EVALUATING NEWS BIAS IN AGRICULTURE: THE *SALMONELLA* OUTBREAK OF 2008

A Thesis

by

CHARLSIE LAUREN SCHROEDER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

December 2010

Major Subject: Agricultural Leadership, Education, and Communications

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Approved by:

Chair of Committee,	Tracy Rutherford
Committee Members,	Kim Dooley
	Jodi Sterle
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ABSTRACT

Evaluating News Bias in Agriculture: The *Salmonella* Outbreak of 2008.

(December 2010)

Charlsie Lauren Schroeder, B.S., Texas A&M University

Chair of Advisory Committee: Dr. Tracy Rutherford

Although the United States is considered to have one of the safest food supplies in the world, consumers have become increasingly alarmed with the subject of food safety as each crisis-related outbreak is scrutinized. With the onset of an agricultural-related food crisis, the media plays a vital role in publicizing both facts and opinions. Because of the relationship between agricultural risk communication and the media, it is essential to study the level of bias in the news reporting of these agricultural risk-associated events. The purpose of this study was to analyze the coverage and level of bias of the *Salmonella* outbreak associated with tomatoes in associated press (AP) newswires during a six-month period in 2008 through a descriptive content analysis.

A comprehensive search yielded 57 usable articles written during a six-month period surrounding the outbreak; these articles were analyzed using the Hayakawa-Lowry News Bias categories. A total of 1,444 sentences were coded into nine categories: (a) report attributed, (b) report unattributed, (c) inference labeled, (d) inference unlabeled, (e) judgment attributed favorable, (f) judgment attributed unfavorable, (g) judgment unattributed favorable, (h) judgment unattributed favorable, and (i) other.

Data indicated a significantly higher number of report sentences as compared to judgment sentences. Report sentences are considered both verifiable and factual. Thus, data indicated a low level of bias. Additionally, although journalists were objectively reporting information regarding the *Salmonella* outbreak, per capita tomato consumption for 2008 decreased.

In the wake of a crisis, objective reporting is crucial. Journalists have an obligation to report information that is objective, factual, and verifiable. Understanding how the media tells agriculture's story can help bridge the gap between the industry and those reporting the issues.

NOMENCLATURE

AP	Associated Press
BSE	Bovine Spongiform Encephalopathy
CIDRAP	Center for Infectious Disease Research and Policy
CDC	Centers for Disease Control and Prevention
ERS	United States Department of Agriculture Economic Research Service
FDA	United States Food and Drug Administration
FSIS	United States Department of Agriculture Food Safety Inspection Service
H1N1	Swine Flu
HAACP	Hazard Analysis Critical Control Point
nvCJD	New Variant of Creutzfeldt-Jakob Disease
PFGE	Pulsed-Field Gel Electrophoresis
USDA	United States Department of Agriculture

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CHAPTER I

INTRODUCTION: FOOD SAFETY, CONSUMER CONFIDENCE, AND THE IMPORTANCE OF EFFECTIVE RISK COMMUNICATION

Although food is a source of both pleasure and stress, it is also a provider of physical well-being for consumers (Wilcock, Pun, Khanona, & Aung, 2004). Verbeke (2005, p. 347) stated "increased market demand for quality food in general, and the occurrence of cross-national food safety crises, have heightened consumer awareness of food quality and safety." Wilcock, Pun, Khanona, and Aung (2004, p. 56) stated "each food item must be safe, aesthetically pleasing, good tasting, and consistent with the product." Effectively communicating to the public factual information regarding the safety of agricultural products is a major issue in modern day society.

> The analyses of the ideal-typical values of journalism, and how these vary and get meanings in different circumstances, have shown that any definition of journalism as a profession working truthfully, operating as a watchdog for the good of society as a whole and enabling citizens to be self-governing is not only naïve, but also one-dimensional and sometimes nostalgic for perhaps the wrong reasons. (Deuze, 2005, p. 458)

With this in mind, objectivity is a key concept in the occupational ideology of journalists (Deuze, 2005). Food safety and consumer confidence in the food supply are both important and vital to production agriculture. Wilcock, et al. (2004, p. 56) noted that

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This thesis follows the style of *Journal of Applied Communications*.

"instrumentation and food safety practices are of central importance, with particular emphasis on very high sanitary and hygienic operating standards."

> To manage food safety risks, it is important to identify which foods, pathogens, or situations lead to food-borne illness, and determine the magnitude of the impact these have on human health. Such information is needed to make rational decisions about whether or not resources should be allocated for increased management or regulation of any one hazard over another, and the kind of interventions which would be most effective in reducing food-borne disease. (Lammerding & Fazil, 2000, p. 147)

With growing consumer concerns regarding the safety of the food supply, and a focus towards negatively publicized agricultural production practices, it is necessary for agricultural communicators to convey facts to the media, and in turn, the media disseminate unbiased factual reporting. Additionally, it is of upmost importance for journalists to be objective in their reporting, especially when a crisis situation is at hand. Assessing the level of bias in reporting of such issues in agriculture can help agricultural communicators understand how to communicate with the media in a more efficient and clear manner with the ultimate goal of reporting factual and unbiased information.

According to the United States Food and Drug Administration (FDA) (2009), 82 food-borne illness outbreaks were connected with fresh-produce consumption from 1996 to 2008. A total of 14 (17.1%) of these outbreaks were linked to tomatoes (FDA, 2009). Tomato-associated outbreaks, all due to bacterial agents during the same time period, accounted for 1,927 illnesses and three deaths (FDA, 2009).

Second to only China, the United States is a one of the world-leading producers of tomatoes (USDA-ERS, 2009). Both fresh and processed tomatoes tally for more than $2 billion in farm cash receipts annually (USDA-ERS). With fresh-market tomato production in every state in the nation, commercial scale production is present in approximately 20 states (USDA-ERS). Although national fresh-market tomato acreage has been trending lower over the past several decades, U.S. fresh field-grown tomato production has trended higher over the same time period with substantial growth during the 1980s (USDA-ERS).

The FDA issued more than 40 recall notices and/or warnings for food products labeled for human consumption in 2008 (FDA, 2008). Additionally, more than 50 meat, poultry, and egg food product recalls for human consumption were reported in 2008 alone (United States Department of Agriculture (USDA) Food Safety Inspection Service (FSIS), 2010). However, the most publicized food recall of 2008 began in April.

Initially, tomatoes were implicated as the culprit of the national scare involving a rare strain of salmonellosis, *Salmonella* Saintpaul. The CDC and FDA quickly began collaborating with public health officials in several states, as well as the Indian Health Service, to investigate the, then on-going, multistate outbreak (CDC, 2008a). Initially, Roma and red round tomatoes were thought to be a source of the outbreak. The CDC (2008a, ¶ 2) reported that "on May 22, 2008, the New Mexico Department of Health notified the CDC of four people ill with the outbreak strain of *Salmonella* Saintpaul and 15 other people with *Salmonella* infection whose isolates had not yet been

characterized.” Some months later (late August 2008), jalapeno and serrano peppers were identified as major sources of the outbreak, not tomatoes (CDC, 2008a).

According to the CDC (2008a), between April and late August 2008, 1,442 people were infected with *Salmonella* Saintpaul in 43 states, the District of Columbia, and Canada, as shown in Figure 1. The United States Department of Agriculture (USDA) Economic Research Service (ERS) estimated the 2008 economic cost of salmonellosis related to all food safety outbreaks at $2,646,750,437 for 2008 in (USDA-ERS, 2010a).

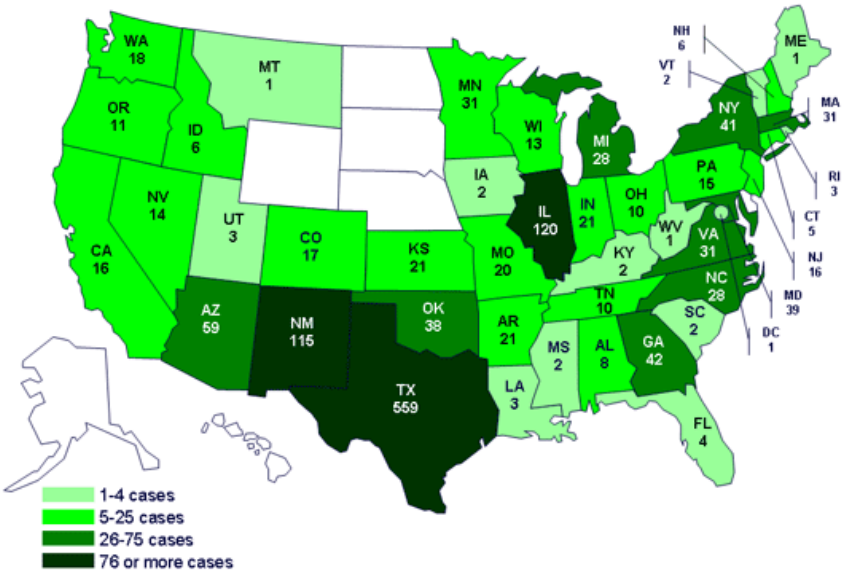

Figure 1. Cases infected with the outbreak strain of *Salmonella* Saintpaul, United States, by state, as of August 25, 2008, 9pm EDT (CDC, 2008b).

"Food quality and safety issues have received intensive mass media coverage in recent years, which has led consumers and agri-food chain stakeholders to change their beliefs, attitudes, and behavior" (Verbeke, 2005, p. 347). Verbeke (p. 347) reported that "these changes have been reflected in recent developments in food supply, purchasing, and consumption patterns." "There has also been growing interest, not only in the role and mechanisms of information, but also in the evaluation of the various techniques and vehicles for spreading information" (Verbeke, p. 347).

Food producers have both moral and ethical responsibilities in the production of safe products for consumers (Callaway, Edrington, Anderson, Byrd, & Nisbet, 2008). "There exist strict withdrawal rules that have been scientifically developed and that producers are supposed to observe, so the moral (and legal) responsibility clearly falls to the producer" (Rollin, 2006, p. 159).

Kunkel, Thompson, Miller, and Skaggs (1998, p. 706) stated that "agriculture has had to cope increasingly with a wide range of risks and uncertainty during the past several years." With hysteria created from outbreaks in both animal and food-related outbreaks, agriculture has been handed unfavorable views. "The food supply of the United States is one of the safest in the world and becomes safer each year; but many food-borne illnesses continue to occur" (Callaway et al., 2008, p. E163). Miles and Frewer (2001, p. 47) stated that the "increase in public concern regarding food hazards and decline in public trust in food risk regulators suggests that there is a need to identify the actual concerns held by the public regarding specific food hazards in order to develop effective risk communication." Berg (2008, p. 52) reported that the *Salmonella*

outbreak of 2008 "reminds us of the extent to which the federal, state, and local pieces of our public health system rely on each other."

"With each issue, there is potential for members of the public to alter lifestyle behavior or to accept or reject a product" (Kunkel et al., 1998, p. 707). Food safety issues and events have created market instability, disputes in trade laws, and problems for producers at all levels within the production phase. These food safety concerns have had dramatic impacts on the production of food and markets. A challenge remains in providing both quality and safe food products, and also in communicating this in an effective and efficient manner to the consumer (Verbeke & Viane, 2000). "Contextual conceptions presume that management, law, regulation, media, and public perceptions as well as the severity of the consequence, will figure prominently in decision making in the face of uncertainty" (Kunkel et al., p. 706). Priest (2010, p. 183) explained that "the explosion of new technology and consumer electronics has affected almost all areas of modern life, but especially the areas of communication and information."

Purpose

The purpose of this study was to examine the coverage and level of bias of the *Salmonella* outbreak associated with tomatoes in associated press newswires during a six-month period in 2008. Understanding how the media tells agriculture's story can help bridge the gap between the industry and those reporting the issues.

Problem Statement

"Over the past several years, consumers have become more concerned about food safety" (Nayga, 1996, p. 467). Both intensive media coverage and awareness, as

well as diet and health awareness have intensified these concerns (Nayga). Buzby and Ready (1996) reported 70.1% of surveyed respondents obtained food safety information from newspaper articles, as shown in Figure 2. “Only 16.5% obtained food safety information from government publications” (Buzby & Ready, p. 46). “Five percent said they do not pay attention to food safety information” (Buzby & Ready, p. 46). “Some scientists and academicians believe that the only food safety crisis is that which exists in people’s minds as a result of incomplete reporting of scientific information by the media” (Nayga, p. 467). Decreased demand, and ultimately decreased profit for producers, can be a result of consumer doubt. This research can help agricultural communicators be prepared for future food safety scares by creating risk communication plans in advance that can quickly be put in place with the onset of a crisis. Although industries may never be fully prepared, potential risk communication plans could help alleviate any initial shock and communication of false information.

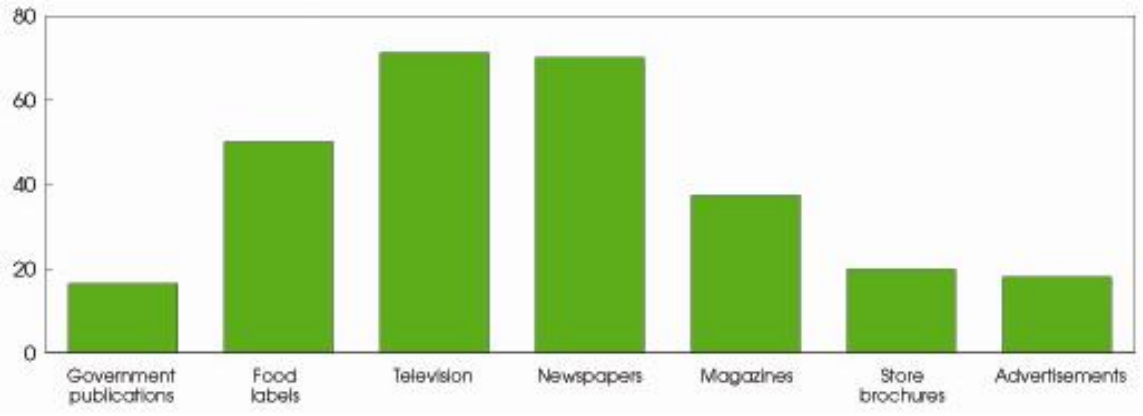

Figure 2. Where do consumers obtain food safety information? (Buzby & Ready, 1996)

Theoretical Framework

"The general notion that mass communication interposes in some way between 'reality' and our perceptions and knowledge of it refers to a number of specific processes at different levels of analysis" (McQuail, 2010, p. 85). "In the particular context of journalism as a profession, ideology can be seen as a system of beliefs characteristic of a particular group" (Deuze, 2005, p. 445). Deuze reported that alternative explanations of objectivity have been presented in studies in both multicultural reporting and media newsrooms.

This research sought to assess the level of bias in AP newswires regarding a specific agricultural food safety incident, and compare consumer trends to the level of bias. The Westley and MacLean model is abstract in its representation of the communication process, and is useful in describing the mass communication process (Lacy, 1989). "Most significant is the idea that the media are sought out by institutional advocates as channels for reaching the general public and for conveying their chosen perspective on events and conditions" (McQuail, 2010, p. 85).

"The simple picture of a 'two-step' process of mediated contact with reality is complicated by the fact that mass media are not completely free agents in relation to the rest of society" (McQuail, 2010, p. 86). McQuail (p. 86) stated that "they are subject to formal and informal control by the very institutions (including their own) that have an interest in shaping public perceptions of reality." "Their objectives do not necessarily coincide with the aim of relaying some objective 'truth' about reality" (McQuail, p. 86).

> The media provide their audience with a supply of information, images, stories, and impressions, sometimes according to anticipated needs, sometimes guided by their own purposes (e.g. gaining revenue or influence), and sometimes following the motives of other social institutions (e.g. advertising, making propaganda, projecting favourable images, sending information). Given this diversity of underlying motivation in the selection and flow of "images of reality," we can see that mediation is unlikely to be a purely neutral process. The "reality" will always be to some extent selected and constructed and there will be certain consistent biases. These will reflect especially the differential opportunities available for gaining media access and also the influence of "media logic" in constituting reality (McQuail, p. 86).

Experience is not completely or always mediated by the media, which is represented in the Westley and MacLean Model (McQuail, 2010). Direct channels of contact with social institutions exist, as presented in Figure 3 (McQuail). "The potentially diverse sources of information may not be completely independent from each other, but they provide some checks on the adequacy and reliability of quasi-mediated interaction" (McQuail, p. 86).

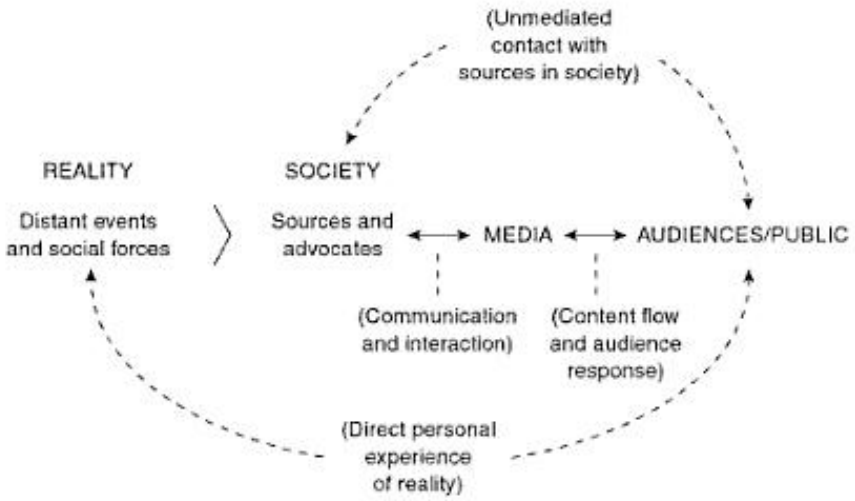

Figure 3. A frame of reference for theory formation about media and society: Media interpose between personal experience and more distant events and social forces (based on Westley and MacLean, 1957) (McQuail, 2010)

Research Objectives

Four objectives direct this study: (a) categorize all articles written about *Salmonella* contamination associated with tomatoes in AP newswire stories for six months according to story type, and date; (b) analyze the sentences in feature articles and news briefs using the Hayakawa-Lowry News Bias Categories; (c) determine the level of bias and judgment statements; and (d) compare consumer trends to the level of bias found in the articles.

Assumption

The assumption of this study is that all AP newswires associated with the *Salmonella* outbreak of 2008 for the selected timeframe were utilized.

Summary

Some consumers maintain decreased confidence regarding the safety of the American food supply even though the United States is considered to possess the safest supply worldwide (Nayga, 1996). What could be the cause of this disparity? "Most scientists and professional experts, agree that such concerns are unjustified and may be a reflection of consumers' unfamiliarity with the technical or scientific aspects of the production processes and of negative publicity from the media" (Nayga, p. 473).

> We define an accident as an occurrence which becomes an event inadvertently, that is, without the planning of those who caused the happening in the first place. The accident can thus be contrasted with the more routine sorts of events that dominate the public press and result from purposive activity staged with event potential clearly in mind. The accident thus differs in sharp ways from such events as a press conference statement, a declaration of war, or a Gulf of Tonkin Resolution. (Molotch & Lester, 1975, p. 258)

Historically, agricultural-related topics are highly publicized only when a crisis arises. Agriculture's story is rarely told when the tone is advantageous towards the industry. Do consumers ever hear about the fact that agriculture feeds the world? The media, in various forms, as well as special interest groups will always be an audience no matter what issue arises. How agriculture communicators convey the industry's message to the media will become an effective tool in telling agriculture's story.

The media can help disseminate information about various agricultural-related issues that may be of high importance, including food recalls and safety practices. “Informed professionals should redress scientifically unjustified anxiety fuelled by irresponsible media reports through timely interventions” (Wilcock et al., 2004, p. 64). Bridging the gap between the scientific and technical aspect of agricultural topics, the media, and consumers could reduce negative economic and political impacts for the industry.

CHAPTER II

REVIEW OF LITERATURE

Recently, consumer concerns in relation to food safety and associated risks, food hazards, and impacts of food consumption have continued to increase (Verbeke & Viane, 2000). Various cases involving food-borne illness and product recalls continue to create significant food safety issues and have negatively influenced consumer confidence. With more than 50 product recalls involving meat, poultry, and egg products alone in 2008, increasing awareness of consumer confidence and dissemination of information should be of importance.

Wilcock et al. (2004) reported that the United States Government was the first to introduce food safety to the consumers of North America. The Food Safety Council was created in the United States in 1976 (Wilcock et al.). Wilcock et al. (p. 56) reported that the Council's "task was to develop new criteria for evaluating the safety of the food supply, whether it was for a food ingredient, a food additive, or a basic foodstuff." In addition to this task, the Council also developed both documents and regulations responding to food safety scientific research (Wilcock et al.).

Agriculture products are exposed to potential food safety issues at every level of production. Produce grown in fields are subject to various forms of contamination at various levels of the production phase including soil, manure, irrigation water, runoff, and handlers. The contamination process can also occur at various stages of the production and handling process. All involved parties are vital links in food safety,

including farmers, food inspectors, retailers, and consumers (United States Department of Agriculture [USDA] Food Safety and Inspection Service [FSIS], 2006).

> Microbial food-borne disease may occur when a susceptible individual consumes a food contaminated by a viable microbial pathogen(s), and/or microbial toxin(s). However, not every exposure to a pathogen in food will result in infection or illness, and not all individuals in a given population are equally susceptible to all pathogens. Therefore, the risk of food-borne disease is a combination of the likelihood of exposure to a pathogen in a food, the likelihood that exposure will result in infection or intoxication, and subsequently illness and the severity of the illness. (Lammerding & Fazil, 2000, p. 147)

Producers, educators, and public authorities are interested in consumer attitudes in relation to food safety (Wilcock et al., 2004).

Salmonella enterica

Salmonella enterica is considered one of the most common and serious food-borne pathogens in the United States (Callaway et al., 2008). It is a common human pathogen that is frequently the cause of outbreaks in both the industrialized and undeveloped world (Bornemann, Zerr, Heath, Koehler, Grandjean, Pallipamu, & Duchin, 2002). In the United States, human salmonellosis occurs in about 1.3 million people, is the cause of over 500 deaths, and causes the U.S. economy an estimated $2.4 billion each year (Callaway et al., 2008). Because *Salmonella* are estimated to cause over 30% of bacterial food-borne deaths in the United States, understanding how the pathogen enters the food chain is vital (Callaway et al.).

Discovered by American scientist, Dr. Daniel E. Salmon, *Salmonella* bacteria have been known to cause illness for more than 100 years (USDA-FSIS, 2006). "Members of the *Salmonella enterica* species are public health problems associated with significant morbidity and mortality in those infected with the pathogens" (Foley, Lynne, & Nayak, 2008, p. E149).

Shown in Figure 4, *Salmonella enterica*, a gram-negative facultative intracellular anaerobe, causes 1.3 billion cases annually (Coburn, Grassl, & Finlay, 2007). Although it can be spread through the nasal cavity to the gut, it primarily exists in a fecal-oral life cycle (Callaway et al., 2008). Normally orally-acquired, *Salmonella* species cause several syndromes: enteric fever (typhoid), enterocolitis/diarrhea, bacteremia, and chronic asymptomatic carriage (Coburn, Grassl, & Finlay, 2007).

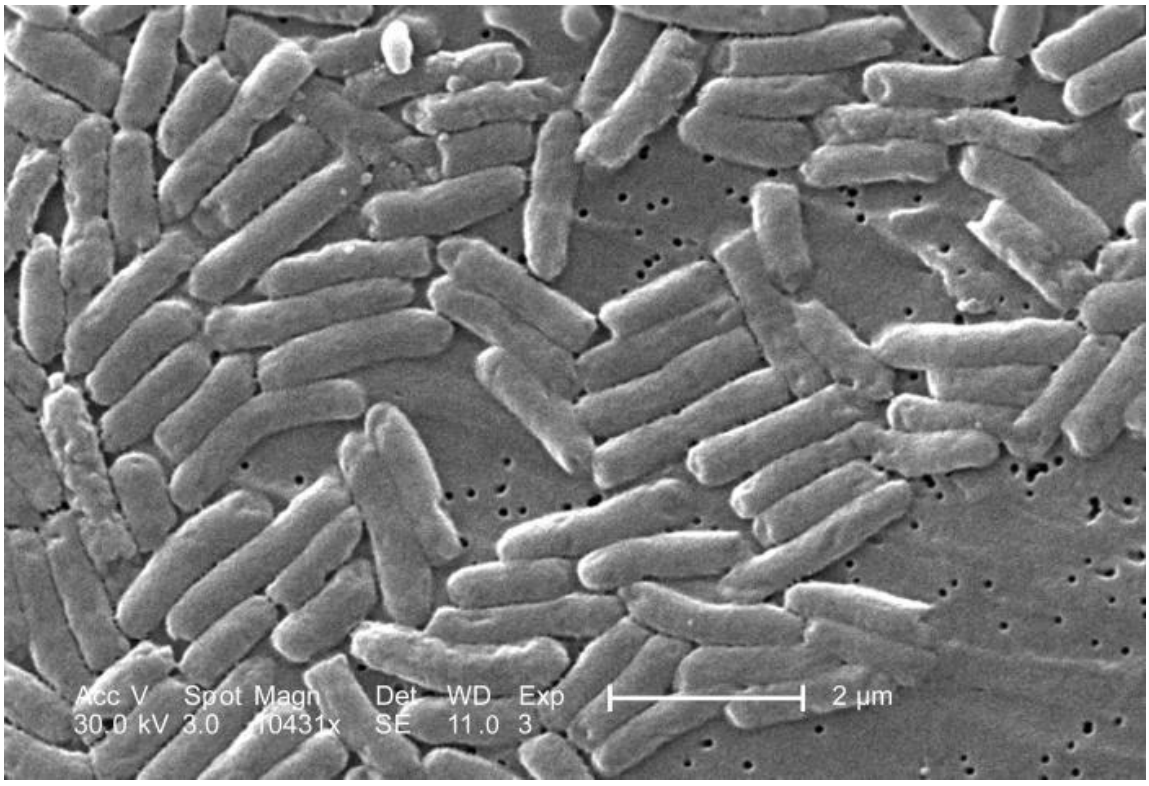

Figure 4. Colony of *Salmonella* bacteria under 10431x magnification. Image courtesy of Janice Haney Carr, CDC Public Health Image Library (2010).

Scientists have identified over 2,500 serovars categorized into six subspecies (Coburn, Grassl, & Finlay, 2007). "Subspecies are further subdivided into serovars that are differentiated by their flagellar, carbohydrate, and lipopolysaccharide (LPS) structures" (Coburn, Grassl, & Finlay, p. 112). The different *Salmonella* serotypes have both evolved and adapted to infect specific hosts (Callaway et al., 2008). With this fact, each species of animals is associated with specific serotypes causing illness in the

species (Callaway et al.). However, some serotypes can infect many species, such as Typhimurium (Callaway et al.). While infecting animals other than their adapted hosts, some serotypes may produce illness, and some do not (Callaway et al.).

Adaption has allowed *Salmonella* to exist to ways: (a) either as a pathogen in an ideal host environment, or as a member of the gastrointestinal population in a less ideal host environment (Callaway et al., 2008). "What this means in a practical sense is that some serotypes can live in food animals without causing illness; however, when host animals and their carried serotypes are consumed by humans, then food-borne illness can result" (Callaway et al., p. E164). Means other than just food and water have also been liable for illness in humans (Callaway et al.).

Treatment strategies don't differ between serotypes even though differences exist in regards to sickness in humans between various serotypes (Callaway et al., 2008). "With this genetic and environmental diversity, serotypes are adapted to live in a variety of hosts, which may or may not manifest with clinical illness" (Callaway et al., p. E163). *Salmonella* introduces multidimensional threats to the production and safety of our food supply (Callaway et al.).

> Therefore, focusing solely on a handful of critical serotypes is only helpful in understanding the flow of specific isolates within the food chain, with too much attention focused only on certain serotypes when making macroscale economic, trade, public health policy, or scientific decisions. (Callaway et al., p. E164)

"It is critical, therefore, that we understand the various serotype host preferences but continue to view *Salmonella* as the threat, rather than only watching a few serotypes" (Callaway et al., E164).

Salmonellosis: The infection

Species of *Salmonella* cause disease burden globally (Coburn, Grassl, & Finlay, 2007). *Salmonella* causes the infection salmonellosis (USDA-FSIS, 2006). In the United States, salmonellosis is the second leading cause of bacterial food-borne illness, and agricultural products, such as beef, poultry, eggs, milk, and fresh produce, are associated with a majority of these infections (Foley, Lynne, & Nayak, 2008). The Centers for Disease Control and Prevention (CDC) estimates salmonellosis to cause 1.4 million cases of food-borne illness and over 500 deaths in the United States annually (USDA-FSIS, 2006). It's estimated that about 95% of the salmonellosis cases are associated with consumption of contaminated food products (Foley et al., 2008). Salmonella was identified as the most common bacterial infection reported by the Surveillance Report from the Food Diseases Active Surveillance (FoodNet) for the year 2004 (USDA-FSIS).

Within 8 to 72 hours after eating contaminated food, most people experience diarrhea, abdominal cramps, and fever (USDA-FSIS, 2006). In humans, disease happens after the ingestion of more than 50,000 bacteria in contaminated food, typically (Coburn, Grassl, & Finlay, 2007). Most infections cause mild to moderate illness; however, death can occur as a result of serious disease (Voetsch et al., 2004).

"Human typhoid fever and intestinal/diarrheal disease represent the most common syndromes associated with *S. enterica* infection and involve the pathogenic

processes of both bacteria and host most thoroughly investigated in infectious models of *Salmonella* pathogenesis" (Coburn, Grassl, & Finlay, 2007, p. 112). "The various virulence programs employed by *Salmonella* species interact with host defense mechanisms at various tissues in different stages of infection resulting in significant host immunopathology, morbidity, and mortality" (Coburn, Grassl, & Finlay, p. 112). Symptoms include abdominal pain, diarrhea with or without blood, nausea, and vomiting (Coburn, Grassl, & Finlay). Salmonellosis is most commonly a disease of the ileum, however inflammation in non-typhodial disease can occur in the large bowel (Coburn, Grassl, & Finlay, 2007).

Symptoms usually last from 5-7 days (Coburn, Grassl, & Finlay, 2007). In cases where fluid loss is extensive, treatment of both fluid and electrolyte imbalances is necessary (Coburn, Grassl, & Finlay). "In adults, specific antimicrobial therapy is indicated only in the presence of positive signs of invasive disease, and does not decrease the duration of illness or the severity of symptoms" (Coburn, Grassl, & Finlay, p. 113). In order to prevent invasion, neonatal gut infection requires treatment (Coburn, Grassl, & Finlay).

Worldwide, even though estimates can vary greatly because of the lack of consistency in both diagnosis and reporting, between 200 million and 1.3 billion cases of intestinal disease due to non-typhodial *Salmonella*, including 3 million deaths are estimated to occur annually (Coburn, Grassl, & Finlay, 2007). Although incidence of disease caused by *Salmonella* is the greatest in developing countries, it is of high importance in developed countries as well (Coburn, Grassl, & Finlay).

Salmonella *Saintpaul: The driver of the 2008 outbreak*

The identification of the epidemic strain associated with an outbreak is critical to the success of investigations that are aimed at the prevention of the spread of the outbreak and eradication of its source (Beyer, Mukendi, Kimmig, & Böhm, 1998). Berg (2008) reported that people began to fall in April of 2008, from a previously rare strain of *Salmonella* serotype Saintpaul. First indications of the outbreak came from New Mexico, which on May 22, 2008, reported to the CDC four cases (Berg, 2008). Additionally, cases were reported from Texas and Colorado the next day. The FDA issued a nation-wide advisory on June 7, 2008, warning consumers not to eat certain tomatoes (Berg). Berg reported that on the agency issued an advisory for jalapeno peppers originating from Mexico on July 9, 2008. Some time later, Serrano peppers were also included (Berg).

> By the end of July, Congress was holding hearings. Industry representative Hank Giclas, of Western Growers, testified that businesses never implicated in the outbreak had suffered losses ranging from $400,000 to $3.4 million. “Shipment ground to a halt,” testified Anthony J. DiMare, vice president of DiMare Company. (Berg, p. 50)
>
> On July 21, FDA isolated the outbreak strain on a jalapeno pepper from the state of Tamaulipas, Mexico. On July 30, it found the pathogen in irrigation water used on the implicated farm. The involvement of Serrano peppers from the farm also has been confirmed. But it’s still not known—may never be known—if any tomatoes were a vehicle. (Berg, p. 50)

Preventative Measures

Developed by the Pillsbury Company in the 1960s to ensure the safety of food for space flights, the Hazard Analysis Critical Control Point (HACCP) procedure is a systematic approach to identification, assessment, and control of hazards (Ropkins & Beck, 2000). Early HACCP developmental work was performed in the United States (Ropkins & Beck). "HACCP is also a tool for the development, implementation, and management of effective safety assurance procedures, as opposed to an actual safety assurance procedure" (Ropkins & Beck, p. 11).

> It was intended for use by individual food companies (i.e., food producers, manufacturers, distributors, and retailers) as a protocol for the development of unique safety assurance procedures to meet their individual needs. The range and severity of hazards varies significantly from case-to-case (i.e., with site, food, ingredients, and production line), therefore this approach is more effective than instigating rigorously, pre-defined safety assurance procedures 'across-the-board' within each food sector. (Ropkins & Beck, p. 11)

The FDA performed a pilot program in 1973 including random HACCP audits of low acid-canned foodstuffs to develop Good Manufacturing Practices (GMP) strategies for the low-acid canned food industry (Ropkins & Beck, 2000). Failure in early attempts at implementation have been considered a factor in the initial lack of interest in HACCP (Ropkins & Beck).

> Food industry attention to HACCP principles generally remained insignificant until they were endorsed by the World Health Organization (WHO), United

> States Food and Agriculture Association (FAO), and the National Advisory Committee on Microbiological Criteria for Foods (NACMCF), in the 1980s. (Ropkins & Beck, p. 13)
>
> The attention that the HACCP system has received, both in the private and public sectors, has been in recognition of the increasing importance of food safety to public health and economic development (including promotion of food trade), the increasing incidence of foodborne diseases, and the additional advantages that the system offers over the traditional prescriptive approach. (Motarjemi & Käferstein, 2000, p. 326)

The HACCP concept has been promoted for some time by both public health and food authorities worldwide (Motarjemi & Käferstein, 2000). In the combat against food-borne illness, the HACCP concept and system provide extremely powerful checkpoint tools (Motarjemi & Käferstein). HACCP has been interpreted in different manners by various organizations (Ropkins & Beck, 2000). In regards to an outbreak in the UK involving pasteurized cheese in 1996, the industry did indeed have a HACCP system in place, however there were no corrective measures within the plan (Motarjemi & Käferstein).

Unfortunately, because no critical control points can be applied, no true on-farm HACCP systems are achievable for fresh produce (Powell, 2000). However, HACCP principles can guide development of on-farm food safety programs.

Lammerding and Fazil (2000) define risk assessment, presented in Figure 5, as “a process that provides an estimate of the probability and impact of adverse health effects

attributable to potentially contaminated foods" (p. 148). Risk assessment consists of the following steps: Hazard identification, exposure assessment, hazard characterization, and risk characterization (Lammerding & Fazil).

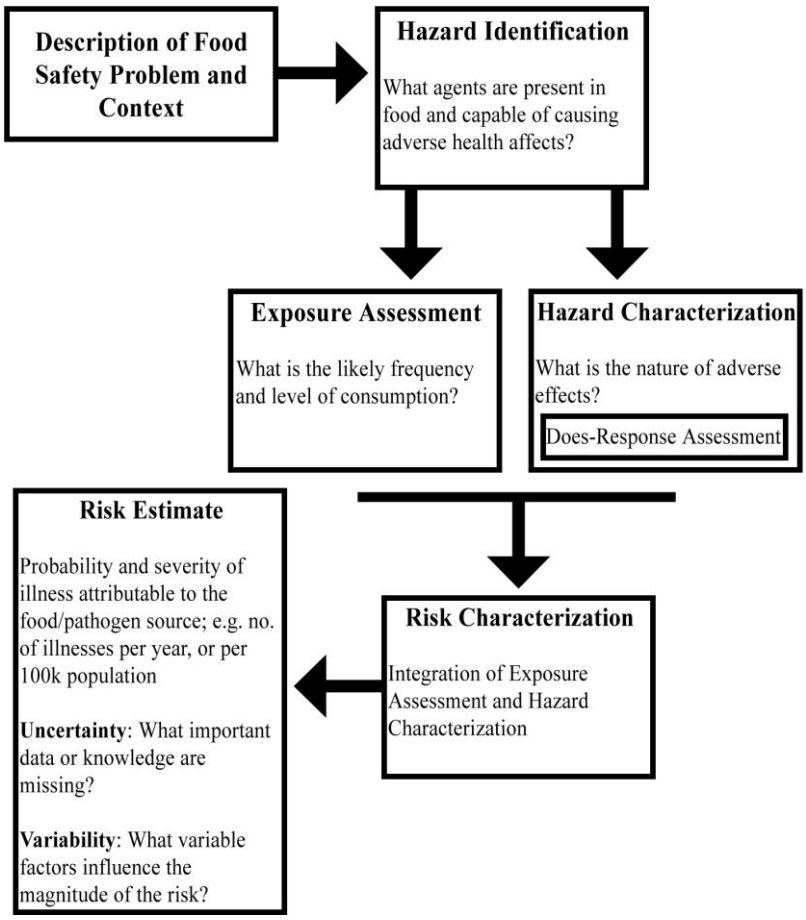

Figure 5. Steps of microbial food safety and risk assessment (Lammerding & Fazil, 2000).

These four steps describe the systematic process that both identifies and evaluates the significance of microbial hazards in food (Lammerding & Fazil, 2000). Risk assessment is just one part of risk analysis, which is a strategy that includes risk management and risk communication (Lammerding & Fazil, 2000).

> The identification of the problem may arise from any one of a number of sources: Regulators, public health sectors, the food industry, scientists, or consumers. Generally, the background information about the issue is assembled by a risk manager or decision-maker, providing a 'risk profile' that describes the food safety problem and its context. It is important that there is a high degree of consultation and communication between the risk manager(s) and the risk assessor(s) to ensure a common understanding of the problem and the scope of information that should be taken into consideration. (Lammerding & Fazil, 2000, p. 149)

Lammerding and Fazil (2000) reported that hazard identification is considered to be the first step in any formal risk assessment. "This activity is largely a qualitative evaluation of the risk issue and a preliminary examination of information that is analyzed in more detail in the subsequent steps of the process" (Lammerding & Fazil, p. 150). The term exposure assessment is defined as an estimation of the likelihood either an individual or population may be exposed to a microbial hazard and what numbers of the microorganism are ingested (Lammerding & Fazil). Lammerding and Fazil reported that food consumption patterns are considered to be part of an exposure assessment (Lammerding & Fazil).

> In summary, hazard identification identifies the issues of concern and provides the focus of the risk assessment. The exposure assessment generates estimates of the likelihood and magnitude of exposure to the hazard, setting the stage for the next two steps of the assessment, hazard characterization, and risk characterization, in which the exposure outputs are translated into a measure of risk. (Lammerding & Fazil, 2000, p. 158)

What went wrong in identifying the hazard during the *Salmonella* outbreak of 2008? What impacts on consumer demand, buying decisions, and dollars lost to producers were documented by falsely identifying tomatoes as the driver for the outbreak?

Objective Journalism

"Conceptualizing journalism as an ideology primarily means understanding journalism in terms of how journalists give meaning to their newswork" (Deuze, 2005, p. 444). Ideology can be viewed as beliefs characteristic of a particular group (Deuze, 2005). "Objectivity is at once a moral ideal, a set of reporting and editing practices, and an observable pattern of news writing" (Schudson, 2001, p. 149). If all news reports were written or reported in this manner, shouldn't they present factual information without opinions and bias on behalf of the writer? According to Schudson, objective reporting is to be cool, and not emotional in tone. The job of the journalist is to report news without commenting, skewing, or shaping its form in any particular way according to the objectivity norm (Schudson, 2001). However, this is not always the case.

According to Schudson (p. 161), "analytical fairness had no secure place until journalists as an occupational group developed loyalties more to their audiences and to themselves as an occupational community than to their publishers or their publishers' favored political parties." Although journalists become more loyal to their audiences, does the assumption that objectivity existed towards other parties involved as well regarding reporting of factual information?

> At the very moment that journalists claimed 'objectivity' as their ideal, they also recognized its limits. In the 1930s, there was a vogue for what contemporaries called 'interpretive journalism.' Leading journalists and journalism educators insisted that the world had grown increasingly complex and needed to be not only reported, but explained. (Schudson, 2001, p. 164)

Schudson (2001) reported that journalists insisted upon the fact that their job was to help readers both know and understand. Blevens reported

> In the context of the increasing concentration of ownership in the newspaper industry, and the growing influence of advertisers in the United States in the 1940s, some press critics, alarmed by what they saw as a trend toward journalism as "big business," were speaking in harsher tones in their claims that newspapers specifically were exhibiting class bias and becoming less and less representative of the country (as cited in MacDonald, p. 750).

Time Magazine and the Encyclopedia Britannica founded the Commission on Freedom of Press in 1947 in response to this crisis, more commonly known as the Hutchins Commission (MacDonald, 2006). Interpretations aren't always correct, and

adding judgment and bias to news can skew the tone. “The public service ideal can be seen as a powerful component of journalism’s ideology” (Deuze, 2005, p. 447).

> There are strong reasons for journalists to seek publicly-appealing moral norms to protect them from criticism, embarrassment, or lawsuits, and to give them guidance in their work to prevent practices that would provoke criticisms or even lawsuits, and to endow their occupation with an identity they can count as worthy. (Schudson, 2001, p. 165)

Although objectivity may not be possible, this does not intend that journalists shouldn’t strive to obtain it (Deuze, 2005). Whitaker & Dyer reported that both the content and level of bias is different in agricultural magazines as compared to nonagricultural magazines (Whitaker & Dyer, 2000). It is vital for both agricultural educators and communicators to instruct future journalists and agricultural communicators of ways to properly report unbiased facts. Good journalists can become the victim of inaccurate articles if they’ve chosen poor source choices (Whitaker & Dyer, 2000).

Risk Communication and the Media: Past Outbreaks

Consumers have increasingly become more concerned regarding the subject of food safety over recent years (Nayga, 1996). Some consumers still express a lack of confidence regarding the safety of the food supply of the United States even though it is thought to have one of the safest in the world (Nayga). These consumer concerns can prove perplexing for producers. “Most scientists and professional experts agree that such concerns are unjustified and may be the reflection of consumers’ unfamiliarity with the

technical or scientific aspects of the production processes and the negative publicity from the media" (Nayga, p. 473).

> Of great concern is the conveyance of information about food-related hazards, as there is potential for members of the public to alter lifestyle behaviors (for example, in the reduction of fat consumption in the diet) or to accept or reject the consumer products of particular technologies (for example, genetic engineering as applied to food production). People are unlikely to change their behavior or attitudes if they do not trust the source of risk information. However, to date, little research has been conducted into this particular area of risk communication. (Frewer, Howard, Hedderley, & Shepherd, 1996, p. 473)

Historically, issues facing agricultural industries have been integral parts of agricultural reporting, however only recently have these issues garnered forefront awareness in nonagricultural periodicals (Whitaker & Dyer, 2000). How do people gather information and form opinions regarding food safety information? Buzby and Ready (1996, p. 46) reported "most people obtain food safety information from television and newspapers," as shown in Figure 6. However, most people are more likely to trust information related to food safety from either government publications and packaging or labels, as shown in Figure 6 (Buzby & Ready). The problem with these facts is Buzby and Ready also reported more than 40% of survey respondents did not trust the accuracy of food safety information in any form—including government publications and food labeling. That being the case, what source do consumers trust for important food-related information?

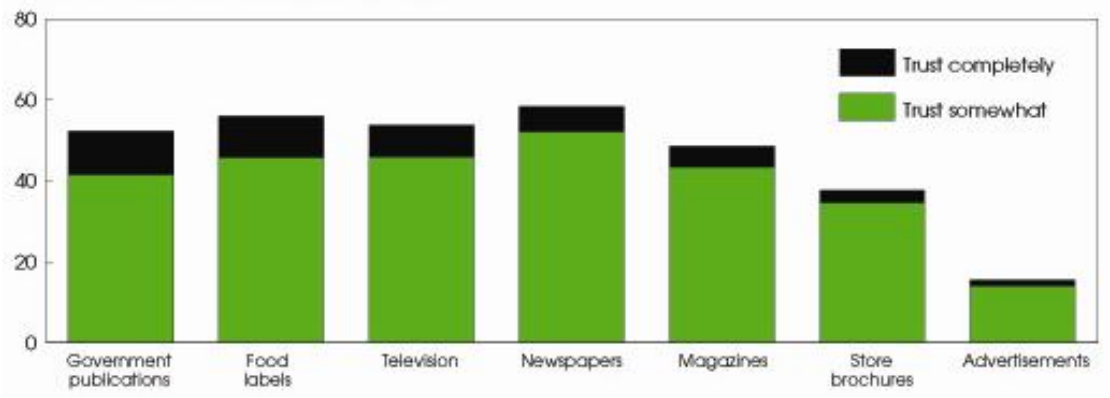

Figure 6. Do consumers trust food safety information? (Buzby & Ready, 1996)

> The beginning of the 20th century saw a visible increase in the mass production of newsprint. In the United States, the boom in newspapers created mass markets and interest in public opinion. Journalism schools emerged, leading to demands for ethical standards and for empirical inquiries into the phenomenon of the newspaper. (Krippendorf, 2004, p. 5)

Whitaker and Dyer (2000) reported that journalists began reporting both environmental and food safety information in the 1980s. However, these issues had become extremely complex, and by the time they had received the attention of the journalists, the journalists were overwhelmed (Whitaker & Dyer). Although journalists had been equipped and trained with writing skills, they weren't equipped to understand their influence on relationships between producers and consumers (Whitaker & Dyer).

Recently, agriculture has had the need to cope with both a wide range of risks and uncertainty (Kunkel et al., 1998). Frewer, Howard, Hedderley, and Shepherd (1996) reported that consumer trust in risk information regarding food safety could be as important as the actual content of the risk information. "Assessments and evaluations of these risks, however, have incorporated different conceptions of the risks involved and required different approaches to handling the uncertainties" (Kunkel et al., p. 706). There are various factors that can affect the likelihood and severity of food-borne disease occurrence in both the production and consumption of food (Lammerding & Fazil, 2000). Lammerding and Fazil stated that factors can vary, and minimal information may be available.

Powell (2000) stated that risk communication, a new scientific topic, is the science and understanding of both scientific and technological risk, and then how it is communicated. Various groups developed models that included value systems into risk communication theory during the 1980s (Powell). "This generated broad agreement that risks are evaluated according to their perceived threat to familiar social relationships and practices, and not by numbers alone" (Powell, p. 394). Understanding why certain sources are considered to be trusted sources of information and why others aren't is a question of focus in risk communication literature (Frewer, Howard, Hedederley, & Shepherd, 1996). Little research examining the effects of both trust and disturst has been conducted (Frewer, Howard, Hedderley, & Shepherd). "In essence, risk communication must be treated as a reciprocal process – including the opinions of all stakeholders, not

simply those who wish to sell their side of the story more effectively" (Powell, 2000, p. 394).

"The popular press has been instrumental in framing issues in the social content" (Powell, 2000, p. 399). Attitudes towards a certain item are extremely important because they have been found to predict behaviors (Wilcock et al., 2004). The attitudes of consumers in regards to food safety can be different dependent on the type of food safety crisis at hand (Wilcock et al.). Previous research indicates that perception can be formed only within the boundaries of the information that is available (Powell). With this assumption, the popular press has addressed the public's values (Powell). "Of particular importance from a risk communication perspective is that the framework is conducted in collaboration with stakeholders and iterates stages in the process if new information changes the need for, or nature of risk management" (Powell, p. 394).

> A body of knowledge has been created over the past decade that can assist in the understanding of public perceptions of microbial food safety risk, how the media translates this information, and how government, industry and other organizations can better relate risk information over a wide range of disciplines. (Powell, 2000, p. 394)

It is vital to understand the audience involved with any risk communication exercise (Powell, 2000). The U.S. National Research Council stated

> The growth of interest in risk communication is driven by four motivations: (1) a requirement for – or desire by – government to inform in the participatory democracies of Western politics, from informal consultation to legislated

> accountability (such as the U.S. Administrative Procedures Act of 1946 and the Community Right to Know provisions of Title III of the Superfund Amendments and Reauthorization Act of 1986; (2) desires to overcome opposition to decisions; (3) a desire to share power between government and public groups; and (4) a desire to develop effective alternatives to direct regulatory control. (as cited in Powell, p. 394)

"Underlying these motivations is a general recognition that decision-making in democratic societies is becoming more public and is increasingly driven by non-experts" (Powell, p. 394). Efforts such as Environmental Farm Plans (EFP), training courses, and food safety systems should show the public that all steps are being proactively taken to reduce risk (Powell).

Recent outbreaks of food-borne safety issues, such as bovine spongiform encephalopathy, commonly known as BSE or mad cow disease; and *Escherichia coli* O157:H7, commonly known as *E. coli*, have significantly changed the public's perception of food safety. In the mid-1990s, studies by the Food Marketing Institute of the Unites States suggested the fact that most consumers were confident in the safety of the food they purchased Studies (Wilcock et al., 2004). However, other studies have shown that a majority of consumers show some concern of the safety of the food supply, and are even willing to pay premiums for safer foods (Wilcock et al., 2004).

Break downs can occur at any point including, sanitation, processing, preparation, and even home procedures (Kunkel et al., 1998). Historically, tomatoes have been difficult to trace (Berg, 2008). The Dr. Acheson of the FDA previously stated

that tomatoes are washed, packed, repacked, and comingled at multiple distribution points (Berg). Berg reported that Acheson stated "The commingling has the potential to multiply the quantity of food that is contaminated. It also increases the difficulty in determining which tomatoes were the source of the illness" (p. 51).

Considerations for methods of risks are debated in philosophical literature (Kunkel et al., 1998). People who are concerned can differ in their concept of risk due to having received different information (Kunkel et al.). Challenges and problems do exist in the communication of risk information (Kunkel et al.). "With each issue there is potential for members of the public to alter lifestyle behavior or to accept or reject a product" (Kunkel et al., p. 707).

The concept of risk is disputed (Kunkel et al., 1998). Kunkel et al. reported that differences in the conceptions of risk have lead to problems in assessment, evaluation, and communication. Previous well publicized outbreaks including the BSE cases in the U.K. and the 1993 *E. coli* 0157:H7 outbreak involving Jack-in-the-Box have changed public discussions regarding the concept of food safety (Powell, 2000).

With the possible link between a new variant of Creutzfeldt-Jakob disease (nvCJD) in humans and BSE, producers, governments, and scientists were presented with an overwhelming challenge (Kunkel et al., 1998). Early practices in the BSE case was if there was no basis to respond, then there was no scientific evidence for the alleged risk (Kunkel et al.). However, a different approach to these arguments would need to be taken with the outbreak of 15 nvCJD human cases in 1997 (Kunkel et al., 1998).

> In the early 1990s, there was no scientific evidence that BSE is a human health hazard. However, claims that British beef was safe to eat also could not be considered scientific when the question had not been tested and was, perhaps, untestable. (Kunkel et al., p. 708)

After 1985, in Britain, BSE became epidemic in cattle (Kunkel et al., 1998). The agent of transmission of the spongiform encepahlopathies is a modified protein, prion, that is produced from a protein normally found in all mammals (Kunkel et al.). Kunkel et al. reported that scientific efforts at the time focused on epidemiological studies. "But, the implications for human health could only be assessed intuitively" (Kunkel et al., p. 708). Although science had revealed little insight into the BSE epidemic in Europe, food safety risks become heightened in the European public perception (Kunkel et al.).

> A contextual risk assessment is a difficult aspect to handle. At question are the legitimacies of the attributes undertaken to determine the context of the risk. This was evident in the early days of the BSE epidemic in Britain. Sensitivities centered on evolving facets. (Kunkel et al., p. 708)

Similarities between scrapie and BSE had raised questions as to whether the disease could jump specie barriers, including to humans (Kunkel et al.). Kunkel et al. reported that this led to secrecy in the British government and that reports were delayed. Acting as though there was very little evidence, the government declared that British beef was safe (Kunkel et al.).

"Upon retrospective analysis, these attributes were hardly legitimate" (Kunkel et al., 1998, p. 708). European countries experienced a heavy decline in consumptions of

fresh meat (Verbeke & Viane, 2000). Verbeke and Viane (2000) stated that explanations for this decline can be found in factors other than economics, to include health concerns, risk perception, and the impact of communication. Kunkel et al. asked how should the nature of risk be characterized, and what kind of training can be implemented?

Verbeke and Viane (2000) reported that demand for fresh meat is both individual and health focused. Increasing consumer concerns in regards to the safety of food products can be attributed to recent decreases in both beef and pork consumption (Verbeke & Viane, 2000). Verbeke and Viane stated that this is not a surprising trend considering the large number of food safety issues associated with meat recently (Verbeke & Viane).

The possibility of a link between BSE and nvCJD became a risk, however it could not be described (Kunkel et al., 1998). "Here was the possibility that eating meat from BSE-infected cattle might infect humans, a theory that was considered impossible until the 1990s and is still treated cautiously by many scientists" (Kunkel et al., p. 708). Kunkel et al. reported that the risk in regards to humans couldn't quantitatively be stated (Kunkel et al.). Cousens, Vynnycky, Zeilder, Will, and Smith reported

> The risk to humans was, at the time, suggested to be between zero, because no one could say with certainty that the nvCJD can be caused by eating diseased beef, and millions (i.e., everyone who has eaten beef), which probably was as honest an approach to the uncertainty as probabilities calculated on the bases of uncertain assumptions. (as cited in Kunkel et al., p. 708)

"The scientific community's conception of risk generally results in the quantification of probabilities justified by statistical inference" (Kunkel et al., 1998, p. 710).

> When mechanisms are poorly understood, as is the case with BSE and nvCJD, it seems inevitable that scientific judgment will be uncomfortably inprecise. Even highly objective analysis of risks is overlain by judgments that need to be scrutinized. But, as scientific knowledge accumulates, it is an attribute that grows in importance relative to other attributes of the context. (Kunkel et al., p. 710)

The BSE outbreak in Europe is an example of what can happen within animal agriculture (Kunkel et al., 1998). A risk-associated event of this magnitude can happen again (Kunkel et al., 1998). With each risk and event, new standards and paradigms are developed (Kunkel et al.). "The most significant element in the probabilistic/contextual continuum is trust" (Kunkel et al., p. 711). "Animal scientists, regardless of their feelings, should acknowledge uncertainty and evaluate risk in a fashion that allows the public, policy makers, and other scientists to make their own accommodations" (Kunkel et al., p. 711).

"Relative to a risk, there will likely be uncertainty as to what action animal agriculture should undertake as a responsible part of society without unneedfully impaling itself on a sacrificial sword" (Kunkel et al., 1998, p. 711).

> Animal agriculture will continue to be confronted with issues of policy in the face of uncertainty. It may cope with such issues by supporting and using the research of the larger scientific community, attempting to understand the contextual aspects of the risk, and conceptually balancing the two aspects. As

> science provides increasing understanding, it can contribute increasingly to the conception of the risk. But management, law, regulation, and public trust as well as perceptions of the severity of consequence, are contextual elements that will likely weigh in on the decision making process. (Kunkel et al., 1998, p. 712)

In 1993, an outbreak concerning *E. coli* O157:H7 occurred in the United States connected to Jack-in-the-Box restaurants. According to Powell (2000), this event along with the BSE outbreaks in Europe drastically changed the public discussions of food safety.

> The Jack-in-the-Box outbreak, which eventually killed four children and sickened over 700, had all the elements of a dramatic story, which catapulted it to the top of the public agenda – at least in the U.S. Children were involved; the risk was relatively unknown and unfamiliar; and a sense of outrage developed in response to the inadequacy of the government inspection system. (Powell, 2000, p. 395)

Powell (2000) reported that E. coli O157:H7 became the focus of debates, and the subject of investigative journalism. With the onset of the Jack-in-the-Box crisis, news stories regarding food safety began appearing more frequently in the media. Powell reported that an overall increase in North American media coverage regarding food safety concluded in a twofold increase from the last quarter of 1993 to mid-1994, and that the microbial food safety story remained at the forefront through December 31, 1998. Additionally, there have also been many other well-publicized outbreaks since this incident that have contributed to the lack of trust in food safety (Powell).

> During the same time period, there have been many public opinion surveys about biotechnology in general, and more specifically, agricultural biotechnology. Since public discussion of this issue began in the late 1980s and early 1990s, concerns about biotechnology have been driven by ethical and safety concerns. Interestingly, the relatively low levels of public support for a variety of gene transfers change dramatically when a gene transfer is tied to achieving a specific goal that is deemed worthy, such as increasing nutritional content in a food crop. The popular press has been instrumental in framing issues in a social context. (Powell, 2000, p. 396)

The media's role in regards to shaping public perception has been well-recorded (Powell, 2000). "Yet the actual impact of media coverage on citizen decision with respect to a particular risk remains unclear" (Powell, p. 396). The mass media can communicate in regards to the risk that is present, and interpersonal channels are implemented in the determination of the level of the risk to the individuals (Powell). The amount of information received by the secondary sources from media stories hasn't been determined (Powell). A focus of more recent research has been communicating uncertainty (Powell).

> Public communication about issues of technological risk often involves messages from diverse individuals or communities that are translated and synthesized by media outlets and other members of the public. At each step, message providers, journalists, and audience members are using their own value systems, constraints, and the filters of experience and expectation to contextualize the information

> they receive. It is therefore incumbent on the provider of risk messages to determine how a specific target audience receives and perceives risk information. (Powell, 2000, p. 396)

"Without effective risk communication in the event of a microbial outbreak, the potential for stigmatization of food is enormous" (Powell, 2000, p. 396). Powell reported an example during the spring and summer of 1996 where an estimated 1,465 people across North America were infected with *Cyclospora cayetanensis*, a parasite that was first linked to the consumption of contaminated strawberries from California. Some time later, the vehicle was thought to be raspberries from Guatemala (Powell). The California Strawberry Commission estimated that it lost anywhere between $20 to $40 million in sales, and some citizens didn't even hear the correction (Powell). *Cyclospora* emerged yet again in 1997 despite increased risk management in fresh fruits, lettuce, and basil (Powell). Powell reported, that after this, sales of fresh herbs dropped immediately.

> Every time a case is reported, Osterholm said, the patient should be immediately interviewed with a detailed, standardized questionnaire. There should be no waiting to find out if a cluster is involved. But as Kirk Smith of the Minnesota Department of Health testified to Congress, "This currently is not done in most localities." Smith also noted that funding for food-borne disease surveillance has "decreased substantially throughout the decade" and that "many state laboratories lack the resources to rapidly confirm and type every *Salmonella* and E. coli isolate they receive." Lack of speed in a food-borne outbreak investigation, in addition to delaying action, can detract from accuracy. (Berg, 2008, p. 51)

"In the Odwalla juice company outbreak of *E. coli*, the increased and more effective attention of the Seattle-King County Health Unit—the same one involved in the Jack-in-the-Box outbreak—toward *E. coli* O157:H7 resulted in rapid identification of the problem" (Powell, 2000, p. 397). Powell reported that the company implemented excellent communication of the risk. Officials responded in both a timely and compassionate manner, cooperating with officials (Powell). The link was first made on October 30, 1996, and affected 65 people in four states and British Columbia (Powell). Odwalla reported

> Upon learning of a child's death, company chairman Greg Steltenpohl issued a statement: "On behalf of myself and the people at Odwalla, I want to say how deeply saddened and sorry we are to learn of the loss of this child. Our hearts go out to the family and our primary concern at this moment is to see that we are doing everything we can to help them" (Powell, 2000, p. 397).

Even though the words expressed were comforting in nature, the company didn't identify the existence of any risk associated with the product (Powell, 2000). Powell (p. 397) reported that "Steltenpohl told reporters at the time that the company did not routinely test for *E. coli* because industry experts had advised that the acid level in the apple juice was sufficient to kill the bug." U.S. Centers for Disease Control and Prevention researchers wrote that the outbreak was caused by unpasteurized, unpreserved cider (Powell). Researchers had found that *E. coli* could survive for 20 days in unpreserved, refrigerated cider, and thus the story received national media attention

(Powell). The drinks produced by Odwalla are shipped in cold storage and have a two-week shelf-life because they are unpasteurized (Powell).

> Despite the many examples of risk communication failures from which to learn, many politicians, company executives, and academics still urge citizens to become better educated in scientific matters as a means to overcome public fear as a barrier to "progress." This strategy has been advocated by technology promoters in discussions of technological risk for the past 200 years. More recently, promoters of agricultural chemicals in the 1960s and nuclear energy in the 1970s have embraced the public education model. It has failed. Today, the notion of public education is the basis of dozens of communications strategies forwarded by government, industry, and scientific societies, in the absence of any data suggesting that such educational efforts are successful. (Powell, 2000, p. 400)

The notion of educating the public cannot be considered a substitute for good risk communication (Powell, 2000). The urge to educate the public to result in awareness of scientific research is a frequent occurrence (Powell). Powell reported that it was unacceptable for Odwalla to say that it had no knowledge that *E. coli* could survive in the low acid environment, especially in a food manufacturing system where vulnerability to outbreaks had been increasing.

For effective risk communication, timeliness is essential (Powell, 2000). Additionally, implementing good risk communication early is not beneficial if it is not done often as well (Powell).

> The current state of risk management and communication research suggests that those responsible for food safety risk management must be seen to be reducing, mitigating, or minimizing a particular risk. Those responsible must be able to effectively communicate their efforts, and they must be able to prove they are actually reducing levels of risk. Otherwise, stigma is a powerful shortcut consumers may use to evaluate food-borne risks. (Powell, 2000, p. 400)

"Surveys and media analysis have shown that the level of perceived trust in promoters and regulators of technologies is the most accurate gauge of consumer support" (Powell, 2000, p. 403). In the promotion of safe food handling practices, consumers are to be encouraged to implement an array of food safety measures (Wilcock et al., 2004). However, one of the most important factors is trust (Powell). "If trust is a better predictor of consumer support, then what factors influence perceptions of trust" (Powell, 400)? This could help in the explanation of why consumers are concerned about food safety issues that some scientists may view as diminutive (Powell).

Most recently, in late spring and early summer 2009, the swine industry was hit with a crisis by name or title. The United States first learned of the so-called "swine-flu" on April 24, 2009 (Sterle, 2009). With the onset of H1N1, or more commonly referenced as the "swine flu," a state of hysteria amassed the public. Dr. Ron Plain estimated that the swine industry lost roughly $487 million from May to August (Sterle). The U.S. swine industry quickly became concerned with the protection of its herd, export markets, and the health and well beings of humans with the onset of human cases in both California and Texas (Sterle). Hispanic demand for pork experienced a decline of almost

40%, while countries such as China and Russia both refused to purchase any pork products from states with confirmed human H1N1 cases (Sterle). Sterle reported that the industry would survive even though the then-current crisis appeared to last longer than the previous one. "Out of hard times also come increases in productivity and innovation" (Sterle, p. 14). Sterle reported that fortunately for the industry, reactions were quick or the results could have been much worse (Sterle).

"Industry experts gave hundreds of media interviews, with the same message: Pork is safe to eat" (Sterle, 2009, p. 14). At the Texas Pork Industry Conference & Youth Symposium a session on media training and scenarios was provided. Participants at the training session learned the importance of risk communication, and that it may not be what is said, but how it's said (Texas Pork Industry Conference & Youth Symposium, 2009). Participants were trained on how to convey to the media the message they were saying to the public (Texas Pork Industry Conference & Youth Symposium).

Historically, outbreaks cost various food industries millions of dollars (Powell, 2000). Regulators are those who are responsible for the effective risk communication (Powell). Powell and Leiss reported

> It is now generally accepted that industry must take primary risk communication responsibility for product-related risks and workplace hazards, as well as for community awareness in the vicinity of facilities where hazardous materials and processes are employed. But with the rationalization of government services, industry is assuming more responsibility for the delivery of food inspection

> services (under government auditing), and therefore is assuming more of the risk communication responsibility. (as cited in Powell, p. 401)

"In essence, risk messages must be designed to address underlying concerns, stressing regulatory oversight and the nature of public consultation, and whether regulatory procedures are adequate or need to be altered" (Powell, 2000, p. 402). Previous research has found that the mass media is the most common source of external influence in regards to the means of communication of food-associated risks (Wilcock et al., 2004). "Consumers' attitudes towards the safety of foods are strongly associated with how much they trust not only the food industry, but also government agencies that are responsible for ensuring food safety" (Wilcock et al., p. 64).

> The first challenge is time. With *Salmonella*, more than a week may pass between exposure to the pathogen and onset of illness. Next, the patient has to get in to see a doctor, the doctor has to order clinical lab work and wait for the results, and the strain has to be sent to a public health laboratory for serotyping and pulsed-field gel electrophoresis (PFGE), which identifies the DNA fingerprint of the pathogen. The median delay in the *Salmonella* Saintpaul outbreak was 16 days, according to the congressional testimony of Lonnie King, director of the National Center for Zoonotic, Vector Borne, and Enteric Diseases at CDC. That means that in more than half the cases, more than 16 days passed. Michael Osterholm, director of the Center for Infectious Disease Research and Policy (CIDRAP) and a professor in the Environmental Health Sciences Division at the University of Minnesota, testified at the same hearing that a cluster of

> cases may therefore not become apparent for three to four weeks after the initial victims are exposed. By then, victims may not remember the foods they ate in the week before they became ill. (Berg, 2008, p. 50-51)

Credible sources should be used to admit uncertainties in order to enhance credibility (Wilcock et al., 2004). Concerns from consumers in regards to food safety should be addressed in a prompt, honest, and expert manner (Wilcock et al., 2004).

> Producer-led risk management programs are an action, an appropriate risk management strategy, to demonstrate to consumers that producers are cognizant of their new found concerns about food safety, and to demonstrate that producers and others in the farm-to-fork continuum are working to reduce levels of risk. Because, when the next outbreak or crisis of confidence comes—and microorganisms can adapt and evolve to any food production and distribution system that is created—producers need to demonstrate due diligence to minimize potential losses. (Powell, 2000, p. 403)

"Informed professionals should redress scientifically unjustified anxiety fuelled by irresponsible media reports through timely interventions" (Wilcock et al., 2004, p. 64). Additionally, the media may serve as a useful tool in the reporting of hazards that may have been previously unfamiliar to the public (Wilcock et al.).

> Few nations are isolated from today's news network. The lines between news and entertainment (sometimes producing the kind of material referred to derogatorily as "infotainment") are blurred, and the lines between interpersonal and mass media are also increasingly blurred. The future of journalism in traditional media

> is uncertain, which raises profound new questions of social responsibility and ethics, but it is also a fascinating world to watch—and an amazing research opportunity. Where is today's news media agenda to be found? (Priest, 2010, p. 184)

In a study related to risk communication and food-related risks, Frewer, Howard, Hedderley, and Shepherd (1996) found that both trust and distrust is both multidimensional, and can't be predicted by single terms. "Trust appears to be linked with perceptions of accuracy, knowledge, and concern with public welfare" (Frewer, Hedderley, & Shepherd, p. 484). "Distrust is associated with perceptions of deliberate distortion of the information by the source, and a history of providing erroneous information" (Frewer, Hedderley, & Shepherd, p. 484). "It has been argued that increased scientific literacy in the general public will help decrease perceived risk associated with science and technology, and, by implication, the products of those technologies" (Frewer, Hedderley, & Shepherd, p. 484). The amount of scientific information coupled with an increase in technical complexity has likely further added to issues in the general public's understanding (Frewer, Hedderley, & Shepherd). Thus, the general public must rely on trustworthy groups who can both filter and disseminate the risk information in a way that is understandable (Frewer, Hedderley, & Shepherd). It is apparent that the media support the powerful (Molotch & Lester, 1975, p.).

Buzby and Ready (1996) surveyed 3,000 randomly selected households in the United States, and gave their survey respondents a list of seven potential concerns in relation to food, and asked them to indicate which was their most important concern,

shown in Figure 7. High saturated fats and cholesterol was the most frequently reported concern (39%), food poisoning was reported with the second most frequency (30.4%) (Buzby & Ready). Buzby and Ready's findings were found to be consistent with those from a 1992 survey conducted by the University of Kentucky. "The consistency of these rankings between 1992 and 1995 is interesting, given that there have been some well-publicized food safety outbreaks in the media since 1992, such as the 1993 *E. coli* O157:H7 outbreak from eating contaminated hamburgers" (Buzby & Ready, p. 48).

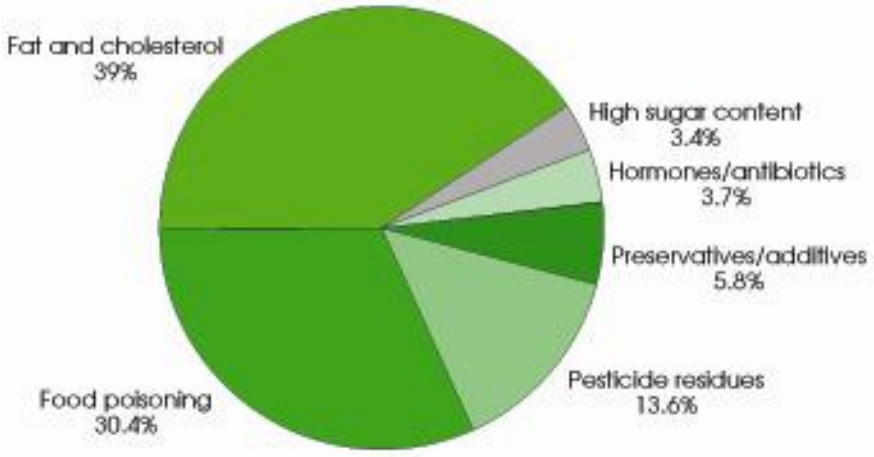

Figure 7. Consumers' top concerns related to food (Buzby & Ready, 1996).

"Still, more than 40% of the survey respondents did not trust the accuracy of food safety information in any form—including government publications and food labeling" (Buzby & Ready, 1996, p. 48). Buzby and Ready reported that their findings indicated that the notion of educating the public in regards to food safety could pose significant challenges. "How are we going to educate people if over 40% do not trust the accuracy of food safety information" (Buzby & Ready, p. 48)? Nayga (1996) stated that resistance from consumers could be reduced if practices in production are explained early. "Are there other media that would be more effective in educating consumers" (Buzby & Ready, p. 49)? "Knowledge of the relationship between individual characteristics and concern for these production practices is useful for the design and implementation of food safety information programs" (Nayga, p. 467).

Summary

The purpose of this study is to examine the news coverage and determine if bias occurred during the *Salmonella* outbreak associated with tomatoes in associated press newswires during a six month period in 2008. The most important challenges are in providing both quality and safe food, and then in communicating this in an efficient and effective manner to consumers (Verbeke & Viane, 2000).

Bridging the gap between consumers, producers, and education, coupled with effectively communicating and disseminating information positively when agriculture faces high profile practice issues or food safety scares could reduce negative economic and political impacts for industry. Whitaker and Dyer (2000) stated that those who report

on agricultural issues should receive training in agricultural journalism due to the complexity of agriculture.

Biased reports and subjective information communicated to the public through the media should be of high importance to any industry. Controversial industry practices, confusion in sickness and industry nomenclature, and confusion regarding trace-back systems are examples of recent events disturbing the agricultural industry, and, historically, that have been scrutinized by mass media. Because of these disasters in perception, it is necessary to examine the issue of biased news reporting in an effort to further educate future communicators of the agricultural industry.

CHAPTER III

METHODS

One of the first quantitative newspaper analysis papers, which was published in 1893 inquired as to do newspapers actually give the news (Krippendorf, 2004). The author of this paper indicated how New York newspapers had cut coverage in regards to religious, scientific, and literary matters in favor of gossip, sports, and scandals between the years of 1881 and 1893 (Krippendorf). Most of human activity is not observable or measurable directly, and it may not always be possible to receive information from people who experienced activity firsthand (Fraenkel & Wallen, 2006). The questions this study sought to answer involved an analysis of historical content, and determination of a level of bias. To answer the research questions, a content analysis methodology was implemented.

Mixed Methodology Research

Can both qualitative and quantitative research approaches be implemented together? Yes, they can, and most often, they should (Fraenkel & Wallen, 2006). Statistics that are descriptive can sometimes be implemented to provide quantitative information in a qualitative study (Fraenkel & Wallen). Numerous historical studies can include combinations of both qualitative and quantitative methods (Fraenkel & Wallen). Thus, their reports present both kinds of data (Fraenkel & Wallen). Fraenkel and Wallen reported that a major strength of studies implementing mixed methodologies is that they can provide complete pictures of situations, whereas either types of data could present

by itself. An advantage is that researchers are able to gather and analyze both more and different kinds of data by implementing mixed methodologies (Fraenkel & Wallen). However, some weaknesses of studies with mixed methodologies are that a researcher who decides to implement this type of study needs to be trained in both methods, and these studies often require extensive data collection, and a substantial amount of time and energy (Fraenkel and Wallen).

Qualitative research

Some research seeks to answer questions such as "how well" and "to what extent" (Fraenkel & Wallen, 2006). "Research studies that investigate the quality of relationships, activities, situations, or materials are frequently referred to as qualitative research" (Fraenkel & Wallen, p. 430). Qualitative methods are implemented in order to seek a deeper truth (Greenhalgh & Taylor, 1997). Qualitative methods of research have been used in all social science disciplines (Borman & LeCompte, 1986). One of the major characteristics of qualitative research is the holistic perspective where the phenomenon is understood as a complex system that is more than just the sum of its parts (Fraenkel & Wallen). Qualitative research is non-standard by nature and dependent on the experience of the researcher and the researched (Greenhalgh & Taylor).

Strengths in qualitative research lie in validity (Greenhalgh & Taylor, 1997). Validity of qualitative methodologies is improved by using triangulation, a combination of research methods and independent analysis of the data involved by more than just one researcher (Greenhalgh & Taylor). There is no way to control for observer bias in qualitative research (Greenhalgh & Taylor, 1997).

> Most often critics of qualitative research operate from a scientistic or positivistic tradition that has idealized investigative models borrowed from the natural sciences. From this perspective, qualitative research is criticized for not being something it never intended to be, and is not given credit for its strengths. (Borman & LeCompte, 1986, p. 42)

Fraenkel and Wallen (2006) stated that qualitative researchers have increased flexibility in strategies and techniques used in the research process as compared to designs that are quantitative in nature.

Quantitative research

"The quantitative approach is associated with the philosophy of positivism, which emerged in the nineteenth century" (Fraenkel & Wallen, 2006, p. 431). Researchers implementing quantitative methodologies typically base their work on beliefs that facts and feelings are separated (Fraenkel & Wallen). Researchers using quantitative methodologies search for the establishment of relationships between different variables, and explanations of the cause of these relationships (Fraenkel & Wallen). Designs for quantitative studies are likely to be predetermined in nature (Fraenkel & Wallen). The role of the researcher in quantitative designs is a detached observer (Fraenkel & Wallen). Fraenkel and Wallen stated that most researchers that implement quantitative designs seek to establish generalizations that go beyond the immediate setting of the research.

Content Analysis

Krippendorf (2004) stated that term content analysis is roughly about 60 years old. Krippendorf reported the definition of content analysis as the "analysis of the manifest and latent content of a body of communicated material (as a book or film) through classification, tabulation, and evaluation of its key symbols and themes in order to ascertain its meaning and probable effect" from the 1961 version of the Webster's Dictionary (p. xvii). Although this definition appeared in 1961, the intellectual roots can be traced even farther back to the use of symbols (Krippendorf). "Content analysis entails a systematic reading of a body of texts, images, and symbolic matter, not essential from an author's or user's perspective" (Krippendorf, p. 3). It is a technique that allows researchers the ability to study the behavior of humans indirectly through the analysis of communications (Fraenkel & Wallen, 2006). Content analysis classifies extensive fields of representation in quantitative terms (Van Leeuwen & Jewitt, 2004, p. 20).

"Today, symbolic phenomena are institutionalized in art, literature, education, and the mass media, including the Internet" (Krippendorf, 2004, p xvii). In regards to answering question about the mass media, content analysis is usually the method of choice (Priest, 2010).

Krippendorf (2004) reported that in the 1930s, sociologists primarily started using survey research and polling extensively. During this time, one of the most important concepts that emerged was that of attitudes (Krippendorf). "Attitude measures

redefined journalistic standards of fairness and balance and opened the door to the systematic assessment of bias" (Krippendorf, p. 7).

> Although content analysis by itself can say little or nothing about influences or effects on people, we need to be able to produce accurate characterizations of media content in order to draw conclusions about problems that might need to be addressed (for example, a lack of minority characters in television dramas or one-sided news coverage of political issues), as well as to think clearly and argue effectively about the possible influences of that content. (Priest, 2010, p. 84)

Content analysis in regards to the media can help in the evaluation of the media, as well as improve performance, provide input that is relevant to media policy, and assess effectiveness of information and/or advertising campaigns (Priest, 2010). Content analysis is the study of what actually is within the media messages (Priest). "Mass communication research as a scholarly field has led the development of content analysis methodology and is the research method most closely associated with media research" (Priest, p. 84). Designs in content analysis can take varying forms, and not every study is designed to investigate every element of content (Priest). "Although content analysis is not literally a tool in the physical sense, it is a method of classification and of quantification, so its definitions must be precise enough to be used reliably" (Leeuwen & Jewitt, 2004, p. 22).

Strengths

One of the major advantages of content analysis designs is that it is unobtrusive (Fraenkel & Wallen, 2006). Researchers can observe without being observed (Fraenkel

& Wallen). “Information that might be difficult, or even impossible to obtain through direct observation or other means can be gained unobtrustively without the author or publisher being aware that it is being examined” (Fraenkel & Wallen, p. 494). Fraenkel and Wallen reported other advantages as (a) it’s very useful for analyzing interview and observational data; (b) researchers can gain a sense of earlier life by reviewing historical documents; (c) the logistics of content analysis are most often both simple and economical; and (d) the replication of the study is permitted because the data is often readily available.

Weaknesses

Leeuwen and Jewitt (2004, p. 24) reported the main limitations of quantitative content analysis are in “the relatively untheorized concepts of messages, texts, or manifest content that it claims to analyze objectively and then quantify.’ Another disadvantage of content analysis is that is typically limited to recorded information (Fraenkel & Wallen, 2006).

The establishment of validity can present another challenge in content analysis designs. “Assuming that different analysts can achieve acceptable agreement in categorizing, the question remains as to the true meaning of the categories themselves” (Fraenkel & Wallen, 2006, p. 494). While implementing historical records and content analysis, the researcher will normally have access only to records that have survived. “Finally, sometimes there is a temptation among researchers to consider that the interpretations gleaned from a particular content analysis indicate the causes of a phenomenon rather than being a reflection of it” (Fraenkel & Wallen, p. 494).

Restatement of the Problem and Research Objectives

With growing consumer concerns regarding the safety of the food supply, and a focus towards negatively publicized agricultural production practices, it is necessary for agricultural communicators to convey facts to the media, and in turn, the media disseminate unbiased factual reporting. These consumer concerns have been increased due to both extensive media coverage and awareness of both diet and health (Nayga, 1996). Buzby and Ready (1996) reported 70.1% of surveyed respondents obtained food safety information from newspaper articles. Decreased demand, and ultimately decreased profit for producers, can be a result of consumer doubt. Much work needs to be implemented in an effort to determine the relationship between the media and human behavior (Fraenkel & Wallen, 2006). This research can help agricultural communicators be prepared for future food safety scares by creating risk communication plans that can easily be put in place with the onset of a crisis.

Research objectives

Four objectives direct this study: (a) categorize all articles written about *Salmonella* contamination associated with tomatoes in AP newswire stories for six months according to story type, and date; (b) analyze the sentences in feature articles and news briefs using the Hayakawa-Lowry News Bias Categories; (c) determine the level of bias and judgment statements; and (d) compare consumer trends to the level of bias found in the articles.

Data Collection

"We usually cannot analyze, investigate, or test every single example study, whether we are talking about newspaper stories in a major daily or text messages in a college dorm" (Priest, 2010, p. 89). "Content researchers usually do not attempt to create census data, but instead will generally try to choose a reasonably representative sample to examine in further detail" (Priest, p. 89). "Most content studies are guided by an interest in a particular type of programming and limited to a particular time, although many of the most insightful of these incorporate a comparison to help us understand how media treatment of images and issues might change over time" (Priest, p. 89).

For this study, tomato and *Salmonella* were selected as keywords when collecting articles, obviously targeting both the product and outbreak. Only associated press newswire stories were collected using the *LexisNexis® Academic* and *ProQuest* databases with a selected time period of six months from April 1, 2008 to September 30, 2008. This time period was selected to ensure all stories regarding the *Salmonella* outbreak and tomatoes were collected even though the first FDA warning wasn't released until early June 2008. Duplicates, stories not pertaining to the subject matter and editorials, due to both extreme bias and lack of creditability, were removed from the data set, resulting in a usable sample of 57 articles.

The *LexisNexis® Academic* and *ProQuest* databases were utilized for collection of articles. *LexisNexis® Academic* considered to be an effective source for researching news, business, and legal topics ("How do I know where to start with *LexisNexis® Academic*," 2008). The source contains more than 6,000 sources from all over the world

that are from print, broadcast and online media ("How do I know where to start with *LexisNexis® Academic*"). *ProQuest* offers specialized information resources ("*ProQuest* creates indispensable research solutions that connect people and information," 2010).

Data Analysis

Following identification of articles, each was coded into story-type categories: (a) news briefs, or (b) feature articles. News briefs are articles containing 150 words or less, and feature articles are those with more than 150 words. The articles were also coded according to the month in which they were published.

"News bias, especially pertaining to network TV news, continues to be the subject of both popular discussion and scholarly research" (Lowry, 1986, p. 573). Hayakawa-Lowry News Bias Analysis Categories was utilized to analyze the articles. Initially, Hayakawa developed the three basic sentence categories (Lowry, 1986). These three types of sentences are: (a) report sentences, (b) inference sentences, and (c) judgment sentences. The system originated with Hayakawa, however was expanded upon by Lowry (Lowry, 1986). Lowry explained that report sentences are factual, inference sentences are subjective, and judgment sentences favorable or unfavorable opinions about what's being described.

> Lowry expanded Hayakawa's trichotomy of sentence types into a system of nine categories that takes into account the important concept of news attribution – i.e., whether the reporter is making the statement on his own or attributing the information to some news source. (Lowry, 1986, p. 574)

Lowry's nine categories, shown in Figure 8, represent all sentence types that can be found reporting: (a) report attributed sentences, (b) report unattributed sentences, (c) inference labeled sentences, (d) inference unlabeled sentences, (e) judgment attributed, favorable sentences, (f) judgment attributed, unfavorable sentences, (g) judgment unattributed, favorable sentences, (h) judgment unattributed, unfavorable sentences, and (i) all other sentences.

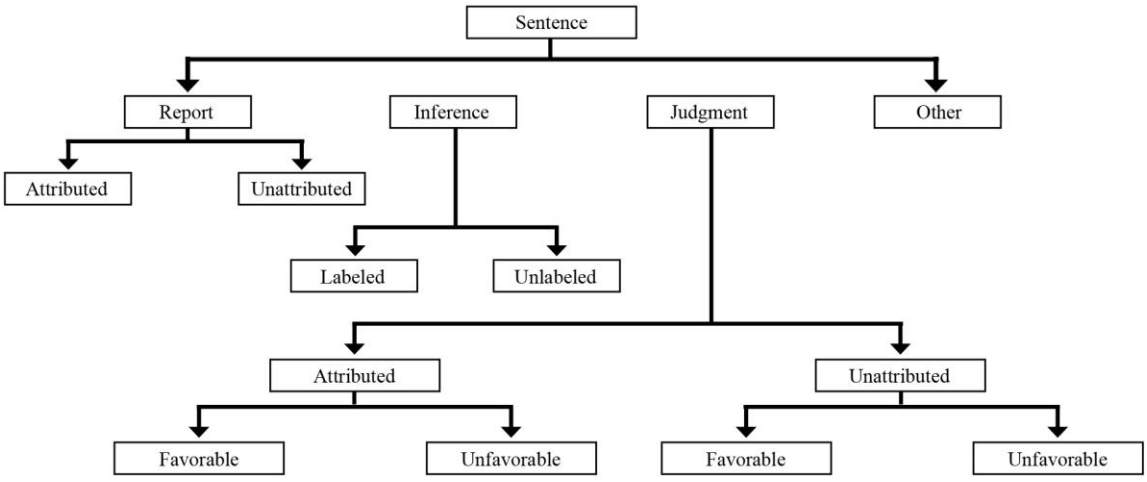

Figure 8. Hayakawa and Lowry Categories (Haygood, Hagins, Akers, & Keith, 2002, as cited in Vineyard, Akers, Oskam, Doerfert, & Davis, 2008).

> A basic theoretical assumption is that report sentences are more likely than inference sentences to be perceived by news consumers as objective. Inference sentences are likewise more likely to be perceived by the public as objective than are judgment sentences which, by definition, contain statements of the reporter's personal opinion. In addition, it was assumed that a reporter is on 'safer' ground and less likely to be perceived as biased when the information in the sentence is attributed to a news source. It is virtually impossible to communicate at any length without making inferences. The assumption made by Lowry was that a reporter is less likely to be perceived as biased if he makes labeled inferences rather than unlabeled inferences. (Lowry, 1986, p. 574)

"What the category system and underlying theoretical rationale define as objective news sentences also tend to be perceived as objective by subjects who have never been exposed to the reasoning behind the category system" (Lowry, 1986, p. 578). "And, on the other hand, what the category system and underlying theoretical rationale define as judgmental news sentences also tend to be perceived as biased" (Lowry, p. 578).

Researcher Bias

Bias exists among all researchers (Fraenkel & Wallen, 2006). There are two important threats to validity in qualitative conclusions: (a) selection of data to fit an existing theory; and (b) preconceived notions and selection of data that could stand out (Maxwell, 2005). These threats both involve the bias of the researcher (Maxwell, 2005).

> Qualitative research is not primarily concerned with eliminating variance between researchers in the values and expectations they bring to the study, but with understanding how a particular researcher's values and expectations influence the conduct and conclusions of the study (which may be either positive or negative) and avoiding the negative consequences. (Maxwell, 2005, p. 108)

A potential bias that could have impacted this research is that I was raised and grew up in production agriculture involving various facets of the industry. For generations, my family has made a living in agriculture, and still does. In almost every case, my bias lies with the farmer or rancher. This bias is part of both my heritage and everyday values. With this in mind, I did make a conscious effort to prevent my bias from skewing any outcome towards being overly sensitive to articles that may have been negative towards farmers or the agricultural industry as a whole. However, limited stories regarding the subject-matter of this research were negative towards farmers with some content negative towards industry.

Reliability

"Data, by definition, are the trusted ground for reasoning, discussion, or calculation" (Krippendorff, 2004, p. 211). Recently, all scholarly communication journals have required authors to report reliability data in content analysis (Lowry, 1986). "Most scholars of news bias develop their categories de novo, resulting in a situation where most studies use different categories and methods" (Lowry, p. 573). "The handful of studies that have used the Hayakawa-Lowry system of news bias categories are one exception to this situation" (Lowry, p. 573). "Media content analysis

is the research method most unique to mass communication studies, but a number of problems with it are still to be worked out, including the best way to ensure a high degree of intercoder reliability" (Priest, 2010, p. 94).

> To stand on indisputable ground, content analysts must be confident that their data: (a) have been generated with all conceivable precautions in place against known pollutants, distortions, and biases, intentional or accidental; and (b) mean the same thing for everyone who uses them. Reliability grounds this confidence empirically. (Krippendorff, 2004, p. 211)

Because content analysis is said to be both objective and have the ability to be replicated, the results should be reliable (Van Leeuwen & Jewitt, 2004).

> Content analysis is important and has given us important insights, especially into how media content has changed with society. However, it is a limited tool that may be most useful when its results can be combined with those of other forms of research, such as surveys, experiments, and ethnographic and other qualitative approaches. (Priest, 2010, p. 92)

Even though there are multiple ways to measure reliability, the reporting of this data has become the norm (Lowry, 1986). The research procedure becomes reliable when the response is the same regardless of the implementation (Krippendorff, 2004). Intercoder reliability can be described as the percentage of times two researchers agree on the appropriate classifications (Priest). As reported by Lowry, both the Hayakawa-Lowry category system and methods implemented in previous studies have produced

high intercoder and intracoder reliability scores. “All that can be said to this point is that the categories seem to have good face validity” (Lowry, p. 574).

“Reliability refers to the degree of consistency shown by one or more coders in classifying content according to defined values on specific variables” (Van Leeuwen & Jewitt, 2004, p. 21).

> Reliability is not concerned with the world outside of the research process. All it can do is assure researchers that their procedures can be trusted to have responded to real phenomena, without claiming knowledge of what these phenomena ‘really’ are. (Krippendorff, 2004, p. 212)

Reliability can be considered a quantitative index of consistency in a content analysis (Van Leeuwen & Jewitt).

> To achieve high levels of reliability, the researcher must: (a) define the variables and values clearly and precisely and ensure that all coders understand these definitions in the same way; (b) train the coders in applying the defined criteria for each variable and value; and (c) measure the inter-coder consistency with which two or more coders apply the criteria using a set of examples similar to, but not part of, the research corpus. (Leeuwen & Jewitt, 2004, p. 22)

Validity

“Validity refers to the appropriateness, meaningfulness, and usefulness of the inferences researchers make based on the data they collect” (Fraenkel & Wallen, 2006, p. 150). With validity, the concerns are truths, as opposed to the concerns associated

with reliability (Krippendorff, 2004). Validity cannot be established through duplication (Krippendorff).

> Validity tests pit the claims resulting from a research effort against evidence obtained independent of that effort. Thus, whereas reliability provides assurances that particular research results can be duplicated, that no (or only a negligible amount) of extraneous "noise" has entered the process and polluted the data or perturbed the research results, validity provides assurances that the claims emerging from the research are borne out in fact. (Krippendorff, 2004, p. 212)

Reliability and validity can be related in content analysis by the following ways: (a) unreliability can limit the chance of validity; (b) reliability does not always guarantee validity; and (c) validity can get lost in the quest for increased reliability. (Krippendorff, 2004, p. 212-213)

Differences exist in quantitative and qualitative designs in regards to how validity threats are dealt with (Maxwell, 2005). Researchers implementing quantitative designs design for in advance (Maxwell).

> Qualitative researchers, on the other hand, rarely have the benefit of previously planned comparisons, sampling strategies, or statistical manipulations that "control for" plausible threats, and must try to rule out must validity threats after the research has begun, using evidence collected during the research itself to make these "alternative hypotheses' implausible. (Maxwell, 2005, p. 107)

Figure 9 "depicts reliability as repeating the same score and validity as being on-target" (Krippendorff, 2004, p. 213). With decreasing reliability, validity becomes a chance

event increasingly, as the top row of the figure presents (Krippendorff). Reliability doesn't guarantee being on-target as depicted in the bottom row (Krippendorff). "Thus, reliability is a necessary, but not a sufficient, condition for validity" (Krippendorff, p. 213).

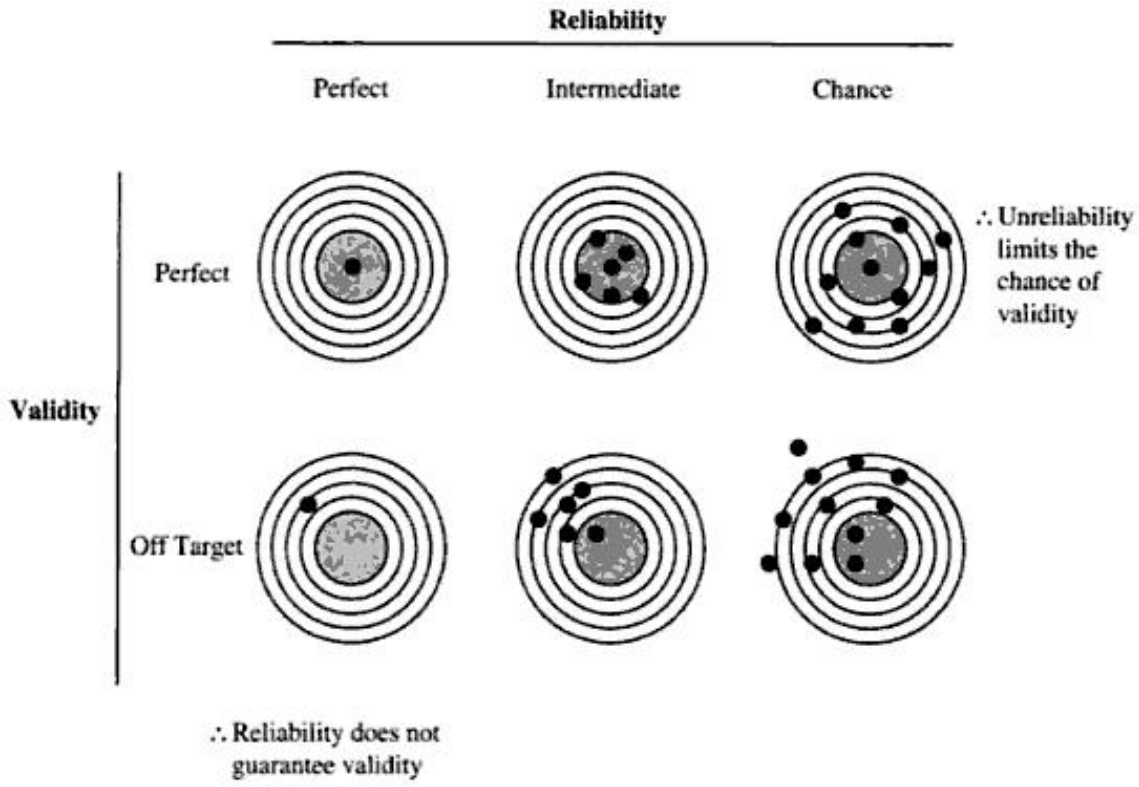

Figure 9. The relationship between reliability and validity (Krippendorff, 2004).

Objectivity

Objectivity is to understand that knowledge is both partial and situated (Malterud, 2001). "During all steps of the research process, the effect of the researcher should be assessed, and later on, shared" (Malterud, 2001, p. 484). When conclusions are supported by data that is collected implementing multiple instruments, validity is increased (Fraenkel & Wallen, 2006). This form of checking is referred to as triangulation. Triangulation can be implemented with any subject and in any setting to improve both the quality of data collected and accuracy of the interpretations of the researcher (Fraenkel & Wallen). Triangulation can occur naturally as well (Fraenkel & Wallen). "In a triangulation design, the researcher simultaneously collects both quantitative and qualitative data, compares the results, and then uses those findings to see whether they validate each other" (Fraenkel & Wallen, p. 443).

In this study, triangulation was achieved through various sources and methods. A variety of instruments were implemented to collect data including both the *LexisNexis*® *Academic* and *ProQuest* databases to ensure all articles identified using the keyword search, and both date and source purposive sampling were achieved.

Bias is not eliminated, but accounted for (Malterud, 2001). My bias has previously been provided. "Failure to acknowledge the effect of theory might be a major threat to objectivity, since notions and models used in interpretation of data are always derived from a theory of some sort" (Malterud, p. 486).

Calculating reliability

Three experts trained in the Hayakawa-Lowry method of content analysis coded a random sample of the articles (*n*=8) to ensure reliability. Codes for the random sample were transferred to a spreadsheet. A panel of three experts met regarding conflicting codes within the random sample to resolve disagreements. I received training independently on the Hayakawa-Lowry News Categories. Upon completion of training, I coded a sample set, and the trainer provided feedback regarding the codes. The process of meeting with the panel regarding the conflicting codes immensely aided in my understanding of the different categories and facilitated my ability to code the remaining articles. All remaining articles (*n*=49) were coded independently by the researcher. Percent agreement was implemented to calculate intercoder reliability for the random sample. Agreement percentages were calculated for each sentence within the articles, and, accordingly, average percentages for total articles. Table 1 reports the reliability achieved from the random sample.

The average percent reliability for all articles (*n*=8) of the random sample was 86.46%. Van Leeuwen and Jewitt (2004) reported that with fewer values for a variable, the more likely this is to be agreement based on chance. With this fact, both binary or tripartite classifications need to be calculated close to 100 percent reliable (Van Leeuwen & Jewitt). In this scenario, however, because the Hayakawa-Lowry news bias categories were used to assess bias, there were nine possible values for each coder to assign to each variable.

Table 1

Percent reliability of the random sample

Title	Sentences	% Reliability
Farmers say *Salmonella* scare has hurt tomato sales	32	84.38%
Tomato growers worry *Salmonella* will halt sales	32	90.63%
System for protecting U.S. food supply comes under scrutiny	92	87.32%
Slow to pick up the pepper trail	66	81.81%
A costly blight of bad publicity: Georgia's tomato farmers see prime crop go to waste	61	91.26%
Safe to eat?	92	89.13%
Salmonella scare prompts menu changes: List of ingredients on the watch list grows, forcing restaurants to improvise on recipes or give customers the option to change	21	82.54%
Salmonella cases in Pa. jump from 6 to 11 ** Tomatoes suspected: Baffled feds also eye cilantro, jalapenos	26	84.62%

Summary

This research implemented mixed methodologies to best answer the research questions. The descriptive content analysis practiced in this study employed a purposive sample of AP newswires from April 2008 through September 30, 2008, associated with

the *Salmonella* outbreak implicating tomatoes. The keywords "*Salmonella*" and "tomato" were implemented in the *LexisNexis*® *Academic* and *ProQuest* database searches.

A random sample (*n*=8) was coded independently by three experts trained in the Hayakawa-Lowry news bias categories. After codes were transferred to a spreadsheet and disagreement found, a panel of experts met to resolve conflicting codes. All remaining articles (*n*=49) were coded independently by the researcher. Once codes for all sentences were analyzed, I compared the findings with historical industry market trends to assess potential economic impact.

CHAPTER IV

RESULTS

The purpose of this study was to examine the coverage and level of bias of the *Salmonella* outbreak associated with tomatoes in associated press newswires during a six month period in 2008. A primary challenge is in providing safe food, and also in communicating this information both effectively and efficiently to consumers (Verbeke & Viane, 2000).

The keyword search yielded 57 unique, usable articles. The date range for the articles was June 9, 2008 to August 29, 2008. The day with the most (*n*=6) published articles was June 11, 2008, representing 10.53% of all articles. Because AP newswire stories were selected, multiple publications spanning the reach of the entire United States contained the articles. A total of 1,444 sentences were analyzed. Stories averaged 25.33 sentences with a range of three to 92 sentences. The articles averaged 564.67 words per article, while the total number of words per article ranged from 80 to 1,974 words.

A random sample consisting of eight articles (*n*=8) were analyzed by three experts using the Hayakawa–Lowry News Bias Categories. Codes from the random sample were transferred to a spreadsheet, and a panel met to reconcile any disagreements. The remaining articles (*n*=49) were analyzed by the researcher.

Results Related to Research Objective 1

The goal of research objective 1 was to categorize all articles written about *Salmonella* contamination associated with tomatoes in AP newswire stories for six

months according to story type, and date. The date range for the articles was June 9, 2008 to August 29, 2008. The day with the most articles published was June 11, 2008, (*n*=6) (10.53%), while there were 18 days where only one article was published. Articles averaged 25.33 sentences with a range of three to 92 sentences. The articles averaged 564.67 words per article, while the total number of words per article ranged from 80 to 1,974 words. A total of 46 feature articles and 11 news briefs were analyzed. Table 2 shows the identified 57 usable articles categorized according to story type and date.

Table 2

AP newswire stories categorized by story type and date

Title	Words	Date	Code
Feature Articles			
Tomato-related *Salmonella* case confirmed in Colorado	287	6-9-2008	LF20
Michigan added to states with *Salmonella*-tomato reports	1,075	6-10-2008	LF17
Tomato outbreak is reminder to follow food safety tips	636	6-10-2008	LF18
Will Salmonella outbreak affect tomato sales in La. & Miss.?	690	6-10-2008	LF19
Tomato growers worry *Salmonella* will halt sales	909	6-11-2008	LF12
NM now investigating 68 cases of tomato-linked *Salmonella*	297	6-11-2008	LF13

Table 2

Continued

Title	Words	Date	Code
North Carolina tomato growers prepare for bruises	518	6-11-2008	LF16
Mexico tomato growers defend their produce as safe	451	6-12-2008	LF9
CDC: *Salmonella*-tainted tomato illness reach 228	458	6-12-2008	LF10
Mexico tomato growers say warning unfair	451	6-12-2008	LF11
Arkansas tomato growers get boost from Mexico woes	152	6-13-2008	LF7
State: One case confirmed of tomato-caused *Salmonella*	261	6-13-2008	LF8
Va. tomato growers fret over *Salmonella* scare	535	6-14-2008	LF6
Tainted tomatoes may still be on the market; FDA to look at other produce too	526	6-29-2008	PF29
CDC widens its Salmonella investigation; As more become ill, possible non-tomato sources get a look	418	7-1-2008	PF28
Tomatoes still lead list of suspects in *Salmonella* probe	531	7-2-2008	PF26
U.S. news: *Salmonella* probe looks beyond tomatoes; other fresh produce now getting tested; pressure is on FDA	640	7-2-2008	PF27
Latest suspect: Fresh salsa; *Salmonella* search zeroes in on dip	368	7-3-2008	PF25
Farmers say *Salmonella* scare has hurt tomato sales	818	7-4-2008	LF5

Table 2

Continued

Title	Words	Date	Code
CDC checks other sources in *Salmonella* outbreak	397	7-6-2008	PF24
Salmonella cases in Pa. jump from 6 to 11 ** tomatoes suspected: Baffled feds also eye cilantro, jalapenos	664	7-8-2008	PF23
Hot peppers added to warning list in *Salmonella* outbreak: Source of illnesses still undetermined	414	7-10-2008	PF19
Warning issued on tainted peppers: Officials investigating *Salmonella* blame some ills on jalapenos	781	7-10-2008	PF20
Officials add jalapenos to *Salmonella* warning	543	7-10-2008	PF23
Tomato growers' profit hopes wither; weak demand, low prices force some to plow crops under	862	7-10-2008	PF22
Mexico declares tomato crop is *Salmonella*-free/Nation demands FDA acknowledge ministry's findings	305	7-12-2008	PF16
Salmonella scare prompts menu changes; List of ingredients on the watch list grows, forcing restaurants to improvise on recipes–or give customers the option to take chance	482	7-12-2008	PF17
Growers want FDA to clear Fla.'s whole tomato crop	318	7-16-2008	LF4
Tomato scare ending; fears linger for many people	793	7-18-2008	LF3
FDA gives all-clear on tomatoes, not peppers; jalapeno, serrano varieties focus of *Salmonella* hunt	900	7-18-2008	PF13

Table 2

Continued

Title	Words	Date	Code
Salmonella outbreak: FDA clears tomatoes: Hot peppers suspected: Emphasis shifts as experts try to trace origins of foodborne illness	900	7-18-2008	PF14
U.S. news: Hot peppers are focus of *Salmonella* probe	566	7-18-2008	PF15
Tomato growers: *Salmonella* scare damages industry	806	7-19-2008	LF2
Florida growers want compensation for tomato scare	324	7-23-2008	LF1
Minnesota's approach quickly traced source of puzzling *Salmonella* outbreak	1,025	7-23-2008	PF12
Tomato industry seeks compensation	593	7-25-2008	PF1
FDA officials narrow *Salmonella* warning to Mexican peppers	715	7-26-2008	PF11
Safe to eat?	1,837	7-27-2008	PF10
A costly blight of bad publicity: Georgia's tomato farmers see prime crop go to waste	1,084	7-28-2008	PF9
System for protecting U.S. food supply comes under scrutiny	1,974	7-30-2008	PF7
Slow to pick up the pepper trail	1,360	7-30-2008	PF8
Amid *Salmonella* case, food industry seems set to back greater regulation	878	7-31-2008	PF4
Mexican farm pegged as source of U.S. *Salmonella* cases	784	7-31-2008	PF5
Salmonella outbreak linked to Mexican farm	591	7-31-2008	PF6

Table 2

Continued

Title	Words	Date	Code
House panel talks *Salmonella* scare	397	8-1-2008	PF3
Feds: Worst of *Salmonella* is over	580	8-29-2008	PF2
News Briefs			
Health department warns of tomato *Salmonella* risk	116	6-9-2008	LB11
Mexican tomato exports to U.S. stall	112	6-10-2008	LB10
NJ agriculture department: State's tomato crop is safe	83	6-11-2008	LB7
No tomato-related *Salmonella* cases in Montana	116	6-11-2008	LB8
Virginia no. 4 in nation in tomato production	126	6-11-2008	LB9
N.H. monitors tainted tomato situation, no illness yet	118	6-13-2008	LB6
North Carolinian ill from tomato-related bacteria	137	6-14-2008	LB5
NJ reports first tomato-related *Salmonella* case	137	6-19-2008	LB4
Tomato growers feel effects of *Salmonella* outbreak	133	6-20-2008	LB3
NM officials call for tomato embargo	134	6-21-2008	LB2
3 tomato *Salmonella* cases in Yakima county	80	6-26-2008	LB1

Results Related to Research Objective 2

Research objective 2 was to analyze the sentences in feature articles and news briefs using the Hayakawa-Lowry News Bias Categories. Generally speaking, journalists wrote mostly report sentences for both categories. However, it should be noted that in feature articles, inference sentences, both labeled and unlabeled accounted for 5.64% of all sentences (*n*=78), and judgment sentences, both labeled and unlabeled, accounted for 15.03% (*n*=208).

Report sentences were the most frequently (*n*=1,146) identified category (79.36%). Most of these sentences, 51.04% (*n*=737), were attributed. An example of a report attributed sentence is "As long as we are continuing to see new cases come on board, it is a concern that there are still contaminated tomatoes out there," said the agency's food safety chief, Dr. David Acheson" (Article LF10, sentence 5). Report unattributed sentences (*n*=409) represented 28.32% of all sentences, and 35.69% of report sentences. An example of a reported unattributed sentence is "It was the first time contaminated peppers had been linked to a case of illness" (Article PF8, sentence 8). Within this subject, data indicated that AP reporters are writing more report attributed sentences; a 22.72% difference in report attributed sentences versus report unattributed sentences existed in regards to total sentences.

Inference sentences, both labeled and unlabeled, represented 5.40% (*n*=78) of all sentences. Most of the identified inference sentences were labeled (*n*=44), representing 56.41% of all inference sentences and 3.05% of all sentences. Inference unlabeled sentences (*n*=34) represented 43.59% of all inference sentences, and 2.35 % of total

sentences. An example of an inference labeled sentence is “The tomato scare may be over, but it has taken a toll it’s cost the industry an estimated $100 million and left millions of people with a new wariness about the safety of everyday foods” (Article LF3, sentence 1). An example of an inference unlabeled sentence is “The move hasn’t brightened the outlook of the $1.3 billion industry, and the stigma and uncertainty of the *Salmonella’s* origin are likely to add to its losses” (Article LF2, sentence 5).

Judgment attributed sentences, both favorable and unfavorable, accounted for 4.71% (*n*=68) of all sentences. The majority of the judgment attributed sentences were unfavorable (*n*=59) accounting for 86.76% of the judgment attributed sentences and 4.09% of all sentences; judgment attributed sentences favorable (*n*=9) represented 13.24% of the total judgment attributed sentences and 0.62% of the total sentences. An example of a judgment attributed favorable sentence is “Alice Billman grew up on a farm, so she understands what it takes to grow fresh produce and eat it safely” (Article PF23, sentence 1). An example of a judgment attributed unfavorable sentence is “Rene Diaz was struck with a particularly vexing challenge for the operator of a Mexican restaurant: What do you do if the federal government says not only tomatoes, but also jalapeno peppers and cilantro, may be linked to the largest foodborne disease outbreak in the past decade?” (Article PF17, sentence 1).

Judgment unattributed sentences, both favorable and unfavorable, accounted for 9.77% (*n*=141) of all sentences. The majority of judgment unattributed sentences were unfavorable (*n*=126) toward the *Salmonella* outbreak of 2008 affecting the tomato industry, representing 89.36% of the total judgment sentences unattributed. An example

of a judgment unattributed unfavorable sentence is “Expect fewer slices of red, ripe tomatoes next to the grill this holiday weekend” (Article LF5, sentence 1). Judgment unattributed favorable sentences (*n*=15) accounted for 10.64% of judgment unattributed sentences, 1.04% of all sentences. An example of a judgment unattributed favorable sentence is “The experience of front-line staff can also make a difference” (Article PF8, sentence 35). Other sentences (*n*=11) accounted for 0.76% of total sentences. An example of a sentence from this category is “How much longer?” (Article LF10, sentence 7).

Feature articles

Feature articles accounted for 95.84% (*n*=1,384) of all sentences in the sample. A majority of sentences for this category were coded as reports, 78.54% (*n*=1,087). Of the report sentences coded, 51.30% (*n*=710) were attributed to a source, while 27.24% (*n*=377) were unattributed. The difference between attributed and unattributed reports was 24.06%. Inference sentences accounted for 5.64% (*n*=78) of sentences coded in feature articles. Of these sentences, 3.18% (*n*=44) were labeled and 2.46% (*n*=34) were unlabeled. Judgment unattributed sentences, considered to be the most biased in nature, accounted for 10.12% (*n*=140) of all sentences in the feature articles. Judgment unattributed favorable sentences accounted for 1.08% (*n*=15), and judgment unattributed unfavorable sentences accounted for 9.04% (*n*=125). All other sentences represented 0.79% (*n*=11) of the feature article sample. This category included all sentences not coded in the prior eight categories, which can include rhetorical questions and

introductory statements. Table 3 shows the number and percentage of sentences by Hayakawa-Lowry category for feature articles.

Table 3

Number and percentage of sentences by Hayakawa-Lowry category for feature articles (*n*=1,384)

Sentence Type	*n*	%
Report	1,087	78.54%
Report Attributed	710	51.30%
Report Unattributed	377	27.24%
Inference	78	5.64%
Inference Labeled	44	3.18%
Inference Unlabeled	34	2.46%
Judgment Attributed	68	4.91%
Judgment Attributed, Favorable	9	0.65%
Judgment Attributed, Unfavorable	59	4.26%
Judgment Unattributed	140	10.12%
Judgment Unattributed, Favorable	15	1.08%
Judgment Unattributed, Unfavorable	125	9.04%
Other	11	0.79%
TOTAL		100%[a]

Note: [a]The total percentage is based on the main sentence categories: Report, judgment attributed, judgment unattributed, and other.

News briefs

News briefs accounted for only 4.16% (*n*=60) of all sentences coded. Journalists wrote a significantly higher amount of report sentences in news briefs, both attributed and unattributed, 98.33% (*n*=59). Of the report sentences coded within news briefs, 45% (*n*=27) were attributed to a source, while 53.33% (*n*=32) were unattributed. There was a 8.33% difference between attributed and unattributed report sentences. Only one judgment sentence was coded, judgment unattributed unfavorable (1.67%). Table 4 shows the number and percentage of sentences by Hayakawa-Lowry category for news briefs.

Table 4

Number and percentage of sentences by Hayakawa-Lowry category for news briefs (*n*=60)

Sentence Type	*n*	%
Report	59	98.33%
Report Attributed	27	45.00%
Report Unattributed	32	53.33%
Inference	0	0.00%
Inference Labeled	0	0.00%
Inference Unlabeled	0	0.00%
Judgment Attributed	0	0.00%

Table 4

Continued

Sentence Type	*n*	%
Judgment Attributed, Favorable	0	0.00%
Judgment Attributed, Unfavorable	0	0.00%
Judgment Unattributed	1	1.67%
Judgment Unattributed, Favorable	0	0.00%
Judgment Unattributed, Unfavorable	1	1.67%
Other	0	0.00%
TOTAL		100%[a]

Note: [a]The total percentage is based on the main sentence categories: Report, judgment attributed, judgment unattributed, and other.

Results Related to Research Objective 3

News bias continues to be the subject of both popular discussion and scholarly research (Lowry, 1986). Research objective 3 was to determine the level of bias and judgment statements. A total of 1,444 sentences were coded. The random sample coded by three experts trained in the Hayakawa-Lowry news bias categories represented 29.22% (n=422) of all sentences. Table 5 presents the number and percentage of sentences (*n*=1,444) by Hayakawa-Lowry category for all usable articles in the sample (*n*=57).

Table 5

Number and percentage of sentences by Hayakawa-Lowry category for all articles (*n*=1,444)

Sentence Type	*n*	%
Report	1,146	79.36%
Report Attributed	737	51.04%
Report Unattributed	409	28.32%
Inference	78	5.40%
Inference Labeled	44	3.05%
Inference Unlabeled	34	2.35%
Judgment Attributed	68	4.71%
Judgment Attributed, Favorable	9	0.62%
Judgment Attributed, Unfavorable	59	4.09%
Judgment Unattributed	138	9.77%
Judgment Unattributed, Favorable	15	1.04%
Judgment Unattributed, Unfavorable	126	8.73%
Other	11	0.76%
TOTAL		100%[a]

Note: [a]The total percentage is based on the main sentence categories: Report, judgment attributed, judgment unattributed, and other.

Report sentences attributed for 79.36% (*n*=1,146) of all sentences. Of the report sentences, 51.04% (*n*=737) were attributed to a source, and 28.32 (*n*=409). Inference sentences attributed for 5.40% (*n*=78) of all sentences. Of these sentences, 3.05% (*n*=44) were labeled, while 2.35% (*n*=34) were unlabeled. Judgment sentences, both attributed and unattributed, accounted for 14.48% (*n*=206). Of the judgment attributed sentences, 0.62% (*n*=9) were favorable, while 4.09% (*n*=59) were unfavorable towards the *Salmonella* outbreak of 2008 implicating tomatoes. Judgment attributed sentences accounted for 33.01% (*n*=68) of all judgment sentences. Of the judgment unattributed sentences, 1.04% (*n*=15) were favorable, while 8.73% (*n*=11) were unfavorable. Judgment unattributed sentences accounted for 66.99% (*n*=138) of all judgment sentences. All other sentences accounted for 0.76% (*n*=11) of all sentences. Sentences in this category usually include rhetorical questions and introductory statements.

Attributed sources

Data indicated attributed sentences accounting for 55.75% (*n*=805) of all sentences. These sentences included report attributed, judgment attributed favorable, and judgment attributed unfavorable. Examination of the source choices can help evaluate journalist objectivity. The sources identified in the attributed sentences were categorized based on relationship to the *Salmonella* outbreak implicating tomatoes. Table 6 reports the percentages of attributed sources for report and judgment sentences (*n*=805).

Table 6

Percentages of attributed sources for report and judgment sentences (*n*=805)

Source	*n*	%
Government or State	409	50.81%
Producers	199	24.72%
Higher Education	55	6.83%
Other	47	5.84%
Mexican Producers & Government	37	4.60%
Restaurants & Chain Stores	33	4.10%
Consumers	25	3.10%

The largest percentage (50.81%) of attributed sentences were from government or state sources (*n*=409). Of the sentences attributed to government or state, 91.69% (*n*=375) were attributed reports, 0.73% (*n*=3) were judgment attributed favorable sentences, and 7.58% (n=31) were judgment attributed unfavorable sentences.

Producers comprised of 24.72% (*n*=199) of all attributed sentences. Of the sentences attributed to producers, 90.45% (*n*=180) were attributed reports, 1.01% (*n*=2) were judgment attributed favorable sentences, and 8.54% (*n*=17) were judgment attributed unfavorable sentences.

Journalists referred to higher education for 6.83% (*n*=55) of all attributed sentences. Of the sentences attributed to higher education, 98.18% (*n*=54) were attributed reports, 0% (*n*=0) were judgment attributed favorable sentences, and 1.82% (*n*=1) were judgment attributed unfavorable sentences.

Sentences categorized into the other category contributed to 5.84% (*n*=47) of all attributed sentences. This category consisted of sources ranging from attorneys to editors, as well as sources excluding enough descriptive identifiers to categorize into another category. Of the sentences attributed to the other category, 87.23% (*n*=41) were attributed reports, 4.26% (*n*=2) were judgment attributed favorable sentences, and 8.51% (*n*=4) were judgment attributed unfavorable sentences.

It should be noted that journalists referred to foreign sources for attributed sentences only 4.60% (*n*=37). Of the sentences attributed to Mexican growers and government, 97.30% (*n*=36) were attributed reports, 0% (*n*=0) were judgment attributed favorable sentences, and 2.70% (*n*=1) were judgment attributed favorable sentences.

Restaurants and chain stores (including grocery stores) were identified in 4.10% (*n*=33) of all attributed sentences. Most of these sentences consisted of reports from spokesmen and spokeswoman. Of the sentences attributed to restaurants and chain stores, 90.91% (*n*=30) were attributed reports, 0% (*n*=0) were judgment attributed favorable sentences, and 9.09% (*n*=3) were judgment attributed unfavorable sentences.

Consumers accounted for 3.10% (*n*=25) of all attributed sentences. Most sentences in this category consisted of direct quotes from consumers. Of the sentences attributed to consumers, 84.00% (*n*=21) were attributed reports, 8.00% (*n*=2) were

judgment attributed favorable sentences, and 8.00% (*n*=2) were judgment attributed unfavorable sentences.

Results Related to Research Objective 4

The news media has an important obligation to report objectively to the public, factual and truthful information, especially during controversial circumstances. The goal of research objective 4 was to compare consumer trends to the level of bias. A majority (79.36%) of sentences were identified as report sentences (*n*=1,146). Report sentences are considered to be the most objective type of sentences identified by the Hayakawa-Lowry news bias categories analysis because they are both factual and verifiable.

Most (46.58%) of the report sentences were attributed to government and state sources (*n*=375). Of all attributed sources (n=805), 50.81% were government or state sources. Judgment sentences attributed to 14.48% (*n*=209) of all sentences. Inference sentences attributed to 5.40% (*n*=78) of all sentences. Other sentences contributed to 0.76% (*n*=11) of all sentences. Based on this data, it can be summarized that news coverage in AP feature stories and news briefs regarding the *Salmonella* outbreak of 2008 implicating tomatoes was both unbiased and objective.

Comparison to consumer trends

Interest regarding information on the consumption and distribution of foods has been of importance (Lucier, Biing-Hwan, Allshouse, & Kantor, 2000). “Although a great deal is known about the supply side of the U.S. fresh and processed tomato markets, relatively little has been published about consumer demand” (Lucier, Biing-Hwan, Allshouse, & Kantor, p. 26).

Second to China, the United States is a world leader in the production of tomatoes (USDA-ERS, 2009). Both fresh and processed tomatoes attribute to over $2 billion in annual farm cash receipts (USDA-ERS). With commercial-scale production in nearly 20 states, fresh tomatoes are produced in every state in the nation (USDA-ERS). Even though national fresh-market tomato acreage has been trending lower recently, U.S. field-grown tomato production has actually trended higher over the past few decades with substantial growth occurring in the 1980s (USDA-ERS).

According to the CDC (2008a), between the months of April and August of 2008, over 1,400 people become infected with *Salmonella* Saintpaul in 43 states, the District of Columbia, and Canada. The annual estimate from the USD-ERS for the economic impact of salmonellosis for 2008 was $2,646,750,437 for (USDA-ERS, 2010a).

Previous analysis has suggested that retail price in regards to field-grown tomatoes is directly linked to the shipping-point price (USDA-ERS, 2009). Changes in shipping-point price for tomatoes in the U.S. change retail prices for both that particular month and then next month (USDA-ERS).

A vital component of the U.S. fresh-market tomato industry is international trade (USDA-ERS, 2009). In regards to U.S. tomato consumption, imports account for roughly one-third, which is a one-fifth increase from the 1990s (USDA-ERS). The U.S. fresh tomato supply has seen a slight decrease in the percentage of the supply that is exported from 7% in the 1980s to 6% (USDA-ERS).

The tomato is the fourth most popular fresh-market vegetable in the nation, only behind potatoes, lettuce, and onions (USDA-ERS, 2009). It's estimated that Americans consume about three-fourths of their tomatoes in the processed form (USDA-ERS). Of great importance has been a variety of changes including the introduction of improved tomato varieties, increased consumer interest in a broad range of tomatoes, an increase of immigrants that eat high-vegetable diets, and increased emphasis on health (USDA-ERS).

Annual average fresh-market tomato consumption has remained well above that reported in previous decades (USDA-ERS, 2009). According to data collected by the USDA-ERS, demand has trended higher over the past two decades, as shown in Figure 10 (Lucier, Biing-Hwan, Allshouse, & Kantor, 2000).

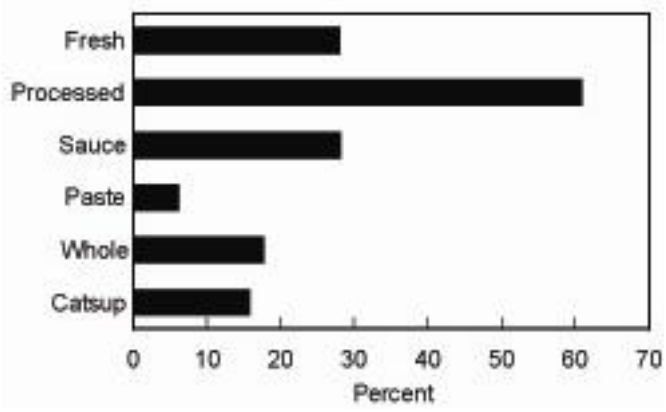

Figure 10. Percent of consumers reporting tomato use on any given day (USDA-ERS as cited in Lucier, Biing-Hwan, Allshouse, & Kantor, 2000).

"A combination of factors, including immigration trends and changes in America's tastes and preferences has likely contributed to rising per capita tomato use" (Lucier, Biing-Hwan, Allshouse, & Kantor, 2000, p. 26). In regards to the demographics of fresh and processed tomato consumption, little is known due to the lack research (Lucier, Biing-Hwan, Allshouse, & Kantor).

According to the USDA-ERS (2010b), tomato per capita use did decline during 2008. The season average price for tomatoes was significantly higher as compared to 2009 and 2007 (USDA-ERS). Total supply declined while domestic utilization saw a decrease as well (USDA-ERS).

According to USDA-ERS (2010b), per capita use for fresh tomatoes had steadily increased during the early 2000s. However, in 2008, per capita consumption dropped significantly as compared to the whole decade (USDA-ERS). Additionally, the USDA-ERS is forecasting another sharp decrease in per capita consumption for 2010 (USDA-ERS). With these decreases and increases in production, the U.S. population has steadily increased over time (USDA-ERS). Total supply for 2008 had decreased as compared to 2007 and 2009 (USDA-ERS). Supply reached a decade high in 2009, however is projected to sharply decline in 2010 (USDA-ERS).

Table 7

U.S. fresh tomatoes (field and hothouse): Supply and use from 2000-2010 (USDA-ERS, 2010b)

Year	Total Supply[a]	Per Capita Use	Total U.S. Population on July 1[b]
2000	5,771.4	19.0	282.385
2001	5,876.7	19.2	285.309
2002	6,184.2	20.3	288.105
2003	5,959.5	19.4	290.820
2004	6,223.8	20.0	293.463
2005	6,295.0	20.2	296.186
2006	6,229.0	19.8	298.996
2007	6,156.7	19.2	302.004
2008	6,015.2	18.5	304.798
2009	6,305.7	19.3	307.439
2010[c]	6,115.0	18.7	310.104

Note: [a]Million Pounds. [b]Millions. [c]ERS forecast.

Summary

This research assessed the level of bias of AP newswires associated with the *Salmonella* outbreak of 2008 implementing the Hayakawa-Lowry News Bias Categories. Although, data indicated most reporting of the crisis was both objective and factual, consumer per capita consumption decreased even as population increased. There are numerous factors that have been reported to likely have been contributing factors to rising per capita tomato use, such as immigration trends and taste preferences (Lucier, Biing-Hwan, Allshouse, & Kantor, 2000).

The purpose of this study was to examine the coverage and level of bias of the *Salmonella* outbreak associated with tomatoes in associated press newswires during a six month period in 2008. Understanding how journalists give meaning to their work is conceptualizing journalism as an ideology (Deuze, 2005). "In the particular context of journalism as a profession, ideology can be seen as a system of beliefs characteristic of a particular group, including, but not limited to the general process of the production of meaning and ideas" (Deuze, 2005, p. 445). The news media has an obligation to provide objective, truthful, and factual content, especially in wake of a crisis situation.

Data indicated AP journalists reporting regarding the *Salmonella* outbreak of 2008 implicating tomatoes was objective, unbiased, and verifiable. The keyword search yielded 57 unique, usable articles. The date range for the articles was June 9, 2008 to August 29, 2008. The most (n=6) articles (10.53%) were published on June 11, 2008. Because AP newswire stories were selected, multiple publications spanning the reach of the entire United States contained the articles. A total of 1,444 sentences were analyzed.

Stories averaged 25.33 sentences with a range of three to 92 sentences. The articles averaged 564.67 words per article, while the total number of words per article ranged from 80 to 1,974 words. Feature articles attributed to 95.84% (*n*=1384) of all sentences, while news briefs attributed to 4.16% (*n*=60) of all sentences.

Report sentences were the most frequently (79.36%) coded, while judgment unattributed sentences, considered the most bias, accounted for 9.77% of all sentences. Of the sentences attributed to a source, 50.81% were attributed to government or state sources.

Although news coverage in AP articles were objective, unbiased, and verifiable, tomato consumption per capita sharply declined in 2008. Additionally, the tomato supply for 2008 saw a decline as well, while the U.S. population steadily increased over time. Bridging the gap between consumers, producers, and education, coupled with effectively communicating and disseminating information positively when agriculture faces high profile practice issues or food safety scares could reduce negative economic and political impacts for industry.

CHAPTER V

CONCLUSIONS, DISCUSSION, & RECOMMENDATIONS

The purpose of this study was to examine the news coverage and determine if bias occurred during the *Salmonella* outbreak associated with tomatoes in associated press newswires during a six month period in 2008. An understanding of how the media depicts agriculture can both more efficiently and successfully allow agricultural communicators to interact with the media, and provide risk communication plans in advance. Through the descriptive content analysis, this research answered four objectives: (a) categorize all articles written about *Salmonella* contamination associated with tomatoes in AP newswire stories for six months according to story type, and date; (b) analyze the sentences in feature articles and news briefs using the Hayakawa-Lowry News Bias Categories; (c) determine the level of bias and judgment statements; and (d) compare consumer trends to the level of bias found in the articles.

Bias in the news has continued to be subject of discussion in research (Lowry, 1986). The news media has an obligation to report information objectively, in a factual, unbiased, and verifiable manner, especially in the event of a crisis situation. This study used descriptive content analysis to analyze news bias regarding the 2008 *Salmonella* outbreak wrongfully implicating tomatoes. My bias as a researcher has already been stated, and with that, the fact that I fully expected the news coverage regarding this controversial event to be negative towards agriculture and mostly biased, goes hand-in-hand.

Conclusions Related to Research Objective 1

For research objective 1, all usable articles (*n*=57) were categorized and coded by story type and date. The date range for the articles was June 9, 2008 to August 29, 2008. Even though the AP news coverage of the *Salmonella* outbreak associated with tomatoes spanned 2 ½ months, as expected, the greatest coverage occurred closest to the onset of the event. Most articles were published during the height of the outbreak, mid-June. The day with the most published articles, (*n*=6) (10.53%), was June 11, 2008, while there were 18 days where only one article was published. Considering the duration of coverage, there were few articles published by the AP relating to the topic, less than one article per day. Articles were short in length, averaging 25.33 sentences with a range of three to 92 sentences. The articles averaged 564.67 words per article, while the total number of words per article ranged from 80 to 1,974 words. Most articles were feature articles (*n*=46), while there were only 11 news briefs.

AP stories cover international news. It would be expected that the timing of the event could have had an impact on the AP newspaper coverage of the *Salmonella* outbreak of 2008. A comparison of the coverage of this event to another agricultural or nonagricultural event would assess the event's level of importance for newspaper coverage by the AP. Had this research explored other means of newspaper coverage, such as local or agricultural publications, we would expect to see greater coverage of the event.

Conclusions Related to Research Objective 2

The goal of research objective 2 was to analyze the sentences in feature articles and news briefs using the Hayakawa-Lowry News Bias Categories. Journalists wrote mostly report sentences for both feature articles and news briefs. However, in feature articles, inference sentences, both labeled and unlabeled accounted for 5.40% of all sentences (*n*=78), and judgment sentences, both labeled an unlabeled, accounted for 15.03% (*n*=208).

Communication is impossible without making inferences (Lowry, 1986). Inference sentences accounted for 5.40% (*n*=78) of sentences coded in feature articles. Of these sentences, 3.05% (*n*=44) were labeled and 2.35% (*n*=34) were unlabeled. "A basic theoretical assumption is that report sentences are more likely than inference sentences to be perceived by news consumers as objective" (Lowry, p. 574). The assumption made by Lowry was that a reporter perceived to be less biased if he or she composes labeled inferences as compared to unlabeled inferences (Lowry). "A labeled inference is one where the reporter uses a variety of tip-off words to more or less openly admit to his readers or listeners that the information in the sentence is subjective to some extent" (Lowry, p. 574).

"Inference sentences are likewise more likely to be perceived by the public as objective than are judgment sentences which, by definition, contain statements of the reporter's personal opinion" (Lowry, p. 574). Judgment sentences, both attributed and unattributed accounted for 14.47% (*n*=209) of the sample. Judgment attributed sentences accounted for 4.71% (*n*=68), where 0.62% (*n*=9) of those sentences were favorable, and

4.09% (*n*=59) were unfavorable towards the subject. When information within sentences is attributed to sources, it is assumed that reporters are on safer ground and thus less likely to be perceived biased (Lowry).

Feature articles

Feature articles accounted for 95.84% (*n*=1,384) of all sentences in the sample. A majority of sentences for this category were coded as reports, 78.54% (*n*=1,087). Judgment sentences, both attributed and unattributed accounted for 15.03% (*n*=208) of the sample. Judgment attributed sentences accounted for 4.91% (*n*=68), where 0.65% (*n*=9) of those sentences were favorable, and 4.26% (*n*=59) were unfavorable towards the subject. Judgment unattributed favorable sentences accounted for 1.08% (*n*=15), and judgment unattributed unfavorable sentences accounted for 9.04% (*n*=125). All other sentences represented 0.79% (*n*=11) of the feature article sample. This category included all sentences not coded in the prior eight categories, which can include rhetorical questions and introductory statements.

News briefs

News briefs accounted for only 4.16% (*n*=60) of all sentences coded. In this category, journalists wrote a significantly higher amount of report sentences in news briefs, both attributed and unattributed, 98.33% (*n*=59). This should be expected since news briefs present factual information in a quick and concise manner.

Conclusions

A majority (79.36%) of the sentences were identified as report sentences. Report sentences are considered to be the most objective of the sentence categories identified by

the Hayakawa-Lowry News bias Categories because they are factual. Consumers have increasingly become more concerned with the safety of the food supply over the past several years (Nayga, 1996). These concerns have been heightened by both scrutinizing media coverage and growing awareness in relation to health and diet (Nayga).

"Some scientists believe that the only food safety crisis is that which exists in people's minds as a result of incomplete reporting of scientific information by the media" (Nayga, 1996, p. 467). Whitaker and Dyer (2000) reported in their previous research that both the content and level of bias is different in agricultural magazines as compared to non-agricultural magazines. Although completeness of reporting was not researched in this study, objectivity and lack of bias were themes found within the articles, which is not supported by Whitaker and Dyer.

These unbiased results could be the reflection of coverage credibility. Research objective 1 reported less than one article was published per day over a two-and-a-half month span covering a national food safety scare. This could be the result of the increasing trend of reduction in newspaper staff.

Conclusions Related to Research Objective 3

The goal of research objective 3 was to determine the level of bias and judgment statements. A total of 1,444 sentences were coded. A random sample consisting of 29.22% (*n*=422) of all sentences were coded by three experts trained in the Hayakawa-Lowry News Bias Categories. The researcher independently coded the remaining sentences, 70.78% (*n*=1,022). "A basic theoretical assumption is that report sentences are more likely than inference sentences to be perceived by news consumers as

objective" (Lowry, 1986, p. 574). "Inference sentences are likewise more likely to be perceived by the public as objective than are judgment sentences, by definition, contain statements of the reporter's personal opinion" (Lowry, p. 574).

Deuze (2005) reported that "rejection as well as critical reappraisal of objectivity all help to keep it alive as an ideological cornerstone of journalism" (p. 448). Data indicated that AP reporting regarding the *Salmonella* outbreak of 2008 wrongfully implicating tomatoes was objective and unbiased during the purposive timeframe. A total of 79.36% (*n*=1,146) sentences were reports, both attributed and unattributed. These sentences are considered to be the least biased. A total of 55.75% of all sentences were attributed to a source (*n*=805), where government and state sources were attributed most frequently (50.81%). An indication of bias, or favoritism, for one particular side of the story was evident in the attributed sources. However, it should be noted, that of the three original sentence categories, judgment sentences, considered to be the most biased, comprised the next majority, 14.48%.

Journalists began reporting both environmental and food safety issues in the 1980s (Whitaker & Dyer, 2000). These issues had become increasingly complex by the time they had received attention of journalists (Whitaker & Dyer). Journalists had been trained to write, however, they weren't equipped to understand their influence on the relationship between producers and consumers (Whitaker & Dyer). Previous research has cited social distrust as a contributing factor in effective communication associated with risk to the general public (Frewer, Howard, Hedderley, & Shepherd, 1996). Trust in

legislation and regulation could be reduced if the general public believes governments work close with industries (Frewer, Howard, Hedderley, & Shepherd).

Who does the public trust regarding the reporting of food-safety issues? A vital question sought in risk communication literature is why certain individuals and organizations are viewed as trusted sources of information associated to risk and why others are not (Frewer, Howard, Hedderley, & Shepherd, 1996). Although journalists looked to government and state for attributed reporting of information, past research has shown the public can distrust government. Government officials have the perception as being insensitive to public concerns and needs (Frewer, Howard, Hedderley, & Shepherd). Trustful information has to be provided from sources that are neither biased nor self-serving (Frewer, Howard, Hedderley, & Shepherd). Whitaker and Dyer (2000) reported that reporters should use many sources when presenting a story in an effort to accurately present to facts. All sides of the story should be represented instead of reporting information that is the easiest to reach (Whitaker & Dyer).

A survey by Buzby and Ready (1996) concluded that around 8% of survey respondents trusted completely the accuracy of food safety information that came from either television shows or news, compared to 6.2% from newspapers. 52.3% of the survey respondents trusted food safety information from government information, however only 10.8% reported that they trusted the accuracy of the information (Buzby & Ready). If the public is more sensitive towards information received from the government or state for various reasons, why would the category for attributed sources consisting of producers and growers attribute to only 24.72% of all attributed sentences?

Who do reporters prefer as factual source choices? Previous research has reported that over two out of three reporters preferred liberal activist groups for environmental information as compared to conservative choices (Whitaker & Dyer, 2000). Does this show unintentional bias instilled within the reporter's work before the work is even produced? One out of four preferred individuals that were not involved with the environment or food safety issues to include celebrities (Whitaker & Dyer). Why would reporters choose these groups, who most often, may not possess certain qualifications needed to gain trust regarding the subject matter? In a comparison to both scientists and agriculturalists, these groups have equal credibility ratings with the general public (Whiatker & Dyer). Why would the public trust these sources?

Data indicated that AP reporters referred to government or state sources for attributed reporting. However, previous research indicated public distrust in these source choices. Additionally, previous research indicated poor credibility in source choices for reporting. Although the Hayakawa-Lowry News Bias Categories measured the level of bias based on the reporter's objectivity, reporters can choose sources based on their own bias, which is not reported through these categories. Report sentences can help conceal a reporter's bias. Reporters who choose sources based on their own bias instill their feelings within their work based on their source choices. How can the agricultural industry, agricultural communicators, educators, and advocates become the sources of choice for AP reporters? Agricultural communicators need to work with the AP in developing clear communication channels to make agricultural sources more easily accessible in an attempt to provide more credible source choices.

Conclusions Related to Research Objective 4

Research objective 4 was to compare consumer trends to the level of bias found in the articles. “Most people obtain food safety information from television and newspapers, yet most are more likely to completely trust the food safety information from government publications and food packaging or labels” (Buzby & Ready, 1996, p. 46). Generally, there has been a tendency for consumer concerns in relation to food safety issues to be exaggerated by the media (Nayga, 1996). “Consumer behavior and attitudes are affected by the acquisition of information such as those related to food safety” (Nayga, p. 468). This research assessed the level of bias of AP newswires associated with the *Salmonella* outbreak of 2008 by application of the Hayakawa-Lowry News Bias Categories.

Even though data indicated most reporting of the crisis was both objective and factual, consumer per capita consumption decreased as population increased, as shown in Figure 11. Comparison cannot indicate consumer trends and attitudes, and we can’t quantify the relationship between the *Salmonella* outbreak implicating tomatoes, AP reporting of the outbreak, and consumer behavior; however, we can draw conclusions between consumer per capita consumption of tomatoes and the *Salmonella* outbreak during 2008.

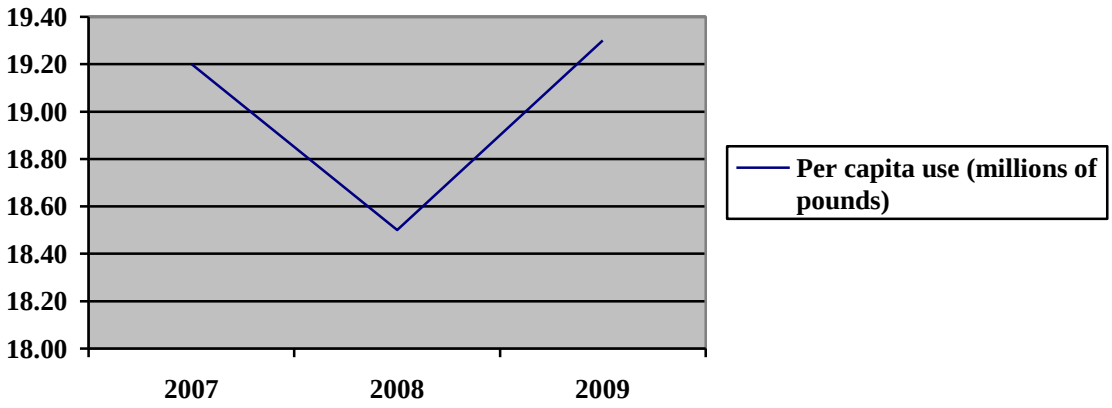

Figure 11. Per capita use of tomatoes (USDA-ERS, 2010b).

There are many factors that could relate to the decreased consumption in tomatoes during the time period, such as demographics, timing, and availability of the product. However, some of these factors could relate to the outbreak, itself. Tomato consumption, as compared to previous years and years after, did decrease during the time period. Consumers saw prices rise, and producers experienced sharp decreases in prices during the span of the outbreak. Accordingly, many producers in the United States plowed their fields during the time period spanning the outbreak. We can assume the outbreak itself had a direct impact on the tomato industry in the United States, both financially and from a credibility standpoint.

Early in the investigation, Mexican farms were not implicated in the outbreak. However, the outbreak was later traced to jalapenos and serrano peppers grown in

Mexico. The USDA-ERS estimated the economic impact of salmonellosis for 2008 at $2,646,750,437 (USDA-ERS, 2010a).

Discussion

Journalists have a responsibility to present objective, factual, unbiased information to the public, especially during times of crisis. It is understood that journalists are human, and share diverse values, beliefs, and opinions. However, there is an obligation for journalists to present objective information, yet personal opinions, beliefs, and values can sometimes be incorporated into their work. Gaining consumer trust in the information communicated during a potential agricultural crisis could reduce potential negative economic impacts. "Trust in risk information about food-related hazards may be as important a determinant of consumer reactions as the content of the risk information" (Frewer, Howard, Hedderley, & Shepherd, 1996, p. 473). "Consumer resistance might be diminished if risks eliminated by these production practices are clearly explained" (Nayga, 1996, p. 467).

Although data indicated AP news reporting concerning the 2008 *Salmonella* outbreak wrongfully implicating tomatoes was objective, this sample cannot account for all reporting. The Hayakawa-Lowry News Bias Categories were employed when assessing level of bias. It should be noted that quoted sentences coded as reports could have a bias tone, but since they are report sentences, they are considered unbiased. Local newspaper articles were unattainable, and an analysis of bias for these articles could potentially shape a different story because of sensitivity to local producers and growers.

Recommendations

With an understanding of the level of bias in newspaper coverage, agricultural communicators will be able to efficiently create risk communication plans in advance to accurately present agricultural-related crisis information in the wake of a risk-associated event. Agriculture is in the news only when the issue is controversial or associated with risk. With this in mind, it's vital for agricultural sources to be easily accessible as source choices for reporters.

For research

It is recommended further research explore news bias of agricultural crisis in various agricultural publications. Further research should be conducted to examine journalist source choices during controversial events. In addition, it is also recommended further research explore news bias for both other agricultural issues, related and non-related, and other industries. What is the level of bias in news reporting regarding the swine flu? What is the level of bias in news reporting regarding medical recalls?

For practice

It is recommended for practice, agricultural communicators provide easy access to data for reporters. Agricultural communicators should have a clear communication channel and be easily accessible for reporters as source choices to effectively paint the correct picture in the onset of a particular risk-associated event. Media training, media literacy, and risk communication paths could be provided and prepared for in advance in preparation to be actively put in place in the wake of a crisis.

Summary

Agriculture feeds the world. It's important to portray the message efficiently and effectively in an effort to promote and secure consumer confidence in the products produced. The media will always play a significant role in telling agriculture's story, both negative and positive. Historically, agricultural-related topics receive excessive attention when the tone is negative. Agriculture's story is rarely told when the tone is positive. Objective reporting in an unbiased and factual manner is an obligation of the media. However, personal values, beliefs, and opinions can intrude on the dissemination process. Bridging the gap between the scientific and technical aspect of agricultural-related topics, media, and consumers could reduce negative economic and political impacts for the industry.

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APPENDIX A

Table 8

All articles comprised in the sample sorted by date (*n*=57)

Title	Date	Words	Dateline	Code
Tomato-related *Salmonella* case confirmed in Colorado	6-9-2008	287	Denver, CO	PF29
Health department warns of tomato *Salmonella* risk	6-9-2008	116	Burlington, VT	LB11
Michigan added to states with *Salmonella*-tomato reports	6-10-2008	1,075	Chicago, IL	LF17
Will *Salmonella* outbreak affect tomato sales in La. & Miss.?	6-10-2008	690	New Orleans, LA	LF19
Tomato outbreak is reminder to follow food safety tips	6-10-2008	636		LF18
Mexican tomato exports to U.S. stall	6-10-2008	112	Mexico City, Mexico	LB10
Tomato growers worry *Salmonella* will halt sales	6-11-2008	909	Fresno, CA	LF12
North Carolina tomato growers prepare for bruises	6-11-2008	518	Raleigh, NC	LF16
NM now investigating 68 cases of tomato-linked *Salmonella*	6-11-2008	297	Santa Fe, NM	LF13
Virginia No. 4 in nation tomato production	6-11-2008	126	Richmond, VA	LB9
No tomato-related *Salmonella* cases in Montana	6-11-2008	116	Helena, MT	LB8

Table 8

Continued

Title	Date	Words	Dateline	Code
CDC: *Salmonella*-tainted tomato illnesses reach 228	6-12-2008	458	Washington, DC	LF10
Mexican tomato growers defend their produce as safe	6-12-2008	451	Mexico City, Mexico	LF9
Mexico tomato growers say warning unfair	6-12-2008	451	Mexico City, Mexico	LF11
State: One case confirmed of tomato-caused *Salmonella*	6-13-2008	261	Montpelier, VT	LF8
Arkansas tomato growers get boost from Mexico woes	6-13-2008	152	Little Rock, AR	LF7
N.H. monitors tainted tomato situation, no illness yet	6-13-2008	118	Concord, NH	LB6
Va. tomato growers fret over *Salmonella* scare	6-14-2008	535	Richmond, VA	LF6
North Carolinian ill from tomato-related bacteria	6-14-2008	137	Raleigh, NC	LB5
NJ reports first tomato-related *Salmonella* case	6-19-2008	137	Trenton, NJ	LB4
Tainted tomatoes may still be on the marked; FDA to look at other produce, too	6-29-2008	526	Washington, DC	PF29
Tomato growers feel effects of *Salmonella* outbreak	6-20-2008	133	Mulberry, FL	LB3
NM officials call for tomato embargo	6-21-2008	134	Santa Fe, NM	LB2

Table 8

Continued

Title	Date	Words	Dateline	Code
3 tomato *Salmonella* cases in Yakima County	6-26-2008	80	Yakima, WA	LB1
CDC widens its *Salmonella* investigation; as more become ill, possible non-tomato sources get a look	7-1-2008	418	McLean, VA	PF28
U.S. News: *Salmonella* probe looks beyond tomatoes; other fresh produce now getting tested; pressure is on FDA	7-2-2008	640	New York, NY	PF27
Tomatoes still lead list of suspects in *Salmonella* probe	7-2-2008	531	Washington, DC	PF26
Latest suspect: Fresh salsa; *Salmonella* search zeros in on dip	7-3-2008	368	McLean, VA	PF25
Farmers say *Salmonella* scare has hurt tomato sales	7-4-2008	818	Fresno, CA	LF5
CDC checks other sources in *Salmonella* outbreak	7-6-2008	397	Atlanta, GA	PF24
Salmonella cases in Pa. jump from 6 to 11 ** Tomatoes suspected: Baffled feds also eye cilantro, jalapenos	7-8-2008	664	Allentown, PA	PF23
Warning issued on tainted peppers: Officials investigating *Salmonella* blame some ills on jalapenos	7-10-2008	781	Baltimore, MD	PF20
Officials add jalapenos to *Salmonella* warning	7-10-2008	543	Washington, DC	PF21

Table 8

Continued

Title	Date	Words	Dateline	Code
Hot peppers added to warning list in *Salmonella* outbreak: Source of illnesses still undetermined	7-10-2008	414	Milwaukee, WI	PF19
Tomato growers' profit hopes wither; weak demand, low pries force some to plow crops under	7-10-2008	862	McLean, VA	PF22
Salmonella scare prompts menu changes: List of ingredients on the watch list grows, forcing restaurants to improvise on recipes–or give customers the option to take a chance	7-12-2008	482	Atlanta, GA	PF17
Mexico declares tomato crop is *Salmonella*-free/Nation demands FDA acknowledge ministry's findings	7-12-2008	305	Mexico City, Mexico	PF16
Growers want FDA to clear Fla.'s whole tomato crop	7-16-2008	318	Orlando, FL	LF4
FDA gives all-clear on tomatoes, not peppers; jalapeno, serrano varieties focus of *Salmonella* hunt	7-18-2008	900	Chicago, IL	PF13
Salmonella outbreak: FDA clears tomatoes: Hot peppers suspected: Emphasis shifts as experts try to trace origins of foodborne illness	7-18-2008	900	Atlanta, GA	PF14

Table 8

Continued

Title	Date	Words	Dateline	Code
Tomato scare ending; fears linger for many people	7-18-2008	793	Washington, DC	LF3
U.S. news: Hot peppers are focus of *Salmonella* probe	7-18-2008	566	New York, NY	PF15
Tomato growers: *Salmonella* scare damages industry	7-19-2008	806	Richmond, VA	LF2
Minnesota's approach quickly traced source of puzzling *Salmonella*	7-23-2008	1,025	Minneapolis, MN	PF12
Florida growers want compensation for tomato scare	7-23-2008	324	Tallahassee, FL	LF1
Tomato industry seeks compensation	7-25-2008	593	New York, NY	PF1
FDA officials narrow *Salmonella* warning to Mexican peppers	7-26-2008	715	Washington, DC	PF11
Safe to eat?	7-27-2008	1,837	Miami, FL	PF10
A costly blight of bad publicity: Georgia's tomato farmers see prime crop go to waste	7-28-2008	1,084	Atlanta, GA	PF9
System for protecting U.S. food supply comes under scrutiny	7-30-2008	1,974	Miami, FL	PF7
Slow to pick up the pepper trail	7-30-2008	1,360	Washington, DC	PF8

Table 8

Continued

Title	Date	Words	Dateline	Code
Amid *Salmonella* case, food industry seems set to back greater regulation	7-31-2008	878	New York, NY	PF4
Mexican farm pegged as source of U.S. *Salmonella* cases	7-31-2008	784	Atlanta, GA	PF5
Salmonella outbreak linked to Mexican farm	7-31-2008	591	Pittsfield, MA	PF6
House panel talks *Salmonella* scare	8-1-2008	397	Los Angeles, CA	PF3
Feds: Worst of *Salmonella* is over	8-29-2008	580	Bradenton, FL	PF2

VITA

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