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Crisis communication during beef recalls due to E. coli O157:H7 contamination

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ABSTRACT

This study aims to evaluate the quantity and quality of crisis communication efforts during one specific type of public health emergency, beef recalls due to *E. coli* O157:H7 contamination. A content analysis of 452 US newspaper reports within 30 days of a beef recall was conducted to determine the sources cited and the messages communicated to the public. The analysis involved a total of 36 recalls issued from 2003 to 2008. The study found the sources cited by reporters include two of the major stakeholders involved in the crisis – government agencies and meat companies who processed or sold the contaminated product. Messages regarding information the public needs to know about the threat were found at a high frequency in the coverage. Self-efficacy messages related to how to control or manage the threat were less common. Messages communicating measures to safeguard against future threat and those that indicate the recall has ended were scant, suggesting areas for improvement in crisis communication. Over the six year time span, there was only a moderate to slight degree of message consistency. This study concludes that the type of media coverage, the sources used, and the messages communicated led to the attenuation of risks associated with beef recalls. Over all, the findings indicate the importance of maintaining a healthy relationship between the food industry and the media, especially during instances that threaten public health and well-being.

Keywords: crisis communication, *E. coli*, food recalls, newspapers, risk communication, sources, messages

CHAPTER 1

INTRODUCTION AND STATEMENT OF THE PROBLEM

Even though the United States is considered to have the safest food production and distribution system in the world, there continues to be threats to the safety of America's food supply. One of these threats comes from food-borne pathogens such as *salmonella*, *listeria*, and *E. coli*.

Over the years, the beef industry has received a great deal of attention from both the media and consumers due to recalls of products contaminated with *E. coli* O157:H7. The 1993 incident with Jack in the Box restaurants in which hundreds of people became ill and several died from eating undercooked contaminated hamburgers enhanced the salience of this issue in the minds of the American public. Since then, the cases in which *E. coli*-contaminated ground beef were recalled has fluctuated, from a low of 180,000 pounds in 2006 to a high of almost 24 million pounds in 2002 (Brasher, 2008). The number of recalls sharply declined by more than 80 percent between 2000 and 2006, according to the US Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS) (NCBA, 2006). However, in 2007, recalls of *E. coli*-contaminated beef spiked to 2002 levels, with 20 recalls involving over 30 million pounds of beef (Brasher, 2008).

Table 1. Total number of recalls and approximate pounds of beef recalled, 2003-2008

Year	Number of recalls	Approximate number of pounds recalled
2003	11	1.88 million
2004	7	1.2 million
2005	5	1.2 million
2006	8	180,000
2007	20	30 million
2008	15	7 million

Source: USDA Food Safety and Inspection Service

Of the pathogens that worry scientists and the general public, *Escherichia coli* is perhaps that most commonly occurring and the most problematic. *E. coli* O157:H7 is a pathogen that can be found on any raw food product that has been exposed to fecal contamination, but is most commonly associated with ground beef. In October 1994, FSIS announced that *E. coli* O157:H7 is an adulterant in raw ground beef due to its epidemiological link to the infections caused by the bacteria. Several years later, that link was extended to include intact raw beef products.

E. coli gets into meat products at several stages of animal harvesting and beef processing. Raw ground beef products are especially at risk because the grinding process spreads the bacteria throughout the ground product. Additionally, insufficient cooking methods do not allow the internal temperature of ground beef to reach correct levels to kill pathogens. Therefore, eating rare steak does not pose as much public health risk because the meat surface where the pathogens thrive is cooked at proper temperatures. Hamburgers, however, need to be well done, or cooked to an internal temperature of 160 degrees Fahrenheit, in order to effectively kill all pathogens.

Sporadic incidences of contamination still bedevil the food industry, producing headlines that put the integrity of the system into question. When the public is alarmed, attention focuses on the issue as well as the extent of government regulation to safeguard the public. Ultimately, the public makes the final decision when to shy away from beef. Because public opinion has such control over profit, it is important for the beef industry to maintain stable ties with consumers.

Cognizant of the need to sustain public trust on the beef industry, the National Cattlemen's Beef Association (NCBA) conducted a survey in June 2007 to measure consumer awareness of beef recalls. The study was prompted by an incident in which a California-based company recalled 5.7 million pounds of *E. coli*-contaminated ground beef that caused 14 people to become ill in six states, the largest recall in over 18 months (Cohen, 2007). The study concluded that a high percentage of consumers are aware of food recalls, with 77 percent of those surveyed stating they heard about food recalls in the past three months and 40 percent saying they were aware of a beef recall. Of highest concern to the respondents was food-borne illness due to *E. coli* (McCarty, 2007). The study concluded that such a high level of awareness is largely due to extensive media coverage of any food or product recall.

Study Purpose

The purpose of this study is to identify and analyze the coverage of ground beef recalls due to *E. coli* contamination. It focuses on newspaper reports following a recall announcement to evaluate both the sources cited and the crisis communication messages they contain. An analysis of the sources cited in this

media coverage will ascertain who has played the role of informing the public about the crisis and the associated threats to food safety. Furthermore, extracting the messages communicated following a recall will shed light on the quality and degree of risk communication associated with public health emergencies. A comparison of media coverage over a six-year span will determine if changes occurred over time. This study offers a unique opportunity to examine many occurrences of the same type of crisis situation over an extended period of time to gain a holistic perspective on communication practices during food safety crisis events.

The findings of this study have implications for the management of public health crises and risk communication. This thorough investigation of a popular threat to public health is expected to inform those responsible for managing food safety and those who deal with risk and crisis communication. It is expected that the findings will highlight the importance of maintaining connections between the food industry and the media, specifically to journalists and reporters who cover food safety issues. Because the media are the primary sources of information regarding risk and crisis situations, it is essential for organizations to work with journalists to ensure that proper messages reach the public.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter discusses previous literature on the subject of risk and crisis communication to provide the study's conceptual foundations. Next, this chapter explains the recall process employed by the United States Department of Agriculture Food Safety Inspection Service (USDA FSIS) to initiate a food recall of potentially harmful food products. This chapter also discusses the role of public perception of risk during crisis situations and on the lessons they provide to crisis communicators. The chapter concludes with an outline of the research questions.

Risk and Crisis Communication

Nothing is more threatening to the fabric of social life than a crisis of any kind. It is perhaps because of this that scholars (e.g., Coombs, 1995; Seeger, 2006; Taylor and Kent, 2007) have focused attention on the best methods and practices for communicating with the public during times of crisis. Many of these studies have identified and explored theoretical formulations and their applicability during crisis situations (e.g., Coombs, 2007; Ulmer et al., 2007). Case studies immediately after a crisis event have evaluated how communication was handled during specific events (e.g., Charlebois and Labrecque, 2007; Christen, 2005; Martinelli and Briggs, 1998; Ulmer and Sellnow, 2000).

The objective of risk communication is to inform the public about potential hazards or dangers that could ultimately cause physical harm or cost lives. When risk or crisis communication is not handled properly, the damages they bring can be catastrophic. In the case of Hurricane Katrina in 2005, scientists warning about the

imminent collapse of the Louisiana levees were ignored, causing tremendous devastation in the wake of a category five hurricane. When the 2004 Asian tsunami first hit, efficient information flow and timely communications could have warned other countries to take appropriate actions that would have limited the magnitude of loss. The lack of transparency in the way British regulatory bodies handled the 1996 outbreak of mad cow disease caused the situation to be blown out of control. During the 1999 West Nile virus outbreak in the eastern United States, the surveillance and response structures between public health, veterinary and other scientific communities failed to appreciate the connection between outbreaks in birds at the Bronx Zoo and human cases (Pate, 2000). Situations like these, and their impact on the environment and human life, underscore the need for effective risk and crisis communication.

A crisis is often an unplanned occurrence that has the ability to negatively influence the image of organizations and other stakeholders involved. A crisis is often brought about by an unexpected and unpredicted event or a series of such events that create great uncertainty that threaten organizational or social goals (Ulmer and Sellnow, 2000). Coombs (1995) defines crises as negative events that "can pollute the positive aspects of an organization's image" (p. 448). A crisis often causes changes in the condition, processes, or structure of an organization or industry that results in tacit defense mechanisms (Charlebois and Labrecque, 2007). The Crisis Response Project (Boone, et al., 2006) sponsored by several organizations, including the USDA and the National Center for Food Protection and Defense, defines a crisis as "an event or series of events characterized by threats to

important goals, short response time, and surprise. It is a decisive moment of intervention where change must occur or the organization (or persons) involved may not survive" (p. 65). The adverse effects of a crisis include reduced sales, loss of market share, and negative public perception (Coombs, 2007).

Crises are categorized based on their causal factors and the locus of their control. Thus, Coombs (1995) proposes that a typology of crises can be developed by situating a crisis event on a matrix based on two criteria: (1) whether the causal factor is internal or external to the affected organization, and (2) whether it was intentionally or unintentionally caused. These two criteria have a bearing on how the crisis can be managed or controlled. A crisis internal to the organization and unintentionally caused by some actor(s) is considered more controllable (Table 2).

Table 2. Examples of crises based on causal factors and intent (adapted from Coombs, 1995)

	Internal actors and actions	**External actors and actions**
Intentional	Transgressions	Terrorism
Unintentional	Accidents	Faux pas

Events such as protests and boycotts instigated by interest groups are externally spawned crises induced by retaliations against an organization's policies. Terrorist activities that aim to reduce sales or disrupt production processes can also be considered as externally induced crises triggered by negative reactions to perceived discordant policies. Examples of these include product tampering, hostage taking, instances of workplace violence, or sabotage. Actors within an organization can knowingly cause harm or subject people to risk thereby prompting

negative public reaction. These include intentionally selling defective or dangerous products, violating safety laws, or withholding safety information from authorities. According to Coombs (2007), a factor that has contributed to most crisis situations so far is accidents—unintentional events that occur due to forces of nature (e.g., natural disasters or calamities and epidemics) or from human error (e.g., industrial accidents and other mishaps that lead to product recalls). The current study examines this latter type of crises; accidents caused by unintentional, internal actions from human errors that trigger public outcry for reforms.

Reynolds and Seeger (2005) define public health emergencies as those that create risk to the general public health needing a "significant communication component in the form of warnings, risk messages, evacuation notifications, messages regarding self-efficacy, information regarding symptoms and medical treatment, among others" (p. 44). Ground beef contaminated with *E. coli* O157:H7 falls under this category of public health emergencies.

The food industry is a sector of society that is prone to crisis. Perhaps the most salient in people's minds are the sporadic food safety threats they have experienced so far, such as the recall of contaminated beef patties, spinach and peanut butter that have cost lives, and the public scare produced by what is more commonly known as mad cow disease. Events that threaten the safety of the food supply have long-term effects on the level of trust consumers have in food producers, handlers, marketers, and regulatory bodies (Charlebois and Labrecque, 2007). A study that examined a crisis situation involving *E. coli* contamination of apple juice in 1996 (Thomsen and Rawson, 1998) showed that the public perceived

the producer, the California-based juice maker Odwalla, “as a threat to the health and lives of its customers” (p. 37). In the case of the 2006 spinach recall due to *E. coli* contamination, ten percent of the respondents of a Rutgers University study said they were “unlikely” or “definitely will not eat” spinach in the future (Cuite et al., 2007) as a consequence. The study also showed that the recall caused people to stop purchasing other bagged produce.

Public perception of the safety of the nation’s beef supply slumped following the threat of an outbreak of mad cow disease in the United States in 2003. Studying this incident, Hallman, Schilling, and Turvey (2004) found that 24 percent of their national sample who were aware of this threat believed the country’s beef supply was unsafe. Another 19.5 percent said they had reduced their consumption of beef as a result. About four percent stopped eating beef altogether.

It is clear, therefore, that a series of these types of incidents can erode public confidence in the safety of the American food supply. Indeed, a study by McCarty (2007) shows that consumers already think their risk of suffering from food-borne illness is increasing. Thus, monitoring public perception and opinion prior to, during and after a crisis is an important component of crisis communication (Seeger, 2006).

Food Recalls

In the US, meat, poultry, and egg products are inspected and regulated by the USDA’s Food Safety and Inspection Service (FSIS) to guarantee that these products are safe, wholesome, and accurately labeled. All other food products are examined and regulated by the Food and Drug Administration (FDA). Food recalls entail removing food products considered to be adulterated, misbranded or contaminated

from the market. These are voluntary actions taken by the manufacturer or distributor to prevent potential health problems, illnesses or deaths. When the FSIS identifies a potential food safety risk, a Recall Committee requests the company responsible for the product to recall the product in question, and determines how the recall should be classified (USDA FSIS, 2006). Individual companies can also initiate voluntary recalls of their own products.

Recalls are classified based on their potential to cause harm to human health. A Class III recall, the least threatening, indicates minimal adverse health consequences from eating the food product. A Class II recall means there is a distant chance of adverse health effects. The most severe recall, Class I, suggests a reasonable probability for major health problems, including death. Beef recalls due to *E. coli* contamination fall under a Class I recall.

A recall is initiated when the FSIS notifies the public through press and electronic releases to media outlets about a potential threat and its identified geographic scope. The press releases are also posted on the FSIS website, www.fsis.usda.gov/Fsis_Recalls/, where the public can check the status of recalls and search for related information.

Public Perception of Risk

Cognizant of the potential internal and external threats crises pose to an organization's integrity, crisis managers have identified appropriate response strategies. These strategies are more effective when they are based on communication theory. Several of these theories have the ability to predict public response to communication efforts in situations that offer significant threat to the

environment and human life. Among them is attribution theory (Coombs, 2007, Coombs and Holiday, 2004).

Attribution theory suggests that people have the tendency to assign blame or have a need to determine responsibility for crisis events (Coombs, 2007). In crisis situations, affected organizations may employ any one of four potential response strategies: denial, forced compliance, voluntary compliance, or they may exert extraordinary efforts to remedy the situation and minimize the damage.

The social amplification of risk theory posits that risk situations are amplified or attenuated by societal forces (Kasperson et al., 1988; Burns et al., 1993; Kasperson and Kasperson, 1996). Risks that are considered reasonably slight can be augmented to create strong public concern and negative societal and economic impacts. The social amplification of risk theory suggests that public responses to a risk or a risk event are affected by psychological, social, institutional, and cultural factors and how these factors interact. According to Kasperson et al. (1988), risk events can be amplified or attenuated by the quantity and quality of information about the risk communicated to the public. The significance of the event, perceived risk, amount of media coverage, and public reaction directly relate to the degree to which the public considers the risk situation as threatening, and their perceived vulnerability to the risk (Burns et al., 1993). In other words, the degree to which the media cover the risk event and the quality of the messages conveyed can influence the nature and level of public response.

Risk communication scholars have long understood that people base their assessments of a given risk not just on probability of harm as evaluated by scientists

and other risk experts. Sandman (2003), for example, defines risk as a combination of hazard and outrage (risk = hazard + outrage). Hazard refers to the technical element of the risk—the likelihood and scale of the risk as evaluated by experts. Outrage is the normative component of risk, including how people apply social values, the level of trust they hold about government and other regulatory bodies, their psychological predispositions about the risk, and the extent to which they perceive themselves as able to control or guard against a threatening situation. In the case of crisis situations, hazard and outrage are high, causing intense public fear due to a perceived great potential for physical harm (Sandman, 2003). Therefore, in order to improve public trust in strategic communications, crisis or risk communicators need to realize that individuals assess risk through technical and normative approaches (Rodriguez and Lee, 2005).

Outrage, which constitutes the normative or psychological dimension of risk perception, changes depending on the type of risk (Sandman and Lanard, 2003). “Outrage includes emotions such as fear, anger, and extreme concern.” These reactions are heightened depending on the extent to which the public sees their exposure to the risk as voluntary or involuntary, whether the risk is scientifically known or well understood, or perceived as an act of God or an act of humans, among others” (Sandman, 2003 as cited in Rodriguez and Lee, 2005, p. 7). Social values and trust also play a role in how the public perceives risk, according to Slovic (1997). In his view, the public’s risk assessment is as affected by complex psychographic factors such as emotions, beliefs, and philosophies as information regarding scientific assessments of probabilities of harm.

In an effort to help organizations and communicators establish a plan to communicate to the public during times of crisis, several scholars and experts have developed lists for best practices for crisis communication (e.g. Seeger, 2006; Hyer and Covella, 2005; Boone, et. al., 2006). One of the steps within these best practices is to develop appropriate messages to communicate to the public. Seeger (2006) recommends these messages include an element of self-efficacy. Examples of those messages are actions recommended for the public to take include avoiding particular food products, practicing proper food handling techniques, availing of medical treatment, or identifying possible symptoms to be able to take advantage of proper medical response. The World Health Organization (Hyer and Covella, 2005) recommends that during public health emergencies, messages should encourage public dialog, enable the public by proposing preventative actions, assist them in identifying symptoms, and telling them where to find additional information.

It is an established fact that the public learns about a risky situation first through their exposure to mass media messages (Marks, et al., 2007; McComas, 2006; Reynolds and Seeger, 2005; and Coleman, 1993). Therefore, how the media portray a crisis plays an important role in managing risks. The media may frame risks by attributing blame, evaluating government responses, and offering expert perspectives, among others (Littlefield and Quenette, 2007). The stakeholders of a crisis situation need to be cognizant of how the media depict the situation and tell the story because these portrayals influence public opinion and mitigate public reaction. In the case of beef recalls, a major stakeholder is the beef industry represented by the National Cattlemen's Beef Association (NCBA). Aside from beef

consumers, there are other stakeholders affected by these beef recalls. These include the slaughter or processing plants from which the contaminated product originated (*Consumer Reports,* 2008). Additional stakeholders are those responsible for regulating and managing the threat, including federal and state government agencies such as the USDA FSIS and the departments of health and human services. An important stakeholder, of course, is beef consumers.

Research Questions

This study focuses on the quality and quantity of information communicated to the public and the sources of that information during beef recalls. This study evaluates the extent to which the stakeholders involved when beef gets recalled are cited. The objective is to determine how risk communication messages were communicated to the public through the media to evaluate the coverage of a public health crisis situation.

From the review of literature above, the following research questions are posed:

RQ1: What are the sources cited in newspaper reports of *E. coli*-related beef recalls?

RQ2: What messages inform the public about the crisis or threat?

RQ3: What messages inform the public about how to control or manage the risk?

RQ4: What messages communicate measures to safeguard against future risk or threat?

RQ5: What messages indicate that the current crisis has ended?

RQ6: Was there a change in reporting of the above messages over time?

CHAPTER 3

METHODOLOGY

The intention of this study is to identify how the media covered crisis situations regarding recalls of *E. coli* O157:H7-contaminated beef. Over the last two decades, millions of pounds of beef were recalled from the market due to food-borne pathogens. This study aims to analyze newspaper coverage immediately following the announcement of a beef recall due to *E. coli* contamination with a three-fold purpose: 1) to identify the sources cited to determine the extent to which the identified stakeholders are involved in crisis communication, 2) to extract the messages communicated to the public that will assist them in controlling, managing, and preventing the threat, and 3) to ascertain whether the extent to which these messages were communicated changed over time. The overall objective is to draw from the findings recommendations on how to improve future food industry crisis communication efforts.

Study Design

The method used to gather data is a content analysis of news reports. The population for this study was composed of newspaper articles that discussed beef recalls specifically due to *E. coli* O157:H7 contamination. The entire newspaper article was the unit of analysis. The timeframe of this study covers the past six years, from 2003 through 2008, because this duration enables a critical examination of the most recent incidences of beef recalls with major implications about the extent to which food-borne pathogens pose risk to the country's food supply. The articles analyzed were published within the first 30 days after a recall was announced.

The search engine Lexis-Nexis was used to collect newspaper articles containing the terms “recall,” “*E. coli*” and “beef.” Articles were collected from national, regional and local newspapers across the United States. A sampling technique was not applied for the majority of the recalls as the number of articles retrieved was of a reasonable number to conduct a census of the entire population. For recalls yielding more than 50 news articles, without duplicates of the same story, a composite random sampling technique was applied, in which there are three cases. Duplicate articles and stories that discussed the topics only tangentially were not included in the analysis.

A list of *E. coli*-related beef recalls was obtained from the USDA FSIS website. Recalls of more than 10,000 pounds of beef were selected for this study. This threshold in terms of number of pounds associated with each recall was deemed appropriate to elicit a significant media response.

Arriving at the sample

Using this study design, a total of 36 recalls issued from 2003 to 2008 was the subject of the 452 newspaper articles that were analyzed. Table 3 describes the study population based on the recall, number of pounds recalled, and associated number of articles collected. The news reports were collected from both national newspapers (48%) and regional newspapers (52%). Of the sample, 83 percent (n = 373) were straight news reports, and 14 percent (n = 65) were categorized as press releases. The remainder of the sample was made up of 13 editorials (3%) and only one feature article.

Table 3. Study population by recall and corresponding newspaper coverage

Date of recall announcement	Pounds recalled	Number of days of coverage	Number of newspaper reports analyzed	Total number of newspaper reports (Includes duplicates)
2003 totals – 6 recalls	**1,930,900**	**Average – 5.3**	**42**	**67**
March 11, 2003	160,000	6	11	16
June 29, 2003	239,000	9	13	23
August 5, 2003	194,700	7	8	11
August 8, 2003	659,000	2	2	3
August 23, 2003	76,000	2	4	8
October 31, 2003	102,200	6	4	6
2004 totals – 6 recalls	**1,198,600**	**Average – 2.5**	**32**	**78**
February 24, 2004	90,000	2	3	7
April 29, 2004	45,000	2	4	15
June 22, 2004	101,600	1	1	2
August 03, 2004	497,000	3	18	36
August 20, 2004	406,000	3	2	2
September 17, 2004	59,000	4	4	16
2005 totals – 4 recalls	**1,242,250**	**Average – 4**	**22**	**48**
June 9, 2005	63,850	3	5	15
August 22, 2005	900,000	8	7	13
September 23, 2005	184,000	11	6	7
November 1, 2005	94,400	2	4	13
2006 totals – 2 recalls	**169,313**	**Average – 1**	**3**	**4**
May 5, 2006	156,235	1	2	3
August 4, 2006	13,078	1	1	1
2007 totals – 10 recalls	**30,037,160**	**Average – 15.4**	**223**	**846**
March 2, 2007	16,743	5	8	12
April 20, 2007	107,943	10	11	18
May 10, 2007	117,500	6	9	13
May 11, 2007	129,000	10	6	15
June 3, 2007	5,700,000	13	50	133
June 8, 2007	40,440	27	9	17
July 21, 2007	26,669	10	5	9
September 25, 2007	21,700,000	37	50	404
October 6, 2007	845,000	12	29	63
October 13, 2007	173,554	10	2	2
November 3, 2007	1,084,384	9	36	124
November 24, 2007	95,927	5	8	36
2008 totals – 8 recalls	**6,957,185**	**Average – 12.1**	**130**	**119**
January 5, 2008	13,150	3	2	3
January 12, 2008	188,000	10	12	18
May 8, 2008	68,670	1	1	3
June 8, 2008	13,275	13	2	3
June 25, 2008	5,300,000	36	50	120
August 6, 2008	153,630	5	15	18
August 8, 2008	1,200,000	28	47	99
October 8, 2008	20,460	1	1	2
Grand totals – 36 recalls	**14,135,408**	**Average – 6.7**	**452 reports**	**1162**

Operational Definition of Variables

The first five *sources* of information cited in the newspaper articles were coded. These sources may be individuals, agencies, organizations, and institutions. Identifying the source attributions will help verify the extent to which the media uses stakeholders as information sources during crisis situations, and what other sources are framing the beef recall incidents to the public. The sources were categorized as follows (adapted from De Guzman, 2008):

1. Scientists from universities and university-based research institutions (scientists from a university with a food safety program);
2. Governmental scientists (e.g., scientists from the Food and Drug Administration, Centers for Disease Control, or USDA);
3. Other scientists (scientists from institutions other than those mentioned above);
4. Scientific journals and journal editors;
5. Meat sellers (e.g., meat packers, meat retailers, meat wholesalers, grocery stores);
6. Ordinary citizens and consumers, but not farmers (e.g., individual consumers, restaurant personnel);
7. Advocacy groups (e.g., People for the Ethical Treatment of Animals, Center for Science in the Public Interest);
8. International not-for-profit groups;
9. Government agencies, employees, but not government scientist (e.g., USDA, FSIS, CDC, spokesperson for government agency who is not a scientist);

10. Industry organizations (e.g., the American Meat Institute);

11. Beef representatives (e.g., National Cattlemen's Beef Association, state beef associations, Cattlemen's Beef Board, state beef councils);

12. Politicians and elected officials (e.g., senators, elected representatives)

13. Other (all other sources not listed above, including lawyers, religious leaders, websites, surveys and public opinion polls).

Specific messages were coded as either present or not present in each article. These messages, culled from risk communication literature as items that assist the public through risk situations, are as follows:

RQ2: Messages informing the public about the crisis or threat:

1. The history of recalls
2. The number of pounds recalled
3. The name of the company or companies involved in the recall
4. The type of product recalled (i.e., product codes, description of product)
5. The date the recall was announced
6. The dates the recalled product was processed or distributed (i.e., sell-by dates, processed-on dates)
7. Where the product was distributed, such as affected states and stores
8. Information about the pathogen (i.e., bacteria, causes of the food-borne illness, and other science-based information)

RQ3: Messages informing the public how to control or manage the risk or threat:

1. Messages about safe food preparation

2. The illnesses and symptoms of *E. coli* infection, including number of people who have become sick or died as a result of consuming the contaminated product
3. Messages informing consumers what to do if they purchased a recalled product (i.e., check if they purchased the product, return the product, throw the product away)
4. An indication of how much of the product has been returned or accounted for, including methods to track recalled products
5. Messages instructing people how to report cases of illness
6. Contact information of companies or agencies from where consumers can get more information.

RQ4: Messages that communicate measures to safeguard against future risks or threats:

1. Description or indication of how contamination was discovered
2. Messages that ensure the beef supply is safe
3. Changes to governmental regulations or processor practices that aim to prevent future outbreaks
4. Actions taken by the beef industry to prevent future outbreaks

RQ5: Messages indicating that the current crisis has ended:

1. The date when the recall has officially terminated.

Additional variables that were coded include the following:

1. The *type* of story (whether it is a straight news report, a feature article, an editorial piece, or a letter to the editor or publication).
2. The *origin* of the story (whether the story was written by a newspaper reporter or staff member, came from a wire service, written by a reader in response to a published article or as a letter to the editor, or from other sources).
3. The *headline* of the story.
4. The *date* when the story was published.
5. The *length* of the story in number of words.

Inter-coder Reliability

To achieve acceptable inter-coder reliability, a pre-test of the newspaper coding scheme was conducted to ensure the validity and accuracy of values and protocols. Two graduate students were trained on the coding procedures. The newspaper articles were systematically numbered, and ten percent of the retrieved articles were randomly selected and made up a sub-sample that was coded to test for inter-coder reliability. The inter-coder reliability for nominal variables was calculated using Holsti's formula in which reliability equals two times the number of agreement between the two coders divided by the total number of coding decisions of the coders. Table 4 provides a summary of the inter-coder reliability test.

Table 4. Summary of inter-coder reliability test

Variables	Inter-coder reliability
Type	1.00
Origin	0.91
Category	1.00
Messages informing about threat	
History of recalls	0.82
Pounds recalled	0.91
Name of company	1.00
Type of recalled product	0.68
Date recall announced	0.64
Dates product processed	0.95
Where product was distributed	0.82
Information about the product	0.64
Messages informing how to control or manage the threat	
Safe food preparation	0.91
Symptoms and illnesses	0.95
What do to with the purchased product	0.86
How much of recalled product was accounted for	1.00
How to report illness	0.91
Company contact information	0.91
Messages about measures to safeguard against future threat	
How contamination was discovered	0.64
Assurances that beef supply is safe	0.95
Changes to regulatory procedures	1.00
Preventing measures specifically from the beef industry	1.00
Messages indicating the threat has ended	
Threat is over	1.00
No indication	1.00

Data Analysis

This study made use of descriptive statistics to answer the six research questions. To respond to RQ 1, the frequency distributions of sources by categories were analyzed. To answer RQ2, RQ3, RQ4, and RQ5 the messages were coded as

either present or not present in each of the newspaper reports. The frequency distributions of messages during the six-year coverage were analyzed to answer RQ6.

CHAPTER 4

RESULTS AND DISCUSSION

This study examines US newspaper coverage of beef recalls due to *E. coli* contamination over a six-year period. It aims to determine 1) the sources cited in the newspaper reports, 2) the messages communicated to the public about the crisis or threat, 3) the messages that informed audiences how to control or manage the risk, 4) the messages that provided measures to safeguard the public against future risks or threats, and the 5) messages that indicated that the current crisis has ended, Additionally, the study sought 6) to determine the extent to which these messages changed over time. The sample population for this study is 452 national and regional newspaper reports within 30 days of a beef recall. The analysis involved a total of 36 recalls issued from 2003 to 2008.

Sources Cited

An analysis of the sources used in the newspaper reports revealed a small number of sources cited per article and a limited number of types of sources referenced across the study timeframe. The average number of sources cited per article was 2.35; six percent of the articles (27) did not cite any source at all. Only 14.4 percent or 65 news reports named at least five sources. That reporters turn to a small number of people, organizations or agencies for information during these events suggests the need for communication practitioners within these groups who are equipped to specifically handle these crisis situations.

An overwhelming majority of the sources were from two categories—government agencies and meat sellers—that were consistently identified among the

first five sources coded for each news report. Figure 1 provides a breakdown of the categories of sources cited.

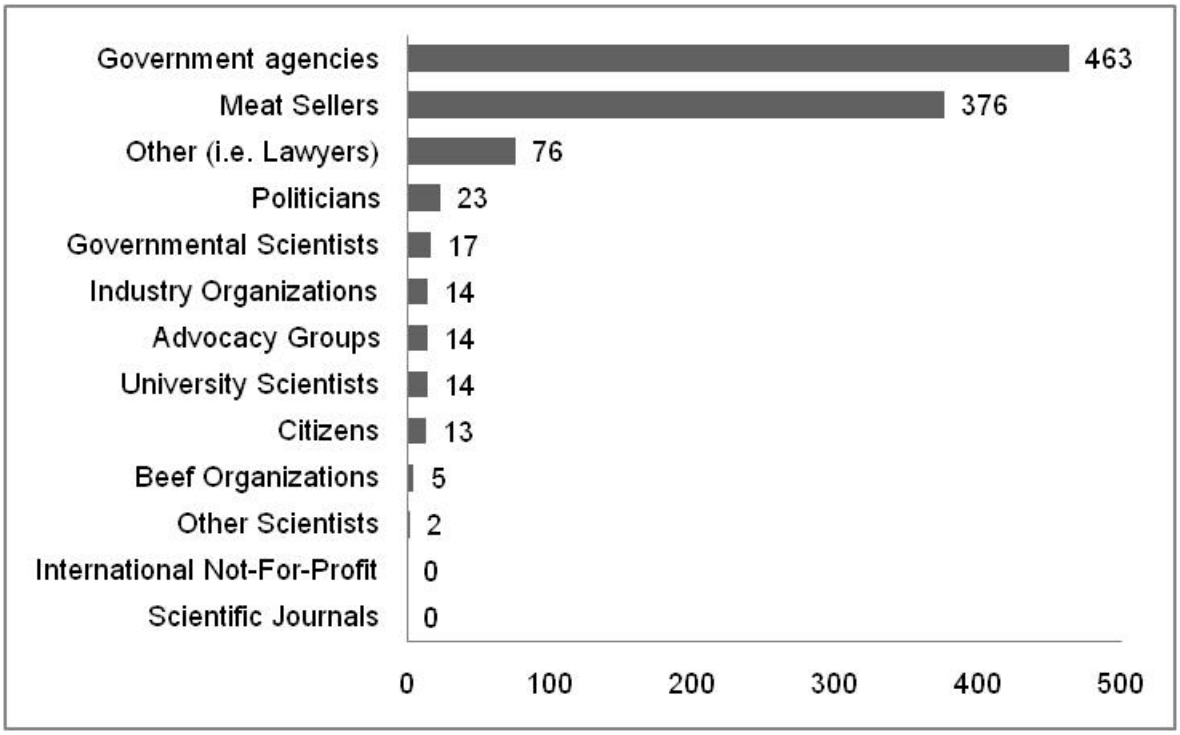

Figure 1. Frequency of types of sources cited in newspaper coverage (totals of the first five sources coded for each news report)

Non-scientist sources from government agencies such as the USDA, FSIS, and federal, state, and county departments of health and human services, were the most frequently cited. Government agencies were the leading source, cited in news reports 463 times. This category includes government spokespeople, directors, and officials from all levels. Of the agencies comprising this category, the USDA and the FSIS were cited 253 times, the most often cited source throughout the study period.

The second most frequently cited source came from the category of meat sellers, companies where the recalled product may have been produced or sold, including meat packers, wholesalers, retailers, and grocery stores. The meat sellers

category received a total of 376 cites in the newspaper reports. These sources involve companies and stores that either produced or sold the recalled meat and their spokespersons, presidents, or representatives.

Although named only in 37 instances, lawyers, categorized as “other” sources, were cited as a source. The most often cited was an attorney who has made a name for himself representing victims of food safety related cases, including *E. coli* contamination. He writes his own press releases and was often quoted by reporters in the coverage of more significant recalls involving sizeable amounts of beef or a high number of associated illness. In general, lawyers were quoted to demonstrate the suffering of victims or as calling for changes to prevent future food safety calamities.

Elected officials played a smaller role as sources of information with a majority of them calling for changes to government regulatory procedures for handling recalls. References to elected officials increased in frequency the longer the recall remained in the media spotlight.

Perhaps more surprising is the finding that beef organizations were cited only five times over the six-year period of coverage. These sources, each cited only once, were the National Cattlemen’s Beef Association (NCBA), the Minnesota Beef Council, the Nebraska Cattlemen, the Nebraska Beef Council, and the California Cattlemen’s Association. The NCBA was quoted from its own press release issued during the June 3, 2007 recall of 5.7 million pounds of beef. The information it provided was not picked up in subsequent coverage of that recall.

The American Meat Institute, a national trade association representing meat and poultry companies and suppliers in the US, was cited a total of 14 times. It was categorized as an industry organization because it is separate and independent from meat sellers and other beef organizations. The Institute figured in reports issued in 2007 and 2008, which saw a spike in the number of recalls and number of pounds recalled.

The findings reveal a limited category of sources newspapers rely on for information regarding these sporadic public health threats. However, those who are expected to communicate to the public during these crisis events, namely the government agencies and the meat sellers, were well represented. It is clear, therefore, that the media rely on these stakeholders for information the public needs to limit their risk.

A significant factor that mitigates public perception of risk is level of trust, especially on institutions legally mandated to assist in crisis events. When the public perceives an organization or agency to be trustworthy, risk perception can be attenuated (Slovic, 1993). This theory holds true for the media as well. Reporters are more likely to turn to a trusted source for information about a crisis situation. The USDA and the FSIS were found to be the leading sources of information on matters related to beef recalls due perhaps to the high level of trust they enjoy among media practitioners (Family Food Information Program, 2007; Zehr, 2003). Reporters turn to them for information in the belief that the public is more likely to heed risk messages from these trusted sources.

Attribution theory, the need for the public to assign blame, may explain why meat sellers were the second most frequently cited sources in the newspaper articles. One of the four crisis response strategies of an affected organization under attribution theory is to exert extraordinary efforts to remedy the situation and minimize the damage (Coombs, 2007). The companies that produced or sold the contaminated beef were more likely to be blamed during these crisis situations. That they are always open and accessible to the media during these events indicate their sense of accountability and their proactive stance to limit public outrage. Their presence and importance as a source becomes more evident in the messages that are communicated, which are described next.

Messages that Inform About the Crisis or Threat

The messages that announce a beef recall and inform consumers of what they need to be aware of are well communicated in the articles collected. All pre-identified messages about the threat of *E. coli* were found. These messages were the most often communicated, with a total of 2,087 messages representing this category. Table 5 lists the frequency with which these messages were mentioned in the news reports.

The Food and Drug Administration provides an *E. coli* O157:H7 model press release and an example that companies can access to provide guidance for information that is required when notifying the public of a product recall (see Appendix B). Additionally, the FDA Office of Regulatory Affairs/Office of Enforcement has available a “Guidance for Industry” for product recalls detailing instructions and counsel for handling a product recall. The guidance includes

information for how to make a recall submission to the FDA, proper public notification, and evaluation of the recall. This document is accessible at http://www.fda.gov/ora/compliance_ref/recalls/recallpg.html.

Table 5. Frequency of messages informing the public about the threat

Messages	Frequency	Percentage
History of recalls	83	18.3
Pounds recalled	389	85.9
Company name given	441	97.4
Type of product recalled	250	55.2
Date recall announced	190	41.9
Dates product processed	317	70.0
Where product distributed	323	71.3
Information about pathogen	94	20.8

In over 97 percent of the news reports, the company involved in the recall and in 86 percent, the number of pounds recalled was listed. At least 70 percent of the time, the public was informed of where the recalled product was distributed, the dates the product was processed or the sell-by/freeze-by dates. Also, descriptions of the recalled product were communicated in 55 percent of the articles. Messages that told about when the recall was announced were found in 40 percent of the articles, and messages that provided information about the pathogen were found in 20 percent of the stories. Messages about the company's history of recalls were the least frequent content item at just above 18 percent.

Most of this information originated from either the USDA FSIS or the meat company itself. Typically, when the FSIS notifies the public of a recall, the press release often contains information about the date the recall was announced, the company involved, the number of pounds recalled, product descriptions, process

dates, an indication of why the recall was issued, illnesses and symptoms associated with consuming a contaminated product, and safe food preparation techniques. The FSIS issues a press release with these information items for each recall, which explains why these types of messages were most common and why the Service was the most often cited source. Information regarding where the product was distributed and the history of recalls generally came from meat companies. In many cases, they appeared to be verifying information provided by the FSIS.

Crisis communication must be principally informative with messages concerning the current state or conditions related to a specific event and the magnitude of the event (Reynolds and Seeger, 2005). Messages informing people about *E. coli*-related threats could be classified under this description. The high volume of these messages provides evidence that effective crisis communication is occurring for these cases.

Messages that Inform the Public How to Control or Manage the Risk or Threat

Messages that inform the public how to control or manage the risk associated with *E. coli*-contaminated beef were moderately prevalent in the newspaper reports examined. A total of 847 such messages were present. The frequency of occurrence of such messages is presented in Table 6.

Table 6. Frequency of messages informing the public how to control or manage the threat

Messages	Frequency	Percentage
Safe food preparation practices	125	27.6
Symptoms and illnesses	351	77.5
What do to in case product was purchased	154	34.0
How much of contaminated product was accounted for	49	10.8
How to report illness	28	6.2
Contact information	140	30.9

The overwhelming majority of messages regarding how to control or manage the threat relates to symptoms and illnesses associated with *E. coli*. Over three-quarters of the articles told the public the symptoms and signs of illness associated with ingesting food contaminated with this pathogen and/or the number of people who became ill or died as a result of eating contaminated products. Statements informing consumers what they should do if they purchased the recalled product were found in 34 percent of the articles. In addition, the contact information of companies or agencies consumers can contact to get more information about the recalled product was provided in one-third of the articles. Approximately 27 percent of the articles included messages on safe food handling procedures, most of which told consumers to cook meat to 160 degrees Fahrenheit. Messages on how much of the recalled product has been accounted for by the company or by the USDA FSIS, and information on how consumers can report illnesses potentially associated with the contaminated product were found in 10.8 percent and 6.2 percent of the articles, respectively.

The objective of risk communication is to inform the public about potential hazards or dangers that could ultimately cause physical harm or cost lives. The outrage dimension of public risk perception includes the extent to which the public perceives it can control or be protected against the threat (Sandman, 2003). These messages of self-efficacy regarding the signs and symptoms of illness, and the number of cases involved suggest an effort in achieving appropriate risk and crisis communication practices (Seeger, 2006; Hyer and Covello, 2005).

However, there is a low frequency of messages on what consumers should do with the recalled product and on safe food handling procedures. This perhaps points to a need for more effective ways of improving the transmission of “how-to” information and more clear calls for action. Information items such as how to cook meat properly, returning or throwing away contaminated products, or calling grocery stores and other retail outlets to find out if they sold the recalled product, are actions the public can readily take to reduce risk. When the public perceives a risk as controllable and voluntary, their outrage factors and risk perception are assuaged (Sandman, 2003).

One message occurring at a fairly high frequency was the contact information of companies involved in the recall. Often, the public was given the name of someone in the company and a phone number to contact if they had questions about the recall. By providing this important information, the companies were being open to and sensitive to public concerns (Seeger, 2006; Hyer and Covello, 2005).

Messages that Communicate Measures to Safeguard Against Future Risks or Threats

This third group of messages, those that communicate measures to safeguard against future contamination, is less frequent, accounting for 298 of the total messages communicated. Table 7 lists the frequency of occurrence of such messages.

Table 7. Frequency of messages about measures to safeguard against future threat

Messages	Frequency	Percentage
How contamination was discovered	182	40.2
Assurance that beef supply is safe	35	7.7
Changes to regulatory policies	78	17.2
Beef industry prevention actions	3	0.7

About 40 percent of the articles discussed how the contamination was discovered. These generally included items such as the results of routine testing for *E. coli* by meat processors or the epidemiology that links tainted meat to illnesses. Changes to regulations to prevent future outbreaks were found in 17.2 percent of the articles. Messages that assure that the beef supply is safe or attempts by the beef industry to prevent further contamination were almost non-existent, found in only 7.7 and 0.7 percent, respectively, of the articles examined.

Articles that talked about measures to safeguard against future threats were relatively low, indicating a risk communication area that can stand major improvement. What is surprising is the almost complete lack of messages from the beef industry along these lines. As one of the major stakeholders in these situations, the industry was relative silent about their preventive measures. Even when the contaminated beef was found responsible for illnesses and death, messages of

reassurance were not found. Of the 7.7 percent of the messages regarding the safety of the beef supply, a majority came from U.S. Secretary of Agriculture Ed Shafer during the June 25, 2008 recall of 5.3 million pounds of beef. During this recall, the USDA was criticized for delaying the announcement, leading to higher cases of illness, and suggesting flaws in the recall process. Secretary Shafer countered that criticism by supporting the USDA's actions in the recall and articulating a need to review the process in the future.

Messages that Indicate the Crisis has Ended

Messages that inform the public whether the recall or threat has ended were almost non-existent. Only three articles reported on this item. Those three articles were associated with only two recalls: two articles were printed four days after an April 20, 2007 recall and another article published six days after an October 6, 2007 recall. Table 8 summarizes these findings.

Table 8. Frequency of messages indicating the threat has ended

Messages	Frequency	Percentage
Threat is over	3	0.7
No indication	449	99.3

Why this is the case is difficult to discern. It may be because *E. coli* contamination can occur at any time without any prior notice or warning. As such, it is best for the public to continue to be vigilant of this recurring risk so they maintain proper food safety habits. However, notifying the public that a recall has ended might encourage consumers to purchase beef once again if they avoided it during the recall. At the very least, companies involved in a recall must notify the USDA FSIS

and everyone within the company when the recall is over. Clearly, this question warrants further exploration.

Change in Reporting of Messages over Time

An evaluation of the change in communicating messages over time reveals sporadic patterns in terms of the frequency of specific messages about the risks involved in beef recalls. This analysis discloses the richness of information that is communicated from year to year. The percentages of messages by year are detailed in Table 9.

Table 9. Percentages of messages in newspaper reports by year

	2003	2004	2005	2006	2007	2008
Messages about the threat						
History of recalls	16.7	28.1	22.7	0.0	16.1	20.0
Pounds recalled	97.6	100.0	100.0	100.0	90.2	68.5
Name of company involved in recall	97.6	100.0	100.0	100.0	96.0	98.5
Type of product recalled	92.9	93.8	100.0	66.7	48.2	37.7
Date recall was announced	33.3	46.9	27.3	33.3	40.6	48.5
Dates product was processed or distributed	85.7	87.5	68.2	33.3	65.2	70.0
Where product was distributed	83.3	87.5	54.5	100.0	68.8	70.0
Information about the pathogen	54.8	71.9	18.2	0.0	14.7	8.5
Average percentage	***70.3***	***77.0***	***61.3***	***54.2***	***55.0***	***52.7***
Messages about how to control or manage the threat						
Safe food preparation practices	19.0	28.1	22.7	0.0	27.7	31.5
Illnesses and symptoms	78.6	65.6	59.1	33.3	81.7	76.9
What to do in case recalled product was purchased	33.3	31.3	27.3	0.0	37.9	30.0
How much recalled product accounted for	4.8	3.1	0.0	33.3	14.3	10.0
How to report cases or illness	14.3	3.1	4.5	0.0	4.9	6.9
Contact information for companies or agencies	47.6	37.5	45.5	0.0	30.4	23.1
Average percentage	***32.9***	***28.1***	***26.5***	***27.8***	***32.8***	***29.7***
Messages on safeguard measures for future threats						
How contamination was discovered	52.4	28.1	18.2	33.3	42.0	40.0
Assurances that beef supply is safe	4.8	0.0	0.0	33.3	6.3	13.8

Table 9. (continued)

	2003	2004	2005	2006	2007	2008
Messages on safeguard measures for future threats						
Changes to regulatory policies	2.4	12.5	4.5	0.0	24.1	13.8
Beef industry prevention measures	2.4	3.1	0.0	0.0	0.4	0.0
Average percentage	***15.5***	***10.9***	***5.7***	***16.7***	***18.2***	***16.9***
Messages that the threat has ended						
No indication at all	100.0	100.0	100.0	100.0	98.7	100.0
Threat has ended	0.0	0.0	0.0	0.0	1.3	0.0

The greatest percent of messages communicated information about the threat of *E. coli*. However, there is a gradual decline in the frequency of these messages from 2003 to 2008. Especially noticeable is a decrease in the number of information about the pathogen. In 2003 and 2004, science information about *E. coli* was prevalent in about 55 percent and 72 percent of the articles, respectively. Those percentages sharply declined to 18.2 percent in 2005, 16.5 percent in 2007, and 8.5 percent in 2008. It is unknown why information about the pathogen declined; it is perhaps an area for further research. In addition, the frequency of messages describing the type of product recalled experienced a sharp dip in the last three years of the study. In 2003, 92.9 percent of the articles described the type of recalled product. In 2008, those messages were found in only 37.7 percent of the stories.

Messages regarding how to control the threat were fairly consistent across all six years, with only a slight decline in the percentage of articles containing these messages in 2005. An individual evaluation of the types of messages under this category shows that the frequency of information on how much of the recalled product has been accounted for increased from 2006 to 2008. The number of

messages on how to report illnesses was higher in 2003 than in any other year, but still only slightly noticeable at 14.3 percent.

Similar to the second category of messages, messages on how to safeguard against further threats were mentioned less frequently in 2005. In general, these types of messages were less prevalent than the other two message categories. However, in 2007, messages regarding changes to regulations that aim to prevent future outbreaks rose considerably. This is perhaps because in 2007, the number of recalls and the total pounds recalled were significantly higher than the previous four years. Politicians and government regulators perceived a need to call for changes to the recall system, the inspection mechanism, and governmental authority to maintain the integrity of the food supply. In addition to a rise in beef recalls in 2007, there were instances of other pathogen-related food recalls that could have contributed to the need for change. The frequency of messages ensuring the safety of the beef supply rose in 2008 due to Secretary Shafer's presence as an important source during one particular recall described above.

In summary, the content analysis of the newspaper reports immediately following the 36 individual *E. coli*-contaminated beef recalls during the six years of this study discloses an adequate approach to crisis communication during these periods of public health emergency. The media relied on two primary stakeholders, government agencies and the companies who processed or sold the contaminated meat product, as their primary sources of information. The most frequent category of messages communicated was those that informed the public about the crisis or threat. These messages regarding the state and magnitude of the crisis event are

essential to effective crisis communication. Messages that inform the public how to control or manage the risk, especially those that relate to symptoms and illnesses associated with *E. coli*, were also found in the coverage at a significant level. These messages of self-efficacy enable the public to have control over the crisis situation and reduce the level of perceived risk. The two categories of messages that are lacking in the coverage are those that communicate measures to safeguard against future threats and messages that indicate the crisis has ended.

An analysis of the messages communicated over the six years reveal only moderate to slight consistency of messages over time. Communicating consistent messages, especially when dealing with the same type of public health emergency, can reduce confusion, alleviate panic, and aid in reducing the magnitude of perceived risk.

The findings show that the media are the direct links and institutional mechanisms for communication among the health, the veterinary and beef, and the public sectors. The findings indicate that the accessibility and availability of major stakeholders to the media and the resulting messages that were communicated to the public led to an overall attenuation of the risks involved in these crises situations. The results suggest ways of improving the efficiency and effectiveness of handling a public health emergency. The findings also suggest areas to consider for improvement in communicating with different audience segments regarding crises of this type. These findings will be explained in the next chapter.

CHAPTER 5

IMPLICATIONS OF THE FINDINGS AND CONCLUSIONS

This study examined crisis communication following recalls of beef products as a result of the pathogen *E. coli* O157:H7. One objective of the study was to determine the sources journalists turn to during public health emergencies of this type. To do so, the study analyzed the information items in newspaper coverage of beef recalls that aimed at informing the public about the threat, how to control or manage the risk, measures to safeguard against future threats, and an indication that the crisis has ended. An assessment of the coverage was conducted over a six-year time span. A content analysis of newspaper reports within 30 days of the announcement of an *E. coli*-related beef recall was done to answer six research questions. A total of 452 newspaper reports were analyzed representing 36 recalls officially issued from 2003 through 2008.

In the past six years, these crisis situations have received sporadic coverage, at times moderate and in other years relatively small, with the exception of three special cases that attracted heavy media attention. The majority of the sources cited were from two of the major stakeholders during these crisis situations, government agencies and meat sellers. Other sources that play a small but perhaps important role in the coverage of these recalls were lawyers and elected officials. Beef industry organizations, an important stakeholder, were rarely cited as information sources, suggesting that they do not constitute an important category of information sources for reporters and journalists. Their lack of influence in the public discussions of this

important topic indicates a major void in their communication efforts, one that needs to be addressed if they intend to demonstrate leadership in this regard.

The information the public needs to know regarding the type, condition, and stage of the threat were well communicated. Messages intended to enhance consumers' self-efficacy so that they are aware of how to control or manage the threat were less common in the coverage. Measures to remedy and control future threats were scant. So were bulletins that inform the public that the threat is over.

An overwhelming majority of the newspaper reports included messages regarding specific information about the recall, including the number of pounds recalled, the names of companies recalling the product, product descriptions, and processing dates. The primary sources of these messages were the USDA and the meat companies linked to producing or selling the contaminated product. The second category of messages, informing how to control or manage the threat, primarily constituted information about the symptoms of *E. coli* O157:H7 and the cases of illness or death associated with the recall. Self-efficacy messages, such as safe food preparation practices, what to do with recalled product, and company contact information were found in about one-third of the reports. Of the messages about measures to safeguard against future threat, information on how the contamination was discovered was prominent, but measures that have been taken to assure the safety of the beef supply and actions the industry has taken to prevent future outbreaks were rarely communicated to the public.

The fifth research question asks what messages indicate that the crisis has ended. The findings reveal that the public is almost never informed that the current

threat or recall has ended. Over the six-year span of this study, there has not been a high degree of consistency in the messages communicated to the public on this regard.

The social amplification of risk framework states that the quality and quantity of information audiences receive can attenuate or amplify public perception of a risk situation (Kasperson et al., 1988). In the case of newspaper reports of beef recalls due to *E. coli* contamination from 2003 to 2008, the quality and quantity of information communicated to the public can be considered high. While the impact of these recalls are still under review, it can be concluded that the type of media coverage, the sources used, and the messages communicated led to the attenuation of risks associated with beef recalls.

Quality risk communication reports need to adequately notify the public about potential threats and educate them of the hazards. Slovic (1986) identifies several criteria reporters should consider when analyzing and communicating risk, which can be used to evaluate the messages communicated in this study. In the case of the risk information about the dangers of *E. coli*-contaminated beef, it is clear that reporters incorporated sufficient risk analysis information.

The probability and magnitude of the risk or harm is conveyed when reporters include information on the number of pounds recalled, the list companies identified as having distributed the contaminated products, and the affected geographic areas. This last information item is crucial because knowing where the contaminated meat was sold provides a clear sense of the areas and the population groups that who

bear a higher risk burden. As found in this study, these types of messages are prevalent in the coverage.

In his criteria for risk analysis, Slovic (1986) maintains that risk reporting should also include an element of the probability of harm and potential number of people exposed. While it is difficult to predict how many people will suffer from consuming *E. coli*-contaminated beef, the coverage does include, at a high frequency, messages regarding the number of known cases of illness or death connected to the recall. These messages, moreover, tell the public of what types of individuals have a greater sensitivity to the contamination and identify that with elevated risks. Found at a low frequency, however, were information on safe food preparation procedures and other steps public can take if they purchased the recalled product. More information of this type will not only help alleviate risk but also provide enduring knowledge people can use should instances like these occur again in the future.

A complete evaluation of risk and crisis communication effectiveness should include both the messages communicated and an element of audience understanding (Slovic, 1986; Weinstein and Sandman, 1993). While this study deals with only the first component, the results indicate that evaluating the communicated messages in terms of the extent to which they develop a public that is aware and knowledgeable of measures they can take is critical in ascertaining the quality of crisis communication efforts beyond the number of warning bulletins issued.

Communicating adverse consequences, such as the symptoms of illnesses associated with *E. coli* contamination and the cases of illness or death associated

with it enhances public understanding of risk. While this risk information may be frightening to some, those who are more susceptible or vulnerable are given fair warning and taught how to take preventive measures. Furthermore, providing technical information about the pathogen and how contamination can occur are important elements that go a long way toward safeguarding public health (Sandman, 2003; Reynolds and Seeger, 2005). The lack of technical information about *E. coli*, especially in the later years of the study when beef recalls were greater in number and severity, can lead to unwarranted public panic.

The findings reveal that messages regarding how to control or manage the threat are few and far between, suggesting an area for improvement in risk communication efforts. Information on safe food handling techniques, what to do with the recalled product, and where to turn to for more information can reduce harm and restore a degree of control over the situation.

Also in need of improvement are messages that can reduce the adverse effects of the crisis on public opinion and trust and, consequently, on business returns. A study conducted at Kansas State University in cooperation with the Cattlemen's Beef Board found that food safety recalls negatively effect domestic beef demand (Mintert, et. al., 2009). This study concluded that the more than two-fold increase in beef recalls from 2006 to 2007 is associated with a 2.6 percent decline in retail beef demand. Assuring the public that either government or industry are perpetually vigilant and are prepared to take measures to limit future threats will help the public maintain trust in these sectors' capabilities to regulate food

processing and distribution. This will aid considerably in maintaining the industry's integrity as purveyors of safe food products.

Over all, the findings indicate the importance of maintaining a healthy relationship between the food industry and the media, especially during instances that threaten public health and well-being. They suggest that public perception of the safety of a food item is a continuous, and not a categorical, variable. A comparison of the magnitude of information richness of coverage regarding a single but persistent threat over time provided more valid and reliable results than a case study of one or different types of crises would have produced. Crisis communicators can draw from these findings the journalistic practices that safeguard public health when contaminated food products are inadvertently released in the market. For producers, distributors, wholesalers, retailers and those hired to represent them during a recall, the value of evaluating risk communication activities lie in its ability to assist in reducing immediate revenue losses and the potential of losing future market shares.

The findings of this type of research may also be applied in other highly threatening conditions, especially in the face of growing concern for the malicious use of plant or animal pathogens to cause devastating diseases in the agricultural sector. This perception of increased risk stems from recent natural outbreaks like foot-and-mouth and the spread of the West Nile virus in the eastern United States.

Limitations of the Study and Suggestions for Future Research

This study has a number of limitations. First, not all newspapers published in the US are archived in the Lexis-Nexis database, which calls into question the generalizability of the findings to the entire population of US newspapers. This

limitation also implies that the journalistic practices that produced these reports may be limited to newspapers with considerable regional and national circulation. How smaller community newspapers respond to these incidents is therefore an area that demand future research attention.

Second, three special recall cases generated a large number of newspaper reports to warrant the employment of random sampling techniques. A complete enumeration of newspaper reports during these unusual recall events may produce different results.

Third, the news reports analyzed were limited only to those that saw print or were present in the online version of newspapers. The broadcast media, which are often the first to issue alerts concerning other crisis situations such as natural disasters, were not included in this analysis. Considering that many consumers depend on them, especially for breaking news, assessing the performance of radio and television in handling these risk events should be an important part of the risk communication research agenda. Indeed risk managers and risk communication practitioners will benefit from future studies along these lines that examine the performance of different media, such as television, radio and online outlets.

Future research in the area of media coverage of beef recalls could involve a case study analysis of the more significant recalls. This type of individual evaluation of all newspaper coverage beyond the initial recall announcement could analyze the dynamics within the recall in terms of sources cited and intensity of coverage.

Content analysis methods can be triangulated with public opinion surveys to determine audience effects in terms of knowledge, attitudes and behavior. A

longitudinal look at trends and changes in public perception will also be helpful in predicting potential consequences in terms of public reaction and government or regulatory body response. Such audience-oriented methods will offer deeper insights about the extent to which crisis communication efforts were effective in mitigating risks and in reducing the harm contaminated beef pose to public health.

REFERENCES

Boone, K., Horstmeier, G., Kock, B., Miller, V., Morgan, V., Sellnow, T., Veil, S., & Venette, S. (2006, July). *Best practices for risk and crisis communication*. Proceedings from the Association for Communication Excellence Crisis Response Project workshop, Kansas City, MO.

Brasher, P. (2008, January 27). Scientists study possible link between ethanol byproduct and *E. coli.* [Electronic Version]. *Des Moines Register*. Retrieved on January 28, 2008, from http://www.desmoinesregister.com/apps/pbcs.dll/article?AID=/20080127/NEWS/801270330/1001.

Burns, W. J., Slovic, P., Kasperson, R. E., Kasperson, J. X., Renn, O., & Emani, S. (1993). Incorporating structural models into research on the social amplification of risk: Implications for theory construction and decision making. *Risk Analysis, 13*, 611-623.

Charlebois, S., & Labrecque, J. (2007). Processual learning, environmental pluralism, and inherent challenges of managing a socioeconomic crisis: The case of the Canadian mad cow crisis. *Journal of Macromarketing, 27*, 115-125.

Christen, C. T. (2005). The restructuring and reengineering of AT&T: Analysis of a public relations crisis using organizational theory. *Public Relations Review, 31*, 239-251.

Cohen, S. (2007, June 9). California firm expands recall of ground beef for possible *E. coli* 0157:H7 contamination. *Recall Release.* FSIS-RC-025-2007. Retrieved on February 11, 2008, from http://www.fsis.usda.gov/News_&_Events/Expanded_Recall_025_Release_060907/index.asp.

Coleman, C. L. (1993). The influence of mass media and interpersonal communication on societal and personal risk judgments. *Communication Research, 20*, 611-628.

Consumer Reports. (2008, March). Recalls & safety alerts. *Consumer Reports, 73*, 11.

Coombs, W. T. (1995). Choosing the right words: The development of guidelines for the selection of the “appropriate” crisis-response strategies. *Management, 8*, 447-476.

Coombs, W. T. (2007). Attribution theory as a guide for post-crisis communication research. *Public Relations Review, 33*, 135-139.

Coombs, W. T., & Holiday, S. J. (2004). Reasoned action in crisis communication: An attribution theory-based approach to crisis management. In D. P. Miller, & R. L. Heath (eds.). *Responding to crisis: A rhetorical approach to crisis communication* (pp. 95-116). Mahwah, NJ: Lawrence Erlbaum Associates.

Cuite, C. L., Condry, S. C., Nucci, M. L., & Hallman, W. K. (2007). *Public response to the contaminated spinach recall of 2006.* New Brunswick, NJ: The State University of New Jersey, Rutgers University, Food Policy Institute.

De Guzman, A. A. (2008). *Greenpeace cyberadvocacy: Message strategies and the framing of the "Say no to genetic engineering" campaign*. Unpublished master's thesis, Iowa State University, Ames, Iowa.

Family Food Information Program, Oregon State University (2007, March). *Food preservation resources*. Corvallis, OR: Oregon State University Extension Service.

Hallman, W. K., Schilling, B. J., & Turvey, C. G. (2004). *Public perceptions and responses to mad cow disease: A national survey of Americans.* New Brunswick, NJ: The State University of New Jersey, Rutgers University, Food Policy Institute.

Hyer, R. N., & Covello, V. T. (2005). *Effective media communication during public health emergencies, A WHO field guide.* Geneva, Switzerland: World Health Organization.

Kasperson, R. E., & Kasperson, J. X. (1996). The social amplification and attenuation of risk. *Annals of the American Academy of Political and Social Science, 545*, 95-105.

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Kasperson, J. X., & Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis, 8*, 177-187.

Littlefield, R. S., & Quenette, A. M. (2007). Crisis leadership and Hurricane Katrina: The portrayal of authority by the media in natural disasters. *Journal of Applied Communication Research, 35*, 26-47.

Marks, L. A., Kalaitzandonakes, N., & Wilkins, L. (2007). Mass media framing of biotechnology news. *Public Understanding of Science, 16*, 183-203.

Martinelli, K. A., & Briggs, W. (1998). Integrating public relations and legal responses during a crisis: The case of Odwalla, Inc. *Public Relations Review, 24*, 443-460.

McCarty, R. (2007, July-August). Food recalls get consumer attention*. Issues Update*. Retrieved on February 9, 2008, from http://www.beefusa.org/newsJuly-August2007.aspx.

McComas, K. A. (2006). Defining moments in risk communication research: 1996-2005. *Journal of Health Communication, 11*, 75-91.

Minert, J., Tonsor, G., & Schroeder, T. (2009, January). *U.S. beef demand drivers and enhancement opportunities: A research summary*. Kansas State University. MF-2876.

National Cattlemen's Beef Association. (2006, October). *Fact sheet: E.coli 0157:H7*. Retrieved on February 9, 2008, from http://www.beeffrompasturetoplate.org/safety.aspx.

Pate, J. (2000). Better plan needed for curbing epidemics. Retrieved on November 29, 2008, from http://cns.miis.edu/pubs/reports/patend.htm.

Reynolds, B., & Seeger, M. W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication, 10*, 43-55.

Rodriquez, L., & Lee, S. (2005, August). *Factors affecting the amplification or attenuation of public attitudes and worry about bioterrorist attacks*. Paper presented at the annual convention of the Association for Education in Journalism and Mass Communication, San Antonio, TX.

Sandman, P. (2003, April 11). *Four kinds of risk communication*. Retrieved on April 13, 2008 from http://www.psandman.com/col/4kind-1.htm.

Sandman, P. M., & Lanard, J. (2003, September 7). *Fear of fear: The role of fear in preparedness…and why it terrifies officials*. Retrieved on April 13, 2008 from http://www.psandman.com/col/fear.htm.

Seeger, M. W. (2006). Best practices in crisis communication: An expert panel process. *Journal of Applied Communication Research, 34,* 232-244.

Slovic, P. (1986). Informing and educating the public about risk. *Risk Analysis, 6*, 403-414.

Slovic, P. (1997). Public perception of risk. *Journal of Environmental Health, 59*, 22.

Taylor, M., & Kent, M. L. (2007). Taxonomy of mediated crisis responses. *Public Relations Review, 33*, 140-146.

Thomsen, S. R., & Rawson, B. (1998). Purifying a tainted corporate image: Odwalla's response to an *E*. *coli* poisoning. *Public Relations Quarterly, 43*, 35-46.

Ulmer, R. R., & Sellnow, T. L. (2000). Consistent questions of ambiguity in organizational crisis communication: Jack in the Box as a case study. *Journal of Business Ethics, 25*, 143-155.

Ulmer, R. R., Seeger, M. W., & Sellnow, T. L. (2007). Post-crisis communication and renewal: Expanding the parameters of post-crisis discourse. *Public Relations Review, 33*, 130-134.

United States Department of Agriculture Food Safety and Inspection Service. (2006, March). *FSIS food recalls*. Retrieved on March 24, 2008, from http://www.fsis.usda.gov/Fact_Sheets/FSIS_Food_Recalls/index.asp.

Weinstein, N. D., & Sandman, P. (1993). Some criteria for evaluating risk messages. *Risk Analysis, 13*, 103-114.

Zehr, A. (2003). *The communication needs and behavior of Iowa's apple and cider producers*. Unpublished master's thesis, Iowa State University.

APPENDIX A

Coding Sheet for Content Analysis of Newspaper Articles

Variable Name	Variable Label	Values
ID	Individual story ID (numbered consecutively)	
Coder	Coder's initials	
Paper	Newspaper name	Enter as a string variable
Type	Categorization of story	1 = straight news 2 = feature article 3 = editorial 4 = letter to editor 5 = press release
Origin	Determine origin of story	1 = Story written by newspaper reporter or staff member 2 = Story from wire service 3 = Reader's response or letters 4 = other 5 = not specified
Headline	The headline of the story	Enter as a string variable
Date	Date of story publication	Enter as month, day, year (mm-dd-yyyy)
Length	Length of story	Number of words in the story
Source1	Name of first source cited	Enter as string variable
Title1	Title/status of first source	Enter as string variable
Agency1	Agency affiliation of first source	Enter as string variable
Cat1	Category of first source	1 = Scientists from universities and research institutions 2 = Governmental scientists 3 = Other scientists 4 = Scientific journals and their editors 5 = Meat packers, retailers, wholesalers 6 = Ordinary citizens and consumers, but not farmers

		7 = Advocacy groups 8 = International not-for-profit group 9 = Government agencies, employees, but not government scientist 10 = Industry organizations 11 = Beef organizations 12 = Politicians, elected officials 13 = Other
Source2	Name of second source cited	Code as in Source 1
Title2	Title/status of second source	Code as in Title 1
Agency2	Agency affiliation of first source	Code as in Affiliation 1
Cat2	Category of second source	1 = Scientists from universities and research institutions 2 = Governmental scientists 3 = Other scientists 4 = Scientific journals and their editors 5 = Meat packers, retailers, wholesalers 6 = Ordinary citizens and consumers, but not farmers 7 = Advocacy groups 8 = International not-for-profit group 9 = Government agencies, employees, but not government scientist 10 = Industry organizations 11 = Beef organizations 12 = Politicians, elected officials 13 = Other
Source3	Name of third source cited	Code as in Source 1
Title3	Title/status of third source cited	Code as in Title 1
Agency3	Agency affiliation of first source	Code as in Affiliation 1
Cat3	Category of third source	1 = Scientists from universities and research institutions 2 = Governmental scientists 3 = Other scientists 4 = Scientific journals and their editors 5 = Meat packers, retailers, wholesalers 6 = Ordinary citizens and consumers, but not farmers

		7 = Advocacy groups 8 = International not-for-profit group 9 = Government agencies, employees, but not government scientist 10 = Industry organizations 11 = Beef organizations 12 = Politicians, elected officials 13 = Other
Source4	Name of fourth source cited	Code as in Source 1
Title4	Title/status of fourth source cited	Code as in Title 1
Agency4	Agency affiliation of first source	Code as in Affiliation 1
Cat4	Category of fourth source	1 = Scientists from universities and research institutions 2 = Governmental scientists 3 = Other scientists 4 = Scientific journals and their editors 5 = Meat packers, retailers, wholesalers 6 = Ordinary citizens and consumers, but not farmers 7 = Advocacy groups 8 = International not-for-profit group 9 = Government agencies, employees, but not government scientist 10 = Industry organizations 11 = Beef organizations 12 = Politicians, elected officials 13 = Other
Source5	Name of fifth source cited	Code as in Source 1
Title5	Title/status of fifth source cited	Code as in Title 1
Agency5	Agency affiliation of fifth source	Code as in Affiliation 1
Cat5	Category of fifth source	1 = Scientists from universities and research institutions 2 = Governmental scientists 3 = Other scientists 4 = Scientific journals and their editors 5 = Meat packers, retailers, wholesalers 6 = Ordinary citizens and consumers, but not farmers

		7 = Advocacy groups 8 = International not-for-profit group 9 = Government agencies, employees, but not government scientist 10 = Industry organizations 11 = Beef organizations 12 = Politicians, elected officials 13 = Other
Source	Total number of sources in the story	Enter total number
Message 1	Messages informing consumers about threat	0 = not present 1 = history of recalls 2 = pounds recalled 3 = name of company or companies involved in recall 4 = type of product recalled (product codes, description of product) 5 = date recall announced 6 = dates product processed or distributed (sell-by dates, processed-on dates) 7 = where product was distributed, affected states 8 = information about the pathogen (bacteria, causes food-borne illness, science based info)
Message 2	Messages informing how to control or manage the threat	0 = not present 1 = safe food preparation 2 = illnesses and symptoms of E. coli; number of people sick or dead 3 = what to do if purchased recalled product 4 = how much of the product has been returned/accounted for 5 = how to report cases of illnesses 6 = contact information for companies/agencies where consumers can get information
Message 3	Messages about what is being done to safeguard	0 = not present 1 = how contamination was discovered 2 = insurance that the beef supply is safe 3 = changes to governmental regulation preventing future outbreaks 4 = attempts from beef industry preventing future outbreaks
Message 4	Messages that the recall or threat has ended	0 = not present 1 = threat or recall has ended

More detailed descriptions of source *categories*:

1 = Scientists from universities and university-based research institutions (scientists from a university with a food safety program);

2 = Governmental scientists (e.g., scientists from the Food and Drug Administration, Centers for Disease Control, or United States Department of Agriculture; Federal or State);

3 = Other scientists (scientists from institutions other than those mentioned above);

4 = Scientific journals and journal editors;

5 = Meat packers, wholesalers, retailers (any meat company where the product may have been produced or sold);

6 = Ordinary citizens and consumers, but not farmers (e.g., individual consumers, restaurant personnel);

7 = Advocacy groups (e.g., People for the Ethical Treatment of Animals, Humane Society of America);

8 = International not-for-profit groups;

9 = Government agencies, employees, but not government scientist (e.g., USDA, FSIS, CDC, Federal or State, spokesperson for government agency-not a scientist);

10 = Industry organizations (e.g., American Meat Institute);

11 = Beef representatives (e.g., National Cattlemen's Beef Association, State Beef Associations, Cattlemen's Beef Board, State Beef Councils);

12 = Politicians and elected officials (e.g. Senators, Representatives)

13 = Other (all other sources not listed above, including religious leaders, websites, surveys and public opinion polls, lawyers).

More detailed descriptions of *messages*:

Messages informing consumers about the threat

0 = not present
1 = history of recalls
2 = pounds recalled
3 = name of company or companies involved in recall
4 = type of product recalled (product codes, description of product)
5 = date recall announced
6 = dates product processed or distributed (sell-by dates, processed-on dates)
7 = where product was distributed, affected states
8 = information about the pathogen (i.e. bacteria, causes food-borne illness, science based info)

Messages informing how to control or manage the threat

0 = not present
1 = safe food preparation
2 = illnesses and symptoms of E. coli; number of people sick or dead
3 = what to do if purchased recalled product; check if purchased product
4 = how much of the product has been returned/accounted for
5 = how to report cases of illnesses
6 = contact information for companies/agencies where consumers can get more information

Messages that indicate what measures are being done to safeguard against further contamination or outbreaks

0 = not present
1 = how contamination was discovered
2 = insurance that the beef supply is safe
3 = changes to governmental regulation or production practices preventing future outbreaks
4 = attempts from beef industry preventing future outbreaks

Messages informing consumers that the threat or recall has ended

0 = not present
1 = threat or recall has ended

APPENDIX B

E. coli O157:H7 Model Press Release (with example)

Accessed from: ORA/Office of Enforcement
Division of Compliance Management and Operations
http://www.fda.gov/ora/compliance_ref/recalls/ecoli.htm

FOR IMMEDIATE RELEASE DATE
COMPANY CONTACT AND PHONE NUMBER

FOOD CO. RECALLS PRODUCT BECAUSE OF POSSIBLE HEALTH RISK

Company Name of City, State is recalling Quantity and/or Type of Product because it may be contaminated with Escherichia coli O157:H7 bacteria (E. Coli O157:H7). E. coli O157:H7 causes a diarrheal illness often with bloody stools. Although most healthy adults can recover completely within a week, some people can develop a form of kidney failure called Hemolytic Uremic Syndrome (HUS). HUS is most likely to occur in young children and the elderly. The condition can lead to serious kidney damage and even death.

Product was distributed Listing of states and areas where the product was distributed and how it reached consumers (e.g., through retail stores, mail order, direct delivery).

Specific information on how the product can be identified (e.g., type of container [plastic/metal/glass], size or appearance of product, product brand name, flavor, codes, expiration dates, etc.).

Status of the number of and types of related illnesses that have been CONFIRMED to date (e.g., "No illnesses have been reported to date."

Brief explanation about what is known about the problem, such as how it was revealed, and what is known about its source. An example of such a description -- "the recall was initiated after it was discovered that product was contaminated with E. coli O157:H7. Subsequent investigation indicates the problem was caused by a temporary breakdown in the company's production and packaging processes."

Information on what consumers should do with the product and where they can get additional information (e.g., "consumers who have purchased Brand X are urged to return it to the place of purchase for a full refund. Consumers with questions may contact the company at 1-800-XXX-XXXX.)

####

(SAMPLE PRESS RELEASE)

XYZ Inc.
123 Smith Lane
Anywhere, MS

FOR IMMEDIATE RELEASE DATE
Sam Smith /555-555-5555

XYZ RECALLS "SNACKIES" BECAUSE OF POSSIBLE HEALTH RISK

XYZ Inc. of Anywhere, MS, is recalling its 5 ounce packages of "Snackies" food treats because they have the potential to be contaminated with Escherichia coli O157:H7. E. coli O157:H7 causes a diarrheal illness often with bloody stools. Although most healthy adults can recover completely within a week, some people can develop a form of kidney failure called Hemolytic Uremic Syndrome (HUS). HUS is most likely to occur in young children and the elderly; the condition can lead to serious kidney damage and even death.

The recalled "Snackies" were distributed nationwide in retail stores and through mail orders.

The product comes in a 5 ounce, clear plastic package marked with lot # 666666 on the top and with an expiration date of 12/12/99 stamped on the side.

No illnesses have been reported to date in connection with this problem.

The potential for contamination was noted after routine testing by the company detected the presence of E. coli O157:H7.

Production of the product has been suspended while FDA and the company continue their investigation as to the cause of the problem.

Consumers who have purchased 5 ounce packages of "Snackies" are urged to return them to the place of purchase for a full refund. Consumers with questions may contact the company at 1-800-XXX-XXXX.

####

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