cattlemen’s Beef Association in Denver, Colorado. A convenience sampling method was used to sample attendees. The communication theory developed by Berloe (1960) established a theoretical framework for this study. Researchers found “magazine,” “free Internet,” and “technical publication” as the respondents’ three most preferred information channels. These three channels were correlated with selected demographic characteristics. Almost 90% of respondents reported accessing information on food safety at least once a month.*

Key Terms: Beef, Beef Cattle Industry, Food Safety, *E. coli* O157:H7, National Cattlemen’s Beef Association, Communication Channels and Delivery Methods
Introduction

According to the 2003 United States Department of Agriculture consumption data, beef was the number one source of protein in America, and the demand for beef has continued to grow (NCBA, 2004). With the high demand for beef, comes the responsibility of the American beef industry to provide a safe product for consumers. Although not all food-borne illnesses are caused by beef, there are an estimated 76 million cases of food borne illness, 325 thousand hospitalizations, and five thousand deaths from food-borne diseases in the United States each year (Mead et al., 1999).

Because of these illnesses and deaths, food and animal scientists have been exploring methods of reducing pre-harvest pathogen shedding in cattle. Today, scientists are more knowledgeable concerning the epidemiology and are developing interventions that beef cattle producers can implement in their own practices to control potentially harmful pathogens and outbreaks in the future. Several known factors significantly influence the variation in pathogen shedding. These factors include simple management practices and numerous treatment interventions (Loneragan & Brashears, 2005).

A recent example of pre-harvest pathogen shedding causing illness and death was the *E. coli* O157:H7 spinach outbreak reported on September 25, 2006, in California. Reports indicated this outbreak was due to live animals shedding *E. coli* 0157:H7. This shedding was thought to have infected the spinach at a closely located spinach farm (CBC News, 2006).

Beef cattle producers may lack awareness of new scientific methods and treatment interventions available to treat pathogen shedding of live animals until the information is communicated to them. This leaves researchers with the task of determining which information channel(s) they should use to deliver their message and educate the beef industry about treatment
interventions.

By informing the public and educating consumers about basic food safety principles and practices, scientists hope to assist in decreasing the number of food-borne illnesses. This is challenging, however, because food safety topic areas can be very diverse and the audiences for the information can be equally diverse (Henroid, Ellis, & Huss, 2003).

Theoretical Framework

The purpose of communication was defined by Aristotle as a means of persuasion (Berloe, 1960). Aristotle believed there were three main communication ingredients: the speaker, the speech, and the audience.

In 1960, Berloe expanded upon Aristotle’s theory and a 1947 communication theory developed by Shannon and Weaver. The communication theory proposed by Berloe focused on a source, message, channel, and receiver (Berloe, 1960). He defined the source as a person or group of persons with a purpose or reason for engaging in communication who encodes a message. After the information is encoded, it is expressed in a message. The channel is the medium or the carrier of the message. The receiver is the target of communication and decodes the message.

Berloe (1960) explained that the choice of a communication channel is many times the most important factor in the effectiveness of communication. At the time of his publication, examples of communication channels were the radio and newspaper. Today, the number of communication channels has expanded dramatically. Fourteen communication channels were identified by a group of agricultural communicators at a university for this study. Those channels are comprised of the following: magazine, Internet (free), technical publication, newsletter,
In a study concerning beef cattle producers and communication channels, Obahayujie and Hillson (1988), found that Virginia beef cattle producers ranked clinics near the lowest as a preferred information channel. A later study involving North Carolina farmers found that the farmers preferred self-directed methods to receive information because they were more convenient and complete (Caldwell & Richardson, 1995).

In a study focusing on home makers’ preferred delivery methods, Boone and Zinger (2001) reported that mass media including television, radio, magazines, and newspapers, were used regularly by home makers. However, the mass media channels were used merely as awareness tools and respondents turned to other resources for more in-depth information. Most participants in this study were more trusting of written materials like newsletters than mass media.

In 2003, Bisdorf et al. reported the adoption of Web technology in the agricultural community was moving much slower than other industries. However, she explained that using the Web as an information source for the media can be an effective delivery method but determined in 2003 that the Internet appeared to be an under used channel for delivering agricultural information.

However, in the same year, Cody and Hogue (2003) found the Internet was becoming an accepted method for the dissemination of food safety information and providing answers to food safety questions.

More recent research indicates that more audiences are becoming dependent on the Internet as an information source (Ruth et al., 2005). The number of Americans using broadband
in their homes had increased by 40% from March 2005 to March 2006 – a substantial increase from the previous year (Horrigan, 2006a). The adoption of broadband in rural areas has also increased by 39%. This is comparable to the increase in urban areas.

It has been reported that approximately 50 million Americans use the Internet daily for online news-gathering (Horrigan, 2006b). This news-gathering trend coincides with the rapid broadband adoption in American homes.

Purpose and Objectives

Food and animal scientists have determined a source, agricultural communicators are developing a message, and the receivers of the message have been identified. However, the fourth component to the communication process, the channel, was not clearly identified. Therefore, the purpose of this study was to determine the most effective communication channel(s) for delivering information regarding food safety to individuals involved in the beef industry and to decide how often to deliver this information. Researchers ultimately hope this study will increase awareness and knowledge of food safety and reduce the number of food-borne illnesses related to beef production. The research objectives of this study were to:

1. Determine the preferred information channel of each respondent for receiving information regarding food safety.

2. Determine the relationship between selected demographic characteristics and the respondents’ preferred information channels for receiving information regarding food safety.

3. Determine the frequency the respondents reported seeking out information regarding food safety.
Procedures

This was a quantitative, descriptive correlational study. The data for this research study were collected at the 2006 National Cattlemen’s Beef Association’s (NCBA) annual conference in Denver, Colorado, February 1-2, 2006.

Researchers used a convenience sample limited to a desired population to obtain data. In research, it is sometimes difficult or even impossible to select a random or systematic non-random sample. When this occurs, Fraenkel and Wallen (2006) acknowledge that researchers may be forced to use a convenience sample to obtain data.

Members of the accessible population for this research study were those attendees of the 2006 National Cattlemen’s Beef Association who attended the tradeshow exhibits during the conference. The sample was members of one or more of the following organizations: the National Cattlemen’s Beef Association, the Cattlemen’s Beef Promotion and Research Board, the American National Cattlewomen, Inc., Cattle-Fax, and/or the National Cattlemen’s Foundation. This conference was selected by the researchers because it represented a national group of beef cattle producers who were representative of all segments of the beef cattle industry. However, researchers caution against inferring the results of this study to a larger population because of the sampling method used to collect data.

The survey used to collect information was a researcher-developed instrument. The instrument was used to collect data for multiple research projects. Because this study was only one part of a larger study funded by the Food Safety Inspection Service, only select questions in the instrument pertained to this research purpose. The sections of the instrument pertaining to this study were sections E and F.

The content and face validity of this instrument were established by having a panel of
experts review the instrument. For this study, a panel composed of food safety experts reviewed the instrument for scientific content, and a panel of agricultural educators and communicators reviewed the instrument for face validity. Minor changes were made to the instrument based upon the panels’ recommendations.

Section E of the instrument pertained to information sources. Respondents were asked to select from the list of 14 information channels, the channels they used to find information on food safety. From these channels, they were asked to select their preferred channel to receive information regarding food safety in beef products. They were also asked to report how frequently they sought out information related to food safety. Section F pertained to demographic information of the respondents.

To determine the reliability of this research-developed instrument, it was pilot tested on a group of 30 graduate-level food and animal science students in the South Plains area of Texas. The calculation of the reliability was performed using the coefficient alpha within SPSS. A score of .80 or better is sufficient for an instrument to be considered as having adequate reliability (Gall, Borg, & Gall, 1996, p. 254). The calculated reliability for the information section was 0.89. No reliability was calculated for the demographics section. None of the individuals who completed the instrument in the pilot test attended the 2006 NCBA conference.

Data were collected from attendees of the 2006 NCBA conference who stopped and completed the instrument at the tradeshow. Respondents received a complimentary black portfolio as an incentive. The instrument took approximately five minutes to complete.

According to NCBA conference officials, 5,500 people attended the conference (M. Rossman, personal communication, September 16, 2006). Conference planners estimated 100% of conference attendees visited the tradeshow during the conference. Krejcie and Morgan (1970)
recommended a sample size of 381 for a population of 5,500. The sample size for this study was 627, however, not all respondents completed the information section.

Whenever the characteristics of individuals are correlated, there is the possibility that additional characteristics, besides those characteristics measured, may explain any relationship found between the measured characteristics (Fraenkel & Wallen, 2006). This threat is known as subject characteristics and is a possible threat to this study. Researchers attempted to control the threats of location, testing, instrument decay, data collector characteristics, data collector bias, testing, and mortality by having the same individuals administer the survey in the same location over a two day period.

All collected data were entered into a Microsoft Excel® spreadsheet using a researcher developed Web site with target points. On individual questionnaire items, when respondents chose not to provide an answer, the coding was treated as missing data. The data were transferred into SPSS. All data were evaluated using the statistical software program, SPSS/PC for Windows (Version 13).

Findings

Findings for Objective One

The first objective was to determine the preferred information channel of respondents for receiving information regarding food safety. Respondents selected their preferred information channel from a list of 14 possible channels which were comprised of the following: magazine, Internet (free), technical publication, newsletter, seminar (less than three days), radio, television, field day, Internet (fee-based), newspaper, seminar (longer than three days), computer software, farm demonstrations, and farm tours. The most frequently selected information choice was
“magazine” (31.1%, \( n = 163 \)). The second most frequently selected information choice was “free Internet” (23.5%, \( n = 123 \)). The third most frequently selected information choice was “technical publication” (11.1%, \( n = 58 \)). This information is represented in Table 1.

**Table 1**

*The beef cattle industry’s preferred information channels to receive information regarding food safety. (\( n = 524 \)).*

<table>
<thead>
<tr>
<th>Information Channel</th>
<th>Frequency (( f ))</th>
<th>Frequency Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magazine</td>
<td>163</td>
<td>31.1</td>
</tr>
<tr>
<td>Internet (free)</td>
<td>123</td>
<td>23.5</td>
</tr>
<tr>
<td>Technical publication</td>
<td>58</td>
<td>11.1</td>
</tr>
<tr>
<td>Newsletter</td>
<td>38</td>
<td>7.3</td>
</tr>
<tr>
<td>Seminar (less than 3 days)</td>
<td>33</td>
<td>5.2</td>
</tr>
<tr>
<td>Radio</td>
<td>23</td>
<td>4.4</td>
</tr>
<tr>
<td>Television</td>
<td>22</td>
<td>4.2</td>
</tr>
<tr>
<td>Field day</td>
<td>16</td>
<td>3.1</td>
</tr>
<tr>
<td>Internet (fee-based)</td>
<td>15</td>
<td>2.9</td>
</tr>
<tr>
<td>Newspaper</td>
<td>12</td>
<td>2.3</td>
</tr>
<tr>
<td>Seminar (more than 3 days)</td>
<td>9</td>
<td>1.7</td>
</tr>
<tr>
<td>Computer software</td>
<td>5</td>
<td>.9</td>
</tr>
<tr>
<td>Farm Demonstrations</td>
<td>3</td>
<td>.6</td>
</tr>
<tr>
<td>Farm Tours</td>
<td>2</td>
<td>.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>524</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Findings for Objective Two

The second objective was to determine the relationship between selected demographic characteristics and the respondents’ preferred information channels for receiving information regarding food safety.

The three most preferred information channels identified in objective one were correlated to demographic characteristics. A point-biserial correlation was calculated to determine the relationship between the three most frequently selected information channels and the interval demographic characteristic, age (Table 2). The sample size \( n = 588 \) for this correlation was all respondents who reported their age and reported using these three communication channels to obtain information on food safety. Both magazine and technical publication had positive relationship with age, but free Internet had a negative relationship with age. However, these relationships were all negligible (Davis, 1971).

Table 2

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Magazine</th>
<th>Technical Publication</th>
<th>Internet (free)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.01</td>
<td>.04</td>
<td>-.06</td>
</tr>
</tbody>
</table>

A point-biserial correlation was calculated to determine the relationship between the three most frequently selected information channels and the interval demographic characteristic, years of education (Table 3). The sample size \( n = 557 \) for this correlation was all respondents who reported their years of education and reported using these three communication channels to obtain information on food safety. Magazine had a negative relationship with years of education and free Internet had a positive relationship to years of education. Both were negligible (Davis,
1971). The Davis naming convention categorizes the relationship as a positive, low correlation ($r_{pb} = .23$) between technical publication and years of education.

Table 3

*Relationships between years of education and preferred information sources (n = 557).*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Magazine</th>
<th>Technical Publication</th>
<th>Internet (free)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of education</td>
<td>-.05</td>
<td>.23</td>
<td>.09</td>
</tr>
</tbody>
</table>

*Findings for Objective Three*

The third objective was to determine the frequency the respondents reported seeking out information regarding food safety. The respondents were asked to select how often they seek out information related to food safety from a list of choices comprised of the following: yearly, monthly, weekly, daily, and never. The most frequently selected time was “monthly” (40.6%, $n = 230$). The second most frequently selected time was “weekly” (33.9%, $n = 192$). Only eight respondents (1.4%) reported never seeking out information regarding food safety. This information is represented in Table 4.
Table 4

The frequency the beef industry seeks out information regarding food safety (n = 567).

<table>
<thead>
<tr>
<th>Time</th>
<th>Frequency (f)</th>
<th>Frequency Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>230</td>
<td>40.6</td>
</tr>
<tr>
<td>Weekly</td>
<td>192</td>
<td>33.9</td>
</tr>
<tr>
<td>Daily</td>
<td>82</td>
<td>14.4</td>
</tr>
<tr>
<td>Yearly</td>
<td>55</td>
<td>9.7</td>
</tr>
<tr>
<td>Never</td>
<td>8</td>
<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td>567</td>
<td>100</td>
</tr>
</tbody>
</table>

Conclusions

Conclusions Related to Objective One

The results of this study indicated that respondents to the survey at the NCBA annual conference reported “magazine” as their first choice for receiving information regarding food safety. Their second and third choices were “free Internet” and “technical publication,” respectively.

This is consistent with research by Boone and Zinger (2001) who reported that mass media, such as magazines, was a preferred communication channel of home makers. Although prior research indicated rural and agricultural sectors were slower in adopting the Internet as a communication channel, the results of this study suggest the Internet may be becoming more popular with the beef industry as an information source. This conclusion is supported by recent
research by Horrigan (2006a) that showed a 39% increase in the adoption of broadband in rural areas which would allow individuals to access news-information more quickly than with a dial-up connection.

**Conclusions Related to Objective Two**

Researchers correlated selected demographic characteristics with the three preferred information choices of respondents at the NCBA annual conference. Although the relationship between age and free Internet was negative, it was negligible according to Davis (1971).

A low, positive relationship was found between years of education and using technical publication as a preferred communication channel. One might expect the more highly educated to use technical publications as an information source.

**Conclusions Related to Objective Three**

Almost 90% of the respondents reported seeking out food safety information at least once a month. Researchers found that the majority of respondents at the National Cattlemen’s Beef Association annual conference sought information on food safety either “monthly” or “weekly.” Only eight respondents indicated they never sought out information regarding food safety.

**Recommendations**

**Recommendations for Agricultural Communicators**

The researchers recommend that food safety messages for individuals in the beef industry be primarily focused on the communication channels, magazine and free Internet. Because negligible relationships were found between the previously stated two channels and age, communicators should be confident that information published using these two channels will reach individuals of all ages.
Researchers recommend that food safety experts consider publishing information on a monthly basis considering the reported frequency individuals seek out information on food safety. Researchers suggest an effective method of delivering food safety information is via a free, monthly newsletter distributed via the Internet.

Recommendations for Future Research

When a convenience sample is obtained, it is not considered representative of an entire population and should be replicated (Fraenkel & Wallen, 2006). Therefore, researchers recommend that this study be replicated so results can be generalized to a larger population.

This study identified the preferred communication channels, but no information was gathered on the most trusted information channels. Future research could focus on determining what information channels individuals in the beef industry perceive as the most credible.

Additional research could seek to determine the specific magazines and Internet sources that are preferred by individuals in the beef industry. By establishing what these specific publications are, food scientists and agricultural communicators would know on which publications they should focus.
References


