

THE UNCERTAINTY OF AGROTERRORISM: A  
STUDY OF OKLAHOMA BEEF PRODUCERS'  
RISK PERCEPTIONS, INFORMATION  
SOURCES AND SOURCE TRUST  
IN THE PRE-CRISIS STAGE

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While writing a dissertation is not as bad as being sacrificed to appease evil gods, the process does seem as if it could escalate to that point at any time. It's amazing the amount of pressure we self-inflict in the name of education. Much to my parent's exasperation, many of my childhood experiences share a close bond with Calvin; except for learning.

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## **CHAPTER I**

### **INTRODUCTION**

Although threats to the food supply have always been possible, events in recent years have moved that possibility into the minds of mainstream America. Even before September 11, 2001, the United States (U.S.) had been a possible target for terrorism. “The U.S. is vulnerable to an agricultural bioterrorism incident specifically targeting key animal or plant commodities” (Horn, 1999, p. 3). Horn further maintained the awareness of this threat has increased within the intelligence and counterterrorism communities during the past two years; the United States Department of Agriculture (USDA) has worked with these intelligence communities to position agriculture to anticipate and respond to such a threat (1999).

After September 11, 2001, the possibility of intentional threats to agricultural safety became a reality. Agriculture Secretary Ann Veneman stated, “The intentional threats to agricultural products and our food supply have required us to do much more; we have been working closely with other federal agencies, state agriculture departments, academia, and the agriculture sector on many fronts to secure and strengthen planning and preparedness” (2002, p. 1).

Recent threats of security have forced the U.S. government to create new agencies and measurement systems to respond to the national crisis. Deputy Agriculture Secretary Jim Moseley, stated “the centerpiece of this new homeland security is the largest

reorganization of the federal government since 1947, when Harry Truman sought to prepare our defense infrastructure for the challenges of the post-war world” (2002, p. 2).

Planning for these incidents is essential. Assessing potential areas of effect and the methods that will be used could assist the government in reducing the possible risks of long-term chaos on American agriculture. “The best way to fight terrorists who would target our food supply is to simply take their options off the table by having an effective response plan in place” (Moseley, 2002, p.3).

As recently as December 3, 2004, Tommy Thompson, former Secretary of Health and Human Services, announced at his resignation, “For the life of me, I cannot understand why the terrorists have not attacked our food supply because it is so easy to do” (2004).

Several factors can be attributed to the value of studying public communication needs during an agriculturally related crisis. The recent diagnosis of cases of Bovine Spongiform Encephalopathy (BSE) in the U.S. has placed food quality and safety in the spotlight. Consumers want information from any agency or media involved in providing it to the public.

Public perception will be determined by the effectiveness of this information, its quality, and the ability of the layman to decipher its meaning. Identifying the sources of information beef producer’s use and trust prior to a crisis event could mean the difference between chaos and ordered preparedness.

### **Statement of the Problem**

In the event of a terrorist attack against agriculture, the public will be forced to make life-sustaining decisions in regard to their health, safety and the food they provide

to their families. State agencies, special interest groups and the media will have the responsibility of disseminating communication to consumers and producers alike.

Correct and helpful information is critical for the public to facilitate their way through the crisis. “Public relations practitioners suggest the organization should be as open and forthright as possible to avoid damaging its reputation” (Newsom, Scott & Turk, 1989; and Pinsdorf, 1987, as cited in Seeger & Ulmer, 2001).

The problem addressed by this study is the lack of information showing where beef producers seek information and the sources of information trusted by those beef producers in the context of an agriculturally related crisis such as an incident of agroterrorism.

### **Purpose of the Study**

The purpose of this study was to determine Oklahoma beef producers’ perceptions of the susceptibility of the Oklahoma beef industry to a terrorist attack, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculture during a crisis.

### **Research Questions**

Specifically, this study addressed the following research questions:

1. What are Oklahoma beef producers’ perceptions of the susceptibility of the Oklahoma beef industry to an agroterrorism event?
2. What are the sources of information Oklahoma beef producers use when seeking information about an animal health issue?
3. What are Oklahoma beef producers’ level of trust and reliability in the information sources used?

4. How did Oklahoma beef producers' perceptions toward the susceptibility of the Oklahoma beef industry to agroterrorism differ based upon the demographic variables of age, farm size, and education level?
5. How did Oklahoma beef producers' perceptions toward information source trust and reliability differ based upon the demographics of age, farm size, education level, and access to a computer with internet access?

### **Assumptions**

The following assumptions were made:

1. Local and national media are responsible for communicating accurate information to the public.
2. Any person involved with providing the media with communication involving an agriculturally related crisis should have an acceptable level of agricultural knowledge.

### **Limitations of the Study**

1. The results can only be generalized to the population under study.
2. The results of this study are limited to the extent they reflect only those variables (demographics, communication needs) of the many variables that may contribute to the communication and interpretation of information disseminated during a moment of crisis.
3. Reliability was tested in a post-hoc Cronbach's Alpha test. Due to the schedule of the Oklahoma Agricultural Statistics Service, no provision was made to conduct any pilot testing prior to full administration of the instrument. Although the Cronbach's Alpha showed a reliability score of .84, which is considered reliable,

conducting the test in a post-hoc situation may have rendered the data useless if the score was below .70 at testing.

### **Definition of Terms**

Agriculture: The science, art, or practice of cultivating the soil, producing crops, and raising livestock and, in varying degrees, the preparation and marketing of the resulting products (Merriam-Webster Online, 2004).

Agroterrorism: The intentional or threatened use of viruses, bacteria, fungi, or toxins from living organisms to produce death or disease in humans, animals, or plants; or intentional or threatened use of chemicals against food or animals; or the intentional or threatened use of explosives to disrupt agriculture production or supplies of food. The purpose of the act or threat is to intimidate or coerce a government or civilian population (Schaub, 2002).

Bioterrorism: The deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants (CDC, 2006).

Biological Warfare: The use of a biological organism or biologically derived toxin or other substance to cause lethal or incapacitating effects; agents may be used to target humans, crops or livestock, or nonliving, but economically vital material, such as an oil supply (Sheeran, 2002).

Crisis (a): An unstable or crucial time or state of affairs in which a decisive change is impending, especially one with the distinct possibility of a highly desirable outcome (Henry, 2000).

Crisis (b): An unusual event of overwhelmingly negative significance that carries a high level of risk, harm, and opportunity for further loss...For organizations,

crisis often conveys a fundamental threat to system stability, a questioning of core assumptions and beliefs, and threats to high-priority goals, including image, legitimacy, profitability and even survival (Seeger, Sellnow & Ulmer, 2003)

Organizational Crisis: A specific, unexpected and non-routine organizationally based event or series of events which creates high levels of uncertainty and threat or perceived threat to an organization's high priority goals (Seeger, Sellnow & Ulmer, 1998 )

Risk Management: Identifies a hazard and anticipates the related risk that could impact public safety (Henry, 2000).

Risk Communications: The exchange of information among interested parties about the nature, magnitude, significance, or control of a risk (Corvello, 1992)

Crisis Communication: Involves the sending and receiving of messages to prevent or lessen the negative outcomes of a crisis and thereby protect the organization, stakeholders, or industry from damage (Coombs, 1999)

### **Chapter Summary**

This study was conducted to assess the perceptions of Oklahoma beef producers regarding susceptibility of the Oklahoma beef industry to agroterrorism, as well as to investigate trusted sources of information used to reduce uncertainty about bio-security in an effort to assist planning in the pre-crisis stage.

Public perception of a perceived crisis can be affected by personal agricultural knowledge levels. Horn (1999) maintained the awareness of this threat has increased within the intelligence and counterterrorism communities during the past two years; the

USDA has worked with these communities to position agriculture to anticipate and respond to such a threat.

The purpose of this study was to determine Oklahoma beef producers' perceptions of the susceptibility of the Oklahoma beef industry to a terrorist attack, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculture during a crisis.



## **CHAPTER II**

### **REVIEW OF SELECTED LITERATURE**

The purpose of this study was to determine Oklahoma beef producers' perceptions of the susceptibility of the Oklahoma beef industry to a terrorist attack, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculture during a crisis. Chapter I addressed the need for identifying these information sources and their perceived value to beef producers and the beef industry in the pre-crisis stage.

In this chapter, the theoretical framework of uncertainty reduction theory will be discussed. The chapter will also present an overview of the history of bioterrorism and its affect on agriculture, describing past and potential dangers in the food and fiber system. Agriculturally related crises through deliberate acts, rather than natural disaster or occurrences of nature, are the focus of the crises referred to in this study. This chapter will also discuss the conceptual framework of crisis communications as a foundation for the four stages of a crisis and the role communication plays in crisis planning. The chapter will also describe the uses of information sources within agriculture. Finally, this chapter will review the potential risks organizations and groups create or exacerbate during a crisis situation. This review of literature focused on articles found in the ERIC Documentation Reproduction Service, EBSCO, JSTOR, ProQuest Direct, AGRICOLA, refereed and non-refereed journals, doctoral dissertations, master's theses, white papers,

published texts, and regional and national conference proceedings. Before discussing the theoretical framework of uncertainty reduction, it is important to present the concepts of bioterrorism and its affect on agriculture, crisis communications, information sources, and organizational risk.

### **Demographics of the American Farmer**

In a white paper from the National Agricultural Statistics Service (NASS), a department of the USDA, Allen and Harris (2005) outlined certain demographics information of the American farmer relating to the increasing ages of primary operators and the need for succession planning. All data were from the *2002 Census of Agriculture*, a report conducted every five years by NASS:

In 2002, the average age of all U.S. principal farm operators in the 2002 Census was 55.3 years of age. This average has been more than 50 years of age since at least the *1974 Census of Agriculture* and has increased in each census since 1978 – usually by one year or more from each census to the next. In addition, the percentage of principal farm operators 65 or older has risen consistently since 1978 (when it was about 1 in 6) and reached 26.2 percent (more than 1 in 4) in 2002; the percentage of principal operators with average ages of less than 35 years has been declining since 1982, when it was 15.9 percent, and was only 5.8 percent in 2002 – the percent of principal operators who are 34 years or younger has dropped about 20 percent in each subsequent census since 1982.

Principal farm operators who indicated their primary occupation was farming averaged 57.0 years of age, compared to 53.0 for those who indicated an

occupation other than farming. Beef cattle ranching and farming operators report an average age of 56.7 years, making up 31.2 percent of all farms (pp. 1-2).

### **Bioterrorism and Agriculture**

“A covert biological attack could be easily designed to cripple the poultry or livestock industry by simultaneously introducing three or four highly contagious, highly fatal animal diseases” (Watson, 1999, p. 161). Watson (1999) maintained “the United States is vitally dependent on its agriculture and livestock. We are dependent on plants for our staple crops (wheat, rice, corn, etc.), for fibers (e.g., cotton and flax), for wood, for vegetables, fruits, and luxury items such as tea and tobacco, and for many materials used in industry” (p. 159).

According to an article in BEEF Magazine (Peck, 2005), Radford Davis, assistant professor of public health in the Department of Veterinary Microbiology and Preventive Medicine at Iowa State University, said, “An attack against animals or crops is generally viewed as more benign and less offensive than if humans fell dead from a direct assault” (n.p., 2005). Davis noted, agricultural terrorism is more about crippling the economy than killing animals (Peck, 2005). For those agencies and organizations involved in assessing the fallout from a crisis within American agriculture, determining if the event is a natural occurrence or the work of agroterrorism will be difficult (Frazier, 1999; Casagrande, 2000; Kohnen, 2000; and Foxell, 2003).

Historical accounts of disasters in the food and fiber industry can provide an idea of the level of damage a terrorist attack may inflict on U.S. Agriculture. Due to the absence or minutia of empirical data on actual terrorist attacks against agriculture,

governmental bodies are required to speculate the possible effect of a terrorist attack on the food and fiber industry. These speculations are in “what if” terms for the outcomes of these potential areas of attack. Past history is considered, and by factoring new technology, possible vectors, methods of dispersion, and the availability of agents or toxins in the open market, governmental agencies can create “worse-case” scenarios that might be used in prevention planning. Frazier (1999) maintained previous incidents include plots to infect food at grocery stores, water supplies, food processing facilities; and false claims or hoaxes can reduce public confidence in the agricultural industry.

Foxell (2003) maintained the uses of agroterrorism range from small protesting groups making political statements to organization state or sub-state factions trying to cripple the government through covert warfare. Casagrande (2000) stated “a knowledgeable individual could do severe damage to agriculture with a pathogen obtained from the environment of a foreign country” (p. 95).

Even in our current state of affairs in the Middle East and Iraq, terrorism against American agriculture has been discussed. Kosal and Anderson (2004) maintained Al-Qaeda materials and documents seized by U.S. troops in Afghanistan addressed the subject of agricultural terrorism. Information such as this can provide governmental entities an opportunity to speculate, with greater success, about possible terrorism events.

#### *History of Bioterrorism and Agriculture*

The Center for Disease Control defined bioterrorism as “the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants” (CDC, 2006). Sheehan (2002) defined biological warfare as the “use of a biological organism or biologically derived toxin or other substance to cause lethal or

incapacitating effects; agents may be used to target humans, crops or livestock, or nonliving, but economically vital material, such as an oil supply” (p. 771).

Schaub (2002) defined agroterrorism as “the intentional or threatened use of viruses, bacteria, fungi, or toxins from living organisms to produce death or disease in humans, animals, or plants; or intentional or threatened use of chemicals against food or animals; or the intentional or threatened use of explosives to disrupt agriculture production or supplies of food; the purpose of the act or threat is to intimidate or coerce a government or civilian population” (p. 1). Deen (1999) maintained “biological warfare threats still encompass denial of food supplies, but now includes economic objectives, primarily economic loss to the industry by restrictions on international trade and disruption of internal distribution by governmental efforts to isolate and eradicate the disease” (p. 164).

Even before humans discovered the principles of germ theory and disease, biological uses of organisms and toxins were used in warfare in the fourteenth century (Sheeran, 2002). Five-hundred years later, nineteenth century microbiological advances found the isolation and identification of disease-causing microorganisms a useful discovery in allowing them to be used with more specificity than dead bodies contaminating water supplies (Sheeran, 2002) (See Figure 1 and 2). “Historically, anti-plant and anti-animal agents were selected for widespread distribution, in a wartime situation, with the intent of killing or rendering unfit for their intended use” (Deen, 1999, p. 164).

“Extensive use of chemical weapons during World War I prompted the creation of the Geneva protocol of 1925, which called for the prohibition of the use in war of

**1346-1347** - Mongols catapult corpses contaminated with plague over the walls into Kaffa (in Crimea), forcing besieged Genoans to flee.

**1710** - Russian troops allegedly use plague-infected corpses against Swedes.

**1767** - During the French and Indian Wars, the British give blankets used to wrap British smallpox victims to hostile Indian tribes.

**1916-1918** - German agents use anthrax and the equine disease glanders to infect livestock and feed for export to Allied forces. Incidents include the infection of Romanian sheep with anthrax and glanders for export to Russia, Argentinean mules with anthrax for export to Allied troops, and American horses and feed with glanders for export to France.

**1937** - Japan begins its offensive biological weapons program. Unit 731, the BW research and development unit, is located in Harbin, Manchuria. Over the course of the program, at least 10,000 prisoners are killed in Japanese experiments.

**1939** - Nomonhan Incident - Japanese poison Soviet water supply with intestinal typhoid bacteria at former Mongolian border. First use of biological weapons by Japanese.

**1940** - The Japanese drop rice and wheat mixed with plague-carrying fleas over China and Manchuria.

**1942** - U.S. begins its offensive biological weapons program and chooses Camp Detrick, in Frederick, Maryland as its research and development site.

**May, 1945** - Only known tactical use of BW by Germany. A large reservoir in Bohemia is poisoned with sewage.

**September, 1950-February, 1951** - In a test of BW dispersal methods, biological simulants are sprayed over San Francisco.

**June, 1966** - The United States conducts a test of vulnerability to covert BW attack by releasing a harmless biological simulant into the New York City subway system.

**November 25, 1969** - President Nixon announces unilateral dismantlement of the U.S. offensive BW program.

**February 14, 1970** - President Nixon extends the dismantlement efforts to toxins, closing a loophole which might have allowed for their production.

**1978** - In a case of Soviet state-sponsored assassination, Bulgarian exile Georgi Markov, living in London, is stabbed with an umbrella that injects him with a tiny pellet containing ricin.

**April 2, 1979** - Outbreak of pulmonary anthrax in Sverdlovsk, Soviet Union. In 1992, Russian president Boris Yeltsin acknowledges that the outbreak was caused by an accidental release of anthrax spores from a Soviet military microbiological facility.

**1984** - Cult contaminated 10 salad bars with *Salmonella*, 751 people became sick

**1985-1991** - Iraq develops an offensive biological weapons capability including anthrax, botulinum toxin, and aflatoxin.

*Figure 1. Chronology of State Use of Biological Weapons (BW) (CNS, 2001).*

**429 B.C.** - Spartans ignite pitch and sulphur to create toxic fumes in the Peloponnesian War.

**424 B.C.** - Toxic fumes used in siege of Delium during the Peloponnesian War.

**960-1279 A.D.** - Arsenical smoke used in battle during China's Sung Dynasty.

**1456** - City of Belgrade defeats invading Turks by igniting rags dipped in poison to create a toxic cloud.

**1914** - French begin using tear gas in grenades and Germans retaliate with tear gas in artillery shells.

**April 22, 1915** - Germans attack the French with chlorine gas at Ypres, France. This was the first significant use of chemical warfare in WWI.

**September 25, 1915** - First British chemical weapons attack; chlorine gas is used against Germans at the Battle of Loos.

**February 26, 1918** - Germans launch the first projectile attack against U.S. troops with phosgene and chloropicrin shells. The first major use of gas against American forces.

**June 1918** - First U.S. use of gas in warfare.

**June 28, 1918** - The United States begins its formal chemical weapons program with the establishment of the Chemical Warfare Service.

**1919** - British use Adamsite against the Bolsheviks during the Russian Civil War.

**1922-1927** - The Spanish use chemical weapons against the Rif rebels in Spanish Morocco.

**1942** - Nazis begin using Zyklon B (hydrocyanic acid) in gas chambers for the mass murder of concentration camp prisoners.

**December 1943** - A U.S. ship loaded with mustard bombs is attacked in the port of Bari, Italy by Germans; 83 U.S. troops die in poisoned waters.

**April 1945** - Germans manufacture and stockpile large amounts of tabun and sarin nerve gases but do not use them.

**1962-1970** - U.S. uses tear gas and four types of defoliant, including Agent Orange, in Vietnam.

**1963-1967** - Egypt uses chemical weapons (phosgene, mustard) against Yemen.

**1975-1983** - Alleged use of Yellow Rain (trichothecene mycotoxins) by Soviet-backed forces in Laos and Kampuchea. There is evidence to suggest use of T-2 toxin, but an alternative hypothesis suggests that the yellow spots labeled Yellow Rain were caused by swarms of defecating bees.

**1979** - The U.S. government alleges Soviets use of chemical weapons in Afghanistan, including Yellow Rain.

**August, 1983** - Iraq begins using chemical weapons (mustard gas), in Iran-Iraq War.

**1984** - First ever use of nerve agent tabun on the battlefield, by Iraq during Iran-Iraq War.

**1987-1988** - Iraq uses chemical weapons (hydrogen cyanide, mustard gas) in its Anfal Campaign against the Kurds, most notably in the Halabja Massacre of 1988.

*Figure 2. Chronology of State Use of Chemical Weapons (CNS, 2001).*

asphyxiating, poisonous or other gases, and of bacteriological methods of warfare” (Sheeran, 2002, p. 771). Sheeran (2002) maintained this protocol did not deny a state’s ability for research and development, production or storage of the weapons, only the use in warfare.

Sequeira (1999) maintained U.S. history is full of various “anecdotes of the disastrous effects of invading diseases and insects. In 1904, an epidemic known as the “chestnut blight” caused by an Asian fungal agent, *Endothia parasitica*, resulted in the near extinction of the American chestnut” (p.49). Other examples include the nineteenth century introduction of the boll weevil (*Anthonomus grandis*), drastically affecting cotton production; or “multi-billion dollar threats posed by the Mediterranean fruit fly (*Ceratitis capitata*) and citrus canker (*Xanthomonas campestris*) to the fruit and vegetable production in several southern states; and the nearly completed campaign against wheat Karnal bunt (*Tilletia indica*)” (Sequeira, 1999, p. 49). Casagrande (2000) stated “some of the most damaging crop pests have been insects accidentally introduced from foreign lands into the United States” (p. 94).

According to Sheeran (2002) “one usually thinks of the threat to humans when considering a bioterrorist scenario, a vulnerable target remains in the plant and animal industry. The United States, like many developed nations is vitally dependent on its cash crops, livestock, and poultry to sustain its quality of life and provide economic stability” (p. 780).

Potential risks to livestock may include such pathogenic zoonotic diseases as Foot-and-Mouth disease (FMD), Anthrax (*Bacillus anthracis*), Glanders (*Pseudomonas mallei*), African Swine Fever, Rinderpest, or Avian Influenza. The bacteriological or



viral contamination of livestock can cause a disruption of protein availability in the marketplace, as well as cause the need for the destruction or eradication of animals to prevent further spread of the infection or contaminated areas.

Kohnen (2000) maintained the presence of foot-and-mouth disease (FMD) bears an immediate export restrictive response, as well as incurring a high eradication cost due to its highly virulent nature. For example, the Canadian outbreak of FMD during 1951-1953 affected about 2,000 animals and cost the government about \$2 million for eradication. Trade restrictions devalued Canadian livestock by \$650 million, with an economic impact of \$2 billion (Vannieuwenhoven, 2000). Other outbreaks of FMD: 1) Italy (cattle) in 1993 cost \$11.5 million for eradication and an economic price-tag of \$120 million, (Vannieuwenhoven, 2000); 2) Taiwan (swine) in 1996 cost the country four million head and the world-wide swine industry losses were expected to reach \$7 billion (Wilson & Tuszyński, 1997).

An outbreak of highly pathogenic avian influenza (HPAI) caused around 17 million chickens to be destroyed in Pennsylvania in 1983. Costs associated with the disease: 1) \$86 million eradication; 2) \$548 million in rising poultry costs; and 3) \$7 million in lost wages (Wuethrich as cited in Kohnen, 2000; Vannieuwenhoven, 2000).

Neher (1999) maintained the most widely accepted and reported event of intentional contamination of cattle feed occurred in Wisconsin in 1981 when an entire silo was contaminated by an organophosphate-based corn rootworm insecticide. Neher (1999) and Schuldt (1999) also reported a feed producer, in 1996, contaminated the rendering plant material of a competitor with an organochlorine pesticide; the feed was unknowingly distributed to more than 4,000 farms, many of which were dairies, thus

adulterating the subsequent milk production. The same individual later in 1997 allegedly contaminated poultry feed with a fungicide to gain a competitive edge in sales (Neher, 1999).

Cameron, Pate and Vogel (2001) maintained the Center for Nonproliferation Studies' (CNS) database reports "21 incidents that might be classified as sub-state attacks on agriculture. Most of the incidents were unsophisticated and ineffective, lacking significant impact, and on a very small scale" (p. 2).

#### *Livestock Movement and Concentration*

Deen (1999) maintained better transportation and the need to lower costs per unit for increased profit margins have grown the need and trend for the concentration of individual farms. Murphy (1999) suggested this trend of concentration increases the likelihood of disease transmission due to the growing numbers of cattle populations within close proximity; this trend reduces the geographic area of the target and increases the magnitude of the virulence – but benefits the defense for the disease (Deen, 1999).

Casagrande (2000) stated "if a disease were to be intentionally introduced, a terrorist would only have to infect a few animals in the major feedlots to potentially infect almost all of the cattle in the United States" (p. 577).

The success of the US livestock industry is due in part to the consolidation of companies that control the production of animal feed, the rearing of animals, and their slaughter and processing. This concentration of animal agriculture facilitates the introduction of a single animal with a highly contagious disease that can affect the welfare of millions of other animals (Casagrande, 2000, p. 577).

This issue of concentration poses new stress on mitigation processes of the crisis; once a disease is introduced into this system, locating the origin of the infected animal and all the animals with which it came in contact can be an insurmountable task; a task detrimental to containment and recovery (Casagrande, 2000).

Knowles, et al. (2005) maintained due to the trend of centralization, the marketing, feeding, and processing within the central plains region of Texas, Oklahoma, Kansas, Nebraska, and Colorado, an outbreak of FMD would become costly to the beef cattle industry. BEEF Magazine (2005) estimated FMD outbreak exercises, conducted by the USDA, have shown the spread of the disease to at least 39 states and the need to destroy up to 48 million animals; Kansas alone moves more than 500 truckloads of cattle per day.

To manage any disease outbreak, one great concern is transportation (Graham, as cited in Knowles, et al. 2005). Lane (2002) in sworn testimony to the U.S. Senate Committee on Bio-security and Agro-terrorism stated:

The agriculture industry is highly efficient, particularly in the movement of cattle.

To meet the demands for beef products throughout the United States and the world, it has evolved into a ‘non-stop operation’ that requires constant, uninterrupted movement of live animals, feed supplies and finished product.

“Agromovement” may represent the greatest vulnerability to the industry in preventing, planning for and responding to an agroterrorism event.

Agromovement can best be defined as the continuous cycle of movement required in farm to fork food production, including all aspects of animal transportation to

finished products destined for distribution and consumption throughout the world (n.p.).

Knowles, et al. (2005) stated “any interruption in the cycle of movement will be economically devastating, especially locally where thousands are employed at processing and feeder facilities. The businesses and industries that rely on these employees will be equally affected” (p. 114). Knowles, et al. (2005) maintained as an example in Kansas, the impact of an outbreak of FMD could affect areas in southwest Kansas, bordering the I-35 corridor, containing “nearly 80% of the state’s processing capacity and 90% of the state’s feedlot cattle inventory” (p. 107).

“A focused regional, if not local, effort at understanding the particular facets of the industry that impact the individual community is required for agroterrorism prevention and response planning. More importantly, a national strategy must be developed to eliminate confusion, redundancy and miscommunications” (Lane, 2002, n.p.) One plan identified by the USDA to help ensure some control of the issue of cattle movement and to reduce the uncertainty of specific age and transportation history is the formation of the National Animal Identification System (NAIS).

The USDA (2006) maintained due to the increasing amount of numerous foreign animal diseases, the ongoing threat to possible introductions of these foreign animal diseases through intentional means, and the detection of BSE in the U.S. have led to the creation of the NAIS. This system will allow health officials, at both state and federal levels, to a) make quick and timely identifications of potentially exposed livestock and poultry, b) identify all animals coming in contact with the suspected exposed animal

within 48 hours, and c) create a system of rapid containment offering maximum protection to animal health in the U.S. (USDA, 2006).

### **Crisis Communications**

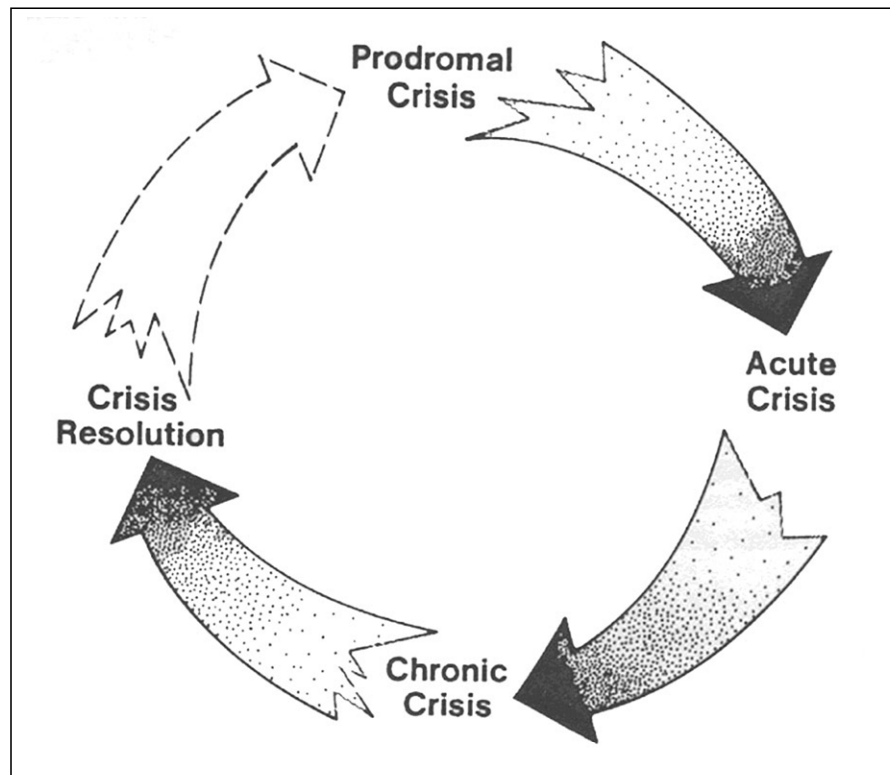
Crises are phenomena that can occur without warning and cause a chaotic atmosphere, especially when the effective dissemination of critical information is reduced. Merriam-Webster's online dictionary cites the third definition of a crisis as "an unstable or crucial time or state of affairs in which a decisive change is impending; *especially* one with the distinct possibility of a highly undesirable outcome <a financial *crisis*>;" or "a situation that has reached a critical phase <the environmental *crisis*>" (2003). "The Chinese symbol for the word 'crisis' – called *wei-ji* – is actually a combination of two words, 'danger' and 'opportunity'" (Fink, 1986, p.1). Seeger, Sellnow, and Ulmer (2003) defined crisis as "an unusual event of overwhelmingly negative significance that carries a high level of risk, harm, and opportunity for further loss" (p. 4). Lagadec (1991) defined crisis as "equal to a lack of knowledge, the unknown and an invasion of unexpected uncertainty" (p. 31).

Henry (2000) maintained crisis management, crisis communications, risk management, and risk communications are all closely related: *Crisis Management* – is how a crisis is managed and hopefully avoided; *Crisis Communication* – shapes how the story is told to the public at large, internal publics, and the media; *Risk Management* – identifies a hazard and anticipates the related risk that could impact public safety; *Risk Communication* – how the public is communicated with before, during, and after such a crisis. (p.1)

“The rules that a professional communicator followed are virtually the same once an incident happens and is ready to become, or already is, a crisis. Crisis communications is all-encompassing and anticipates and includes all hazards and risk. In effect, risk communications is crisis communications” (Henry, 2000, p.1).

### *Models of Crisis Management*

In Steven Fink’s Book titled *Crisis Management: Planning for the Inevitable*, crisis management is outlined using four distinct stages (Figure 1): Prodromal Stage, Acute Stage, Chronic Stage, and the Crisis Resolution Stage (1986).



*Figure 3. Fink's Crisis Cycle (Fink, 1986, p. 26)*

*Prodromal Stage* – the pre-crisis or warning stage, if there is a warning stage.

The reason the Prodromal stage is so important is that it is much easier to manage a crisis in this stage;

*Acute Stage* – the point of no return. You can almost never recover lost ground and the damage that has been done; but the amount of damage depends on the actions during this stage;

*Chronic Stage* – often called the clean up phase, or the post-mortem. It is during this stage that the carcass gets picked clean. Assuming, of course, that a carcass remains to be picked. It can linger indefinitely, but it is a period of recovery;

*Crisis Resolution Stage* – the goal of the other three stages. The organization is well and whole again, or is already headlong into another crisis” (pp. 21-25)

According to the Federal Emergency Management Administration (FEMA), disasters are classified through the same stages or phases, but called *preparedness, response, recovery and mitigation* (2006). Henry (2000) maintained being prepared is the first step. “Anticipate every possible crisis. Then develop a communications plan for each potential crisis. Be prepared to respond immediately; this is essential if one hopes to avoid a crisis or be able to manage one if the inevitable happens” (p.22). Seeger, et al. (2003) maintained the inability to move through effective recovery after a crisis can be brought on by poor communication.

Effective crisis management relies on the foundation of effective planning and communication before, during and after the incident (Fink, 1986; Henry, 2000; and Seeger, et al., 2003). The consideration of possible agroterrorism incidents could lead to

the development of a system or protocol that can be implemented if an assumptive agroterrorism incident became reality.

### **Organizations and Risk**

Once the initial incident has surfaced and the crisis moves into the public view, the first public response is crucial. Wilson (2002) maintained what is done and how communication occurs in the first few minutes or first hours of a crisis may well shape public opinion for hours, days, weeks, and possibly forever. “If handled effectively, organizations have the potential to benefit from crisis; to do so, effective communication is essential” (Ulmer & Sellnow, 2000, p.143).

Seeger, et al. (2003) further maintained organizations may inhibit the public’s ability to effectively assess the potential harm and risk of a situation if the organization has failed to supply or support a healthy exchange of information. Lukaszewski (1987) maintained a crisis event draws an intensified media interest, thus the strategic response of an organization is to control or manage the flow of information.

Organizations are caught between two polar opposites when faced with the opportunity to provide information to a demanding public. On the side of assessing the legality of their openness, the organization is tempted to offer as little information as possible about the crisis to avoid increasing liability or culpability. By contrast, many public relations professionals suggest openness and a forthcoming attitude with information helps the organization minimize or avoid damage to its reputation (Newsom, et al., 1989; Pinsdorf, 1987)



According to a survey conducted by a public relations firm, Porter and Novelli (as cited in Henry, 2000), in the heat of a crisis many people do not believe everything being told to them even if it is the truth. “The survey revealed that the public gets angry:

75% of the time when a company refuses to accept blame or responsibility,  
72% of the time when they believe the crisis could have been avoided,  
71% of the time when the company supplies incomplete or inaccurate information as a response to a problem, and  
70% of the time when the company places corporate profits ahead of public interest” (p. 9).

Consideration of the public’s need or want for information is vital to the decision-making process of information dissemination during a crisis. Seeger and Ulmer (2001) maintained “while immediate responses may not always be appropriate for all aspects of a crisis, leader sensitivity and responsiveness to the high levels of uncertainty faced by stakeholders is a praiseworthy virtue” (p. 374).

Lines of communication often become blurred during times of crisis. “Structural secrecy refers to the way division of labor, hierarchy, and specialization segregate knowledge about tasks and goals” (Vaughan, 1999, p.277). “Structural Secrecy implies:

- Information and knowledge will always be partial and incomplete
- The potential for things to go wrong increase, when tasks or information cross internal boundaries

- Segregated knowledge minimizes the ability to detect and stave off activities that deviate from the normative standards and expectations” (Vaughan, 1996, p.277).

“Structural Secrecy is reinforced as messages are transformed as they pass through the system, either by deletion of information or by distortion,” (Guetzkow as cited in Vaughn, 1999, p. 277). “Complexity can make an organization unwieldy so that the upper levels cannot control the subunits” (Vaughan, 1999, p.276).

#### *Organizational Uncertainty: Schwan’s Salmonella Ice Cream*

Seeger, et al. (2003) maintained in 1994, the largest outbreak in U.S. history of food-borne illness caused by *Salmonella* erupted at the Marshall, Minnesota, facility. Seeger, et al. (2003) maintained the second stage of the crisis, identified earlier as the ‘crisis stage,’ encompasses the most stressful and uncertain period of crisis management; the period with the most significance of reducing or limiting harm. Seeger, et al. (2003) stated “a fundamental goal of crisis management is to try to reduce the uncertainty of potential harm for both the organization and the stakeholders” (p. 139).

The following scenario describes the incident and process by which Schwan’s effectively handled the uncertainty of sick customers and contaminated product as reported in Sellnow, Ulmer and Snider (1998) and Seeger, et al. (2003).

#### *Brief Overview*

Schwan’s Sales Enterprises (Schwan’s) ice cream was contaminated with the *Salmonella* bacteria creating salmonellosis, causing the sickness of 224,000 people; the largest food-borne illness outbreak attributed to one source in U.S. history. Once reports

manifested the link between Schwan's ice cream and public sickness, local, state, and federal health departments were onsite. Schwan's immediately opened the doors to the Marshall, Minnesota, facility for complete inspection.

Before the tests were complete, Schwan's announced full responsibility and began corrective action to alleviate the concerns of the customer stakeholders. Route sales drivers were in direct contact with customers and immediate tracking was available of all ice cream sales due to the individual contacts between the drivers and end customers. Schwan's also created a 24-hour "hotline" for customer concerns. Schwan's sent information packets to the customer via the drivers, providing information about salmonellosis and offering to pay for physician visits and the test, with final claims between 30,000 and 35,000 tests nationwide. Schwan's began settling out of court directly with customers, class action lawyers became involved and claims began settling for prices ranging from \$70.00 to \$70,000 dependent on the severity of the sickness.

After testing, the health departments discovered the outbreak was caused by an independent trucking company hired to transport the pasteurized ice cream mixture to the facility. Unbeknownst to Schwan's, the tanker carrying a daily pasteurized ice cream mixture had carried non-pasteurized raw eggs, a common source of *Salmonella*, in the same tanker without properly killing the bacteria before shipping the ice cream mixture.

*Schwan's Effective Crisis Management*

Sellnow, et al. (1998) stated "organizations that fail to accept or delay in accepting responsibility for crisis may exacerbate the difficulty in maintaining or regaining their social legitimacy" (p. 61). Seeger, et al. (2003) stated "how an

organization deals with a crisis plays an important role in how the crisis will be resolved and the overall trajectory of the crisis” (p. 139). The authors conclude:

The Schwan’s case illustrates how a crisis stage may be managed effectively. The outbreak of food-borne illness was a familiar threat, and the company was able to respond from a well established pattern of relationships and clear values. Most crisis stages are, however, characterized by denial, high levels of uncertainty, limited ability to make sense of the situation, conflict with stakeholders, and failure to act in harm-reducing ways (p. 139).

Sellnow, et al. (1998) maintained Schwan’s ability to reduce uncertainty of the crisis by taking effective corrective action and “despite the magnitude of the crisis and its national notoriety, Schwan’s was able to maintain its customer base and put the crisis to rest” (p. 62).

### **Sources of Information**

Sources of information have been studied for many years. Jederberg (2005) maintained the U.S. is now living in a post 9/11 society, an environment where it is crucial for information sources to have the ability to contextualize communications for effective audience understanding. Penrose (2000) and Covello (2003) suggested there is a value in clearly identifying the key audience stakeholders, especially before a crisis occurs. Understanding and responding to the audience provides information sources the best opportunity to serve those groups when emergency is needed (Wray, Kreuter, Jacobsen, Clements, & Evans, 2004).

Among the many suggestions of public health and crisis communication, Covello (2003) offered ideas about dealing with the communicating the risk to various audiences: a) Use a wide range of communication channels to engage and involve stakeholders, b) Emphasize communication channels that encourage listening, feedback, participation, and dialogue, c) Disclose risk information as soon as possible, fill information vacuums, d) Issue communications with or through trustworthy sources, and e) Respect the communication needs of special and diverse audiences (pp. 5-7).

Frewer and Miles (2003) maintained the hazard, as well as the perception of the level of threat the hazard poses can both influence the public's choice of information sources. This, according to Frewer and Miles, is an indicator for the need to investigate sources of information and source trust. An anonymous report in the periodical *Nutrition Reviews* (1996) reported unguided information allowed to be communicated to the public has the potential to be misleading and affect public confidence. The report qualified newspapers, magazines, newsletters, television shows, and talk radio as the unregulated media sources, compared to regulated sources such as governmental agencies.

Frewer and Miles (2003) maintained confusion and anxiety can breed distrust which in turn affects the public's reaction to risk communication. According to Penrose (2000), information sources should keep in mind the importance of timeliness and accuracy of the information. Inconsistency in the sources, as well as a weak preparedness level when providing information, can result in anxiety or confusion by the public (Wray, et al., 2004).

### *Preferred Information Sources*

Woodson (2005) maintained the reach of newspapers and radio is large and inexpensive. According to Denton (1996), the local Sunday newspaper is preferred by more than 74% of American adults as a primary source of information. Reina (1995) reported college graduates and retired, “old fashioned” people are large groups of readers preferring print media. By contrast, people under 30 rely more heavily on radio and TV compared to print sources. Whereas, Newport and Saad (1998) found sources such as local and national newspapers, identified as more traditional sources, had significantly lower levels of credibility.

“A 1993 survey by American Opinion Research showed 81% of Americans considered mass media their primary source for information on science, the environment, and natural resources” (as cited in Woodson, 2005, p. 3). Newport and Saad (1998) found in their study on source trust, that Americans show faith and reliability in traditional hard news sources. The use of “new” media for news and information showed lower accuracy and trust levels. Newport and Saad also found broadcast media to have higher levels of credibility than print media, with the highest trust level given to electronic news sources. Forty five percent of those surveyed reported a trust in the Internet as a source of information.

In a 2005 study about crisis and the use of the Internet as an information source, Taylor and Perry reported the Internet as an emerging source and tool for organizations or corporate communications departments when communicating with the public and media. However, Taylor and Perry (2005) maintained little is known about the Internet’s usage during a crisis. Pollard’s (2003) study showed the importance of local radio and

television and cable and network news as vital sources of information for events of bioterrorism. In the future, Taylor and Perry (2005) postulated the Internet presence will affect modern media information dissemination in such a way organizations not responding to a crisis online may be considered as “no comment.”

#### *Agriculture and Preferred Information Sources*

Riesenberg and Gor (1989) maintained the issue of the “communication gap” between the extension service personnel and the farmer has been the “stumbling block” of the “methods employed for the dissemination of agricultural information” (p.7). Farmers are reported to prefer the interpersonal style or method of receiving information when they have a choice between interpersonal and mass media (Riesenberg & Gor, 1989).

Past studies of farmers and agriculturalists show the preference of the two types of sources of information dissemination, interpersonal and mass media, as identified by Riesenberg and Gor (1989).

#### *Interpersonal*

In a study of part-time and full-time beef farmers, Obahayujie and Hillison (1988) found part-time beef farmers preferred methods using personalized visits or on-farm demonstrations. Riesenberg and Gor (1989) found agriculture producers preferring to receive information about new and innovative programs by interpersonal and interaction methods. Bruening (1991) reported Iowa farmers also preferred field demonstrations and county and local meetings as useful communication methods when learning about environmental issues. In a later study by Bruening, Radhakrishna, and Rollins (1992), the same preference was shown by Pennsylvania farmers for methods including

demonstrations, tours, or on-farm consults when seeking to learn information about the environment. The least favored methods were those with minimal interaction, for example home study or computer assisted instruction.

In a study surveying extension agents about their perceptions of appropriate methods for outreach, Ohio Cooperative Extension Agents reported a high level of preference for the interactive interpersonal methods and low levels of preference for the mass media based methods (Bouare & Bowen, 1990). Historically, the extension service has been and remains a primary source of information for rural areas (Martin & Omar, 1988; Richardson and Mustian, 1994; Buford, et al. 1995).

Although Woodson (2005) maintained newspaper, radio, and television are sources all county extension agents use, Boldt (1987) suggested county extension agents use varying media sources to disseminate information to diverse audiences. Carter and Batte (1994) suggested their findings indicate print media are most likely to be well received by farmers seeking information through educational materials.

### *Mass media*

Okai (1986) identified extension publications and radio and TV as two of the top four preferred information sources by small-scale Missouri farmers; however, vocational agricultural instructors and area extension specialists were ranked the lowest. A later study by Padgitt (1987) found the opposite when results showed university extension specialists and the Cooperative Extension Service to be considered the most reliable sources, while methods employing radio and television were considered the least reliable.

In the second half of the full-time/part-time farmer study, Obahayujie and Hillison (1988) maintained full-time farmers preferred mass media, such as newsletters



publications, bulletins, radio programs, and leaflets/pamphlets, to the interpersonal type of communication. Richardson (1989) and Richardson, Clement, and Mustian (1997) maintained traditional Extension audiences, such as beef producers, prefer newsletters, bulletins, personal visits, and field day or method demonstrations. Gamon, Bounaga and Miller (1992) and Carter and Batte (1994) agreed farmers show a preference for traditional delivery methods.

Nordstrom, Wilson, Kelsey, Maretzki and Pitts (2000) found focus groups to suggest and recommend mass media methods (TV, newspapers, and radio) as tools to disseminate agricultural education materials. Boone and Zenger (2001) also found homemaker focus to use mass media. The study also showed extension information as more accurate and reliable than mass media, but extension information was more difficult to obtain.

When looking at specific issues such as food safety, Whatley, Doerfert, Kistler, and Thompson (2005) reported there to be five primary sources of information: experiential or family, government agencies, professional associations, and media. Food safety information is about educating the consumer and Whatley, et al. (2005) suggested identifying consumer information source trust is the first step in any consumer education plan; however, Whatley, et al. (2005) suggested little information has been collected about food safety source trust. In a previous study, Frewer and Miles (2003) did identify medical sources as being a highly trusted source when communicating about food risks, while the government sources and many environmental pressure groups were trusted less and the food industry was trusted the least.

### **Theoretical Framework – Uncertainty Reduction Theory**

As people interact and attempt to effectively communicate, one problematic issue is inherent to all situations: communication style and diversity. No two people communicate, read and understand, or organize in the same manner. In the attempt to make sense of messages and their meanings, miscommunication can result. Bradac (2001) stated “there is a human drive to reduce uncertainty, to explain the world, and render it predictable” (p. 456).

During human interaction, internal questions begin to arise about personal expectancy, predictability, and congruence. There are high levels of uncertainty; people begin wondering about unknown likes/dislikes, beliefs, perceptions, and the way they are being perceived by the other person (Berger, 1973, 1979, 1987, 1988; Wood, 2000; Brashers, 2001). Unexpected answers or the absence of clarification to these questions lead to varying degrees of uncertainty.

Brashers (2001) maintained uncertainty is interpersonal; belief in one’s own ability or cognitive level of deriving meaning may cause perceptions of uncertainty, which will cause the individual to be uncertain. Brashers (2001) further maintained people may either attempt to reduce uncertainty when it’s found to be threatening or, at other times, they may feel some measure of hope or optimism with certain levels of uncertainty. Contextually, people use communication as a tool of reduction or even avoidance to manipulate uncertainty to suit their needs. Bradac (2001) stated “the attractive and good idea motivating this theory is that subjective uncertainty to some extent can explain and be explained by communication behavior” (pp. 470-471).

Communication interaction becomes a medium for the public to determine the level of their personal needs for uncertainty. Seeger, et al. (2003) stated “the public seeks information to determine whether the crisis will affect them, how they should think, and what they should do” (p. 71).

Uncertainty reduction theory is described in the context or assumption of two people meeting as strangers, where each person is primarily concerned with increasing the level of predictability, thereby reducing uncertainty, in the understanding of both persons during the interaction (Berger & Calabrese, 1975). The researchers maintained this context or assumption is “consistent with Heider’s (1958) notion that man seeks to “make sense” out of events he perceives in his environment” (Berger & Calabrese, 1975, p. 100).

Berger and Calabrese (1975) maintained uncertainty involves two components: first, recognizing the various ways a person might behave; and second, the process of explaining the other person’s behavior retroactively.

In the first issue, a person engages in the mental process of predicting behavior, only which can be effectively completed if uncertainty about that person is reduced enough for the prediction accuracy - prior to the interaction (Berger & Calabrese, 1975). Once uncertainty is reduced to the extent of determining plausible predictions of behavior of one interactant, the other interactant must then choose appropriate responses, from those available as alternatives, to the expected or predicted action or behavior (Berger & Calabrese, 1975).

The second issue involves deriving meaning and understanding from one interactant’s communication act retroactively to form reasonable explanations of

behavior (Berger & Calabrese, 1975). For any reasonable explanation or attribution to be chosen, the observer must engage in the problematic process of narrowing the choice from any number of plausible explanations or attributions for a particular communication act (Berger & Calabrese, 1975).

Berger and Calabrese (1975) maintained this vein of thought follows Hieder's (1958) early work on seminal attribution, as well as the later work on attribution formulation by Kelley (1967); Jones, et al. (1972); and Kelley (1973) who stated in our personal desires of predicting our own behavior and those around us, we casually create structures to explain our own behavior and the behavior of those around us.

It is important to ground this endeavor of communication behavior prediction and explanation through Berger and Calabrese's (1975) assertion "attribution theorists have been quick to point out that such predictions and explanations generally yield imperfect knowledge of us and others. However, it is significant that such imperfect knowledge does guide our total behavior toward others" (p. 101).

Based upon earlier research, Berger and Calabrese (1975) offered seven axioms of uncertainty reduction. Table 1 lists the category, the axiom, main points of findings and the references.

Uncertainty reduction is generally applied to interpersonal communication relationships. Theorists use this explanation as a method to explain the communication interaction between individuals, groups of people, and organizations. Boyle, et al. (2004) agreed the theory's basic logic is applicable to mass communication research.

"Mass communication can potentially serve as a source of uncertainty as well as a mechanism for information seeking... we expect that uncertainty arising from mass

communication could lead to information seeking in a mass communication context” (Boyle, et al. 2004, p.157).

Berger and Calabrese (1975) maintained uncertainty “is the cognitive inability to predict and/or explain our own and other people’s attitudes, feelings, values, and behavior” (p.21). Gudykunst, Ting-Toomey, Sudweeks & Stewart, (1999) described a person’s ability to speculate as to the outcome of a situation as prediction, and explanation as “stating why something occurred” (p. 21).

This theory can also apply to larger events, such as an agroterrorism incident when viewed from the perception of the individual experiencing the crisis and the communication interactions with media and organizations. Boyle, et al. (2004) maintained through events covered through the media, such as a crisis, “individuals often rely on news coverage to learn more about the tragedy” (p. 155); and a “desire to reduce the discomfort of uncertainty was a key factor explaining efforts to learn and media use in the aftermath of September 11” (p. 156). Gudykunst, et al. (1995) maintained this anxiety “is an affective response involving the feeling of being uneasy, tense, worried, or apprehensive about what might happen” (p. 21). Stephan and Stephan (1985) further stated “...this anxiety stems from the anticipation of negative consequences,” (p.159).

Therefore, to reduce uncertainty during a crisis, effective communication for individuals experiencing the crisis should be provided enough information to increase understanding, thereby reducing uncertainty. Gudykunst, et al. (1995), maintained “if our uncertainty is above our maximum thresholds, we do not think we have enough information to predict or explain other people’s behaviors; when uncertainty is above our

Table 1

*The Seven Axioms of Berger and Calabrese's Uncertainty Reduction Theory (Berger & Calabrese, 1975)*

Category	Axiom	Grounding Studies
Entry Phase Onset	1. Given the high level of uncertainty present at the onset of the entry phase, as the amount of verbal communication between strangers increases, the level of uncertainty for each interactant in the relationship will decrease. As uncertainty is further reduced, the amount of verbal communication will increase.	Kelley (1955); Homans (1961); Adams (1965); and Altman & Taylor (1973)
Nonverbal Affiliative Expressiveness and Uncertainty	2. As nonverbal affiliative expressiveness increases, uncertainty levels will decrease in an initial interaction situation. In addition, decreases in uncertainty level will cause increases in nonverbal affiliative expressiveness.	Mehrabian (1971a, 1971b); and Mehrabian & Ksionzky (1971)
Uncertainty and Information Seeking	3. High levels of uncertainty cause increases in information seeking behavior. As uncertainty levels decline, information seeking behavior decreases	Frankfurt (1965)
Uncertainty and Intimacy Level of Communication Content	4. High levels of uncertainty in a relationship cause decreases in the intimacy level of communication content. Low levels of uncertainty produce high levels of intimacy	Goffman (1959); Taylor & Altman (1966); Taylor, Altman & Sorrentino (1969); Ehrlich & Graeven (1971); Cozby (1972); Jones & Goethals (1972); Altman & Taylor (1973); Berger (1973); Cozby (1973); Serfat & Smyth (1973); and Taylor, Altman & Wheeler (1973);
Uncertainty and Reciprocity Rate	5. High levels of uncertainty produce high rates of reciprocity. Low levels of uncertainty produce low reciprocity rates.	Goffman (1959); Gouldner (1960); Matarazzo, Wiens & Saslow (1965); and Worthy, Gary & Kahn (1969)
Similarity and Uncertainty	6. Similarity between persons reduces uncertainty, while dissimilarities produce increases in uncertainty.	Newcomb (1953,1961); Kelly (1955); Heider (1958); Homans (1961); Berscheid & Walster (1969); Byrne (1971); Koenig (1971); and Duck (1973)
Understanding and Liking	7. Increases in uncertainty level produce decreases in liking; decreases in uncertainty level produce increase in liking.	Festinger (1954); Schachter (1959); and Berkowitz (1969)

maximum thresholds, we do not have confidence in our predictions and explanations of other people's behaviors" (p. 105). Gajdushek (2003) maintained "the minimization of uncertainty maximizes predictability and calculability of actions, procedures, and outputs" (p. 715).

Effective communication between the public and media or an organization should contain enough information for the public to predict or derive possible plans of action to ensure personal safety, as well as the safety of their families and livestock in times of an agriculturally related crisis. Seeger, et al. (2003) maintained "uncertainty reduction enables organizations to diminish ambiguity, build consensual meaning, and coordinate efforts" (p.71).

#### *Criticisms of Uncertainty Reduction Theory*

The debate about this theory has been ongoing since its publication in 1975. Berger and Calabrese (1975) went on to maintain 21 theorems were a result of the seven axioms. Wood (2000) surmises the theory "has been criticized for being extremely narrow in focusing only on uncertainty, which is surely not the only influence in how relationships or intercultural communication develop" (p. 196).

Sunnafrank (1986), Wood (1993), Duck (1994) and Wood (1995) agreed in new relationships there are far more pressing influences than uncertainty, and to claim uncertainty as the primary issue is faulty (Sunnafrank, 1986). In response, Berger (1991) and Berger and Gudykunst (1991) maintained the body of research supports the notion the theory is progressing rather than a fully developed theory. Berger (1991) also maintained future study should be completed for the refinement and modification of the theory rather than a complete dismissal of its principles.

### *The Ongoing Role of Uncertainty Reduction Theory*

Goldsmith (2001) maintained despite this questioning, the theory has withstood the test of time with continual interest, producing “a steady stream of literature examining the experience of uncertainty, the ways in which individuals respond to uncertainty, and the outcomes associated with uncertainty” (p. 514).

Boyle, et al. (2004) state “despite these limitations, the core logic of uncertainty reduction theory remains strong: Individuals in uncertain situations are likely to feel discomfort, and information seeking is a viable solution to that discomfort in many contexts” (p. 157). Bradac (2001) stated “uncertainty reduction theory is clearly formulated, precisely demarcated, highly logical, and easily testable” (p. 470).

Berger and Calabrese’s axioms and theorems have been tested empirically (Sunnafrank, 1990), fostered a foundation for theory construction (Bradac, Bowers, & Courtright, 1980; Sunnafrank, 1986; Gudykunst, 1995; and Neuliep & Grohskopf, 2000), and supported an “accumulation of a substantial body of research” (Neuliep & Grohskopf, 2000, p. 67) as a “result of its longevity” (Bradac, 2001, p. 457). Goldsmith (2001) maintained “clearly, one of the greatest contributions of uncertainty reduction theory has been its heuristic value in directing our attention to the role of uncertainty in various communication situations and to practical concerns with how individuals manage uncertainty in problematic situations” (p. 514).

Goldsmith (2001) goes on to report the interest in uncertainty reduction theory expanded past its original parameters to include research in organizations, health care, and studies of intercultural interactions to uncertainty. Knobloch and Solomon (2002) maintained “the legacy of uncertainty reduction theory has implicitly guided assumptions



about the focus of uncertainty, the function of uncertainty reduction, and the nature of information seeking” (p. 244).

### **Chapter Summary**

The threat of agroterrorism is real (Sequeira, 1999). Terrorists have the capability of disrupting the food supply or causing devastating effects to the animal production industry. These situations have the possibility of creating public chaos as individuals seek to preserve the livelihood and safety of their family and farms. Terrorists may use plant diseases to disrupt crop production through destruction or simply affecting the outcome of harvest yields, causing food shortages. Animals are susceptible to diseases that may cause death or disrupt reproduction capabilities, again, causing food shortages.

Brown (1999) maintained increasing awareness is our only defense to such events. Proper planning through effective crisis management has the capability of reducing individual stress or public chaos by providing a guide that can be followed or replicated by any person or group. By having plans in place, the pre-crisis (Prodromal or Preparedness) stage can be managed more effectively before the crisis reaches the Acute stage of crisis management. “Given the potential for devastating exotic species invasions, it behooves federal agencies to prepare information superstructures and train rapid-response cadres to become the first line of defense in case of biological terrorism (Sequeira, 1999, p. 49).

The theoretical framework guiding this study was based on Berger and Calabrese’s (1975) research of uncertainty reduction. The more effective communication taking place between individuals or groups, the greater the possibility of reducing uncertainty through the relief of stress and anxiety. This study examined previous

research on preferred and trusted sources of information in the agricultural industry.

Specifically, this study is aimed at assessing Oklahoma beef producers' information sources and sources trust during an agriculturally related crisis for future crisis planning.

## **CHAPTER III**

### **METHODOLOGY**

This study is an assessment of the perceived information sources during an agriculturally related crisis. Chapter I addressed the importance of identifying information sources and their perceived value to beef producers prior to a crisis event. The primary purpose of this study was to determine the perception of the level of risk of Oklahoma beef producers concerning an agriculturally related crisis, such as an agroterrorism event, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculturally related issues. Specifically this study addressed the following research questions:

1. What are Oklahoma beef producers' perceptions of the susceptibility of the beef industry in Oklahoma experiencing an agroterrorism event?
2. What are the sources of information Oklahoma beef producers use when seeking information about an animal health issue?
3. What are Oklahoma beef producers' level of trust in the information sources used?
4. How did Oklahoma beef producers' perceptions toward the susceptibility of the Oklahoma beef industry to agroterrorism differ based upon the demographic variables of age, farm size, and education level?

5. How did Oklahoma beef producers' perceptions toward information source trust and reliability differ based upon the demographics of age, farm size, education level, and access to a computer with internet access?

A review of current and relevant literature was conducted in Chapter II.

Underlying theory provides the contextual base through which this study is to be viewed. Berger & Calabrese's (1975) Theory of Uncertainty Reduction was used to frame the research. In moments of crises, the public seeks to make informed decisions that will in turn affect their business livelihood, or in the case of this study, personal and livestock safety. The absence of timely and trusted information may result in public chaos rather than ordered preparedness. Feelings of uncertainty due to poor or ineffective communication and the absence of effective decision-making can create poor planning or preparation and may hinder effective crisis resolution or mitigation.

The purpose of this chapter is to describe the methods and procedures used in research design, data collection and analysis for this study. A description of the population, survey instrumentation, data collection and analysis procedures are contained within this chapter.

### **Institutional Review Board**

Federal regulations and Oklahoma State University (OSU) policy require approval of all research studies that involve human subjects before investigators can begin their research. The Oklahoma State University Office of University Research Services and the Institutional Review Board (IRB) conducts this review to protect the rights and the welfare of human subjects involved in biomedical and behavioral research. In compliance with the aforementioned policy, the OSU IRB reviewed the evaluation

proposal. The study was approved and the researcher was granted permission to collect data from human subjects. The IRB application number was AG061. A copy of the IRB approval form can be found in Appendix A.

### **Research Design**

This study was a statewide descriptive study of beef producers in Oklahoma using a telephone survey. For this study a beef producer was operationally defined as any individual owning at least one animal of any beef cattle breed.

Best (1970) stated:

Descriptive research describes and interprets what is. It is concerned with conditions or relationships that exist; practices that prevail; beliefs, points of view, or attitudes or relationships that are held; processes that are going on, effects that are being felt; or trends that are developing. The process of descriptive research goes beyond the mere gathering and tabulation of data. It involves an element of analysis and interpretation of the meaning of significance of what is described (p.116).

Descriptive research was chosen as the research method since the study dealt with perceptions of beef producers and their preferred sources of information used when seeking to learn more about animal health issues in the context of an agriculturally related crisis.

## **Population and Sample**

The target population of this study was all beef producers in Oklahoma. The population, according to the USDA Oklahoma Agricultural Statistics Service, was approximately 48,000 beef producers. The list frame of beef producers in Oklahoma was updated each year through property assessment records. The number was fluid and approximated due to the fluctuation of citizens investing in the ownership of cattle or selling off their cattle and getting out of the beef industry. A random sample of 2,000 names from the target population was selected using a computerized random selection process.

For this study, using the aforementioned survey population, Krejcie and Morgan (1970) suggest a minimum of 381 respondents for a 95 percent confidence level and a sampling error of +/- 5 percent.

## **Accuracy**

Dillman (1994) defines accuracy as the “results that are close to the true population” (p.13). Dillman noted surveys only provide an estimation of the population, but can “yield accurate results when researchers succeed in avoiding four kinds of error: coverage error, sampling error, measurement error, and nonresponse error” (p.13). The four types of error are discussed in this section.

Coverage Error – was defined by Dillman (1994) as the type of error occurring “when the list – or frame – from which a sample is drawn does not include all elements of the population that researchers wish to study” (p.16). To avoid duplication, respondents completed only one survey. The researcher received four emails declining participation

after the pre-survey letter was mailed and 50 returned letters denoting incorrect addressing for a total of 54 (2.7%) unusable responses of the frame.

Sampling Error – was defined by Dillman (1994) as “when researchers survey only a subset or sample of all people in the population instead of conducting a census” (p.17). Dillman (1994) suggests the control for this type of error is simply increasing the sample size. The researcher asked the OASS to select a random sample of 2,000 for calls. The data collection ended with 470 usable responses out of 678 beef producers who were contacted.

Measurement Error – was defined by Dillman (1994) as the “error that occurs when a respondents’ answer to a given question is inaccurate, imprecise, or cannot be compared in any useful way to other respondent’s answers” (p.17). To guard against this type of error, the questionnaire was provided to different members of the OSU faculty and the director of the OASS to read and correct the instrument for wording problems. All suggestions were taken and assessed and then applied to the instrument when deemed necessary. For example, suggestions made by members of the board of directors of the Oklahoma Cattlemen’s Association and the Director of the OASS were used for the wording of the question regarding number of cattle owned. OSU faculty suggested a simple question asking the exact number of cattle owned by each respondent. The OCA board of directors felt such a direct question was inappropriate since beef producers have fluid herd counts. The director of the OASS suggested the final wording for this question used in the survey (Appendix C).

The telephone interviewers employed by the OASS were provided with a training session before attempting to call any respondents. Interviewers were allowed to practice

calling and reading the instrument aloud to prepare for the actual data collection activities. Dillman (1994) maintained researchers should properly train interviewers on the instrument prior to data collection and pay particular attention to unambiguous word choices to guard against measurement error.

Nonresponse Error – was defined by Dillman (1994) as the error occurring “when a significant number of people in the survey sample do not respond to the questionnaire *and* are different from those who do in a way that is important to the study” (p. 20).

Lindner, Murphy, and Briers (2001) maintain “that late respondents be defined operationally as those who respond in the last wave of respondents in successive follow-ups to a questionnaire, that is, in response to the last stimulus” (p. 52). This type of wave is appropriate during a mail survey when potential respondents are given a succession of opportunities to answer the questionnaire.

In this study, the majority of responses (71.91%) for the telephone survey were collected during the days of July 14 – 16, 2005. The remainder of the responses were collected in two different sessions, July 27 – 29, 2005 and August 8 – 13, 2005. The total data collection period ran twelve days. There were no successive waves of mail to entice the responders to respond. Lindner, Murphy and Briers (2001) maintain “if respondents cannot be categorized by waves, we recommend that the late respondents be defined operationally and arbitrarily as the later 50% of the respondents” (p. 52).

Lindner, Murphy, and Briers (2001) also maintain the result may be generalized back to the target population if no differences are found between the early respondents (first 50%) and the late respondents (last 50%). For this study, the researcher operationalized the early respondents as the 338 responses collected during the first three



days of the collection periods. The remainder of the responses (132) were classified as late respondents.

Grand means were calculated for all the Likert type questions in the survey (see Appendix C). A grand mean comparison using a *t-test* was conducted at a 95% confidence interval with 468 degrees of freedom. The calculated *t-test* value for the grand means of 1.58, being lower than the critical *t* value of 1.96, showed no significant difference between early and late respondents (Table 2).

Table 2

*Early vs. Late Respondents t-Table*

Group	<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>
Early	338	3.159	0.424	1.58	.116
Late	132	3.091	0.419		

df = 468; *p* < 0.05

### **Instrumentation**

The questionnaire was divided into three parts, each part coinciding with the three objectives of the study: risk perception, information sources, and source trust. Questions 1-4 ascertained attitudinal perceptions of risk using categorical questions, and question number five was a five-point Likert-type question assessing level of threat using the Department of Homeland Security's threat levels: 1 = Low, 2 = Guarded, 3 = Elevated, 4 = High, and 5 = Severe.

Questions six, eight, and nine assessed the respondent's perceptions about sources of information they would choose first when given a choice and the medium in which they would like information presented to them. These questions were categorical type questions.

Questions seven and ten obtained the respondent's level of reliability and trust in specific sources of information using Likert-type questions. The scale used for both questions were as follows:

Reliable: 1 = Not Reliable, 2 = Slightly Reliable, 3 = Neutral, 4 =  
Reliable, 5 = Very Reliable

Trust: 1 = Not Trustworthy, 2 = Slightly Trustworthy, 3 = Neutral, 4 =  
Trustworthy, 5 = Very Trustworthy

The remainder of the survey instrument, questions 11 through 17, was used to collect demographic information about the beef producers. Questions in this area were closed-ended or partially closed-ended.

### **Validity**

A panel of experts (Appendix D) reviewed the instrument for content and face validity as suggested by Tuckman (1978). The panel included eight faculty members and two instructors in the Department of Agricultural Education, Communications and 4-H Youth Development and one faculty member in the Department of Sociology at Oklahoma State University. The panel also included the director of the Oklahoma Beef Industry Council, the Board of Directors of the Oklahoma Cattleman's Association; the Director of the Oklahoma Agricultural Statistics Service; and the state veterinarian. The panel found the questionnaire to be valid for this survey, and any revisions of the instrument were made based upon the recommendations of the panel. Most recommendations pertained to grammar and style of the wording choices for each question. The Oklahoma Cattleman's Association assisted with a more detailed list of sources beef producers use in Oklahoma.

## **Reliability**

Due to the OASS timetable and work schedule, this telephone survey was worked into an existing schedule. Because of scheduling issues with the OASS, no provision was made for the researcher to pilot test the survey instrument with a sample of beef producers to check reliability before launching the full data collection.

Reliability, therefore, was analyzed post-hoc. Since the data set was provided to the researcher in chronological order of survey completion, reliability was calculated as if the instrument was tested prior to execution. The researcher assessed the reliability of the entire 470 cases and received a reliability alpha of .84, resulting in a reliable instrument.

## **Data Collection**

Data collection was conducted by the Oklahoma Agricultural Statistics Service, a state division of the National Agricultural Statistics Service, a department of the United States Department of Agriculture. The data were collected via telephone for 12 days during the month of July 2005.

An initial letter was mailed to 2,000 beef producers randomly selected from the OASS list of approximately 48,000 beef producers in Oklahoma. The letter invited each producer to complete the telephone survey (Appendix B). Four e-mails were received requesting they not be called, and 50 letters were returned by the postal service indicating incorrect addressing, totaling 54 (2.7%) potential respondents requiring removal from the list frame.

Interviewers at the OASS used an in-house Computer Assisted Telephone Interview (CATI) system to aid in the data collection procedures. The population frame was entered into the computer system, and the system then randomly selected numbers to

be called by the interviewers. The computer provided the interviewer with the potential respondent's name and phone number. Calling procedures and parameters were defined by the length of time spent collecting data. Early in the collection process, each number was allowed to be called five times per day, if no busy signal or answering machine was the outcome of the call. If a busy signal or answering machine was the result, that specific number was given a one day break before another attempt to reach the potential respondent. Late in the collection procedure, the calling protocol was reset to only two attempts per day for each number called.

All answers were entered directly into the computer system and collected each day at the end of business into an overall database. The database was reviewed at the end of each day to update the OASS population frame of beef producers. Once data collection ended, the database was saved into an Excel spreadsheet document and provided to the researcher.

### **Data Analysis**

Data were analyzed using Microsoft Excel Statistical Tool Pack, Office 2003 version; and the Statistical Package for Social Science (SPSS), Windows version 12.01. Frequencies, percentages, means, modes, standard deviations and cross tabulations were used to analyze and interpret the data.

### **Chapter Summary**

The methods and procedures for data collection to address the research objectives were discussed in this chapter. Specifically, the chapter focused on the research design, description of the population, sampling procedures, survey accuracy, and instrumentation. Additionally, the chapter discussed the measures taken to ensure

reliability and validity of the instrument. Finally, the chapter outlined the data collection and analysis procedures.

This research study used a telephone survey to collect data. The population under study was identified as all producers of beef cattle in Oklahoma. A random sample of the target population was identified using the table created by Krejcie and Morgan (1970).

Data were collected using a survey designed by the researcher. To minimize measurement error, the construction of the questionnaire was completed under the guidance of a panel of experts in both the academic and beef cattle production fields. Data were collected by the OASS in Oklahoma City, Oklahoma, using in house computer-aided telephone interviewing procedures. Data collection error was controlled by conducting a formal interviewer training session to familiarize the interviewers with the instrument. The OASS used seasoned interviewers to ensure ease of use with the computer system. A comparison of early and late responders was examined to control for nonresponse error based on guidelines set forth by Lindner, Murphy, and Briers (2001). No significant difference between early and late responders was shown to exist. Data were analyzed and interpreted using frequencies, percentages, means, modes, standard deviations, and cross tabulations.

## **CHAPTER IV**

### **FINDINGS**

Chapter I addressed the importance of identifying information sources and their perceived value to beef producers prior to a crisis event. The primary purpose of this study was to determine the perception of the level of risk of Oklahoma beef producers concerning an agriculturally related crisis, such as an agroterrorism event, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculturally related issues.

Chapter II provided the conceptual and theoretical framework for research on agroterrorism and crisis. Specifically, the underlying theory of uncertainty reduction provided the contextual base for this study. In moments of crises, the public seeks to make informed decisions that will in turn affect the livelihood of business, or in the case of this study, personal and livestock safety.

Chapter III described the methods and procedures for data collection to address the research objectives. Specifically, the chapter focused on the research design, description of the population, sampling procedures, survey accuracy, reliability, validity, instrumentation, data collection procedures, and data analyses.

This chapter focuses on the findings obtained from this study. The results address the specific questions regarding beef producers' perceptions about potential risk and preferred and trusted information sources.

### **Response Rate**

The data collection period was during the week of July 14 – 16, 2005, July 27 – 29, 2005, and August 8 – 13, 2005, for a total of twelve days. A random sample ( $n = 2,000$ ) was drawn from the overall target population of beef producers in Oklahoma ( $N = 48,000$ ). Of the sample population, 678 completed calls were made providing the researcher with 470 usable responses.

### **Findings related to Demographics of Oklahoma Beef Producers**

The typical Oklahoma beef producer was male (69.72%) and had at least some high school education (59.80%). The average age of the typical beef producer was 59.5, with a range from 24 to 90 years of age; and the producer owns a computer with access to the internet (62.3%).

Beef producers are primarily employed within the beef industry (57.90%) owning a cow – calf operation (87.45%), with one to 49 head of cattle (35.12%). Other operation sizes included 31.06% of respondents owning from 100 to 499 head, 23.83% of respondents owning 50 to 99 head, 5.96% owning 500 to 999 head, and 2.13% owning 1,000 or more head of cattle.

### **Findings related to Beef Producers' Perceived Risk**

Research question one sought to determine beef producers' perceived level of susceptible risk regarding the Oklahoma beef industry. Survey questions one through five were designed to answer this research question.

Question one asked respondents to rate their level of agreement with a statement regarding Oklahoma's susceptibility to an agroterrorism event using a five-point Likert-type scale (1 = Disagree, 2 = Somewhat Disagree, 3 = Neither Agree nor Disagree, 4 = Somewhat Agree, 5 = Agree). When asked to describe their level of agreement with the statement: "The Oklahoma cattle industry is susceptible to an agroterrorism event," Oklahoma beef producers were equal in their reported level of agreement with the attitudinal statement: somewhat agree, 31.5%; agree 31.5%; neither agree nor disagree, 16.6%; somewhat disagree, 8.1%; and disagree, 12.3%; as shown in (Table 3).

Table 3

*Beef Producers' Perceptions on Beef Industry Susceptibility to Agroterrorism*

	Agreement Percentage	<u>M</u>	<u>SD</u>
Disagree	12.3	3.62	1.33
Somewhat Disagree	8.1		
Neither Agree/Disagree	16.6		
Somewhat Agree	<b>31.5</b>		
Agree	<b>31.5</b>		

Note: Classification based on the scale: M = 4.20 or higher = Agree; 3.40 – 4.19 = Somewhat agree; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Somewhat Disagree; and 1 – 1.79 = Disagree

After examining this question through cross-tabulation by age, farm size, and education level, the data revealed no trend based on this demographic analysis within each group when answering a question regarding beef producers' level of agreement in the possible susceptibility of Oklahoma beef to agroterrorism. The mean scores for each age decade showed no change in the trend of the means, and all scores remained in the "somewhat agree" range (Table 4): 20s M = 3.60, 30s M = 3.62, 40s M = 3.50, 50s M = 3.67, 60s M = 3.64, 70s M = 3.61, 80s M = 3.57, and 90s M = 4.00. This trend was



prevalent when looking at the age decade and removing the group with only one respondent, the 90s.

When analyzing the same question as compared to farm size and its affect on perceptions relating to each beef producers' agreement level of beef industry susceptibility, the trend remained in the "somewhat agree" range until it reached beef producers with 1,000 head of cattle or greater and dropped to the "neutral" range: 1-49 head  $\underline{M} = 3.54$ , 50-99 head  $\underline{M} = 3.55$ , 100-499 head  $\underline{M} = 3.79$ , 500-999 head  $\underline{M} = 3.82$ , and 1,000 or more head of cattle  $\underline{M} = 2.80$ .

Finally, when assessing the beef producers' level of agreement in the beef industry's susceptibility to agroterrorism, educational level was constant: no formal education ( $\underline{M} = 3.70$ ); high school ( $\underline{M} = 3.54$ ); associate's degree ( $\underline{M} = 3.66$ ); bachelor's degree ( $\underline{M} = 3.71$ ); master's ( $\underline{M} = 3.51$ ); education specialist ( $\underline{M} = 4.00$ ); professional degree ( $\underline{M} = 5.00$ ); and doctorate degree ( $\underline{M} = 3.80$ ) (Table 4).

Question two asked respondents to rate their perception of the level of threat with multiple types of beef cattle operations using a five-point Likert-type scale (1 = Low, 2 = Guarded, 3 = Elevated, 4 = High, 5 = Severe). The scale used the threat levels identified by the Department of Homeland Security. Oklahoma beef producers reported "Ranches" to have a "Low" threat level ( $\underline{M} = 1.78$ ); "Livestock Exhibitions" were reported to have a "Low to Guarded" threat level ( $\underline{M} = 2.51$ ); "Local Marketing Facilities" were reported to have a "Low to Guarded" threat level ( $\underline{M} = 2.11$ ); "Regional Marketing Facilities" were reported to have a "Low to Guarded" threat level ( $\underline{M} = 2.57$ ); "Background Operations" were reported to have a "Low to Guarded" threat level ( $\underline{M} = 2.29$ ); "Stocker Operations"

were reported to have a “Low to Guarded” threat level ( $\underline{M}$  = 2.22); and “Feedlots” were reported to have an “Elevated” threat level ( $\underline{M}$  = 3.17) (Table 5).

Table 4

*Beef Producers' Perception of Susceptibility Cross-Tabulated by Age, Farm Size, and Education Level*

Age Decade	Susceptibility	
	$\underline{M}$	(n)
20s	3.60	5
30s	3.62	29
40s	3.50	66
50s	3.67	97
60s	3.64	135
70s	3.61	107
80s	3.57	23
90s	4.00	1
Farm Size		
1 to 49 Head	3.54	158
50 to 99 Head	3.55	112
100 to 499 Head	3.79	146
500 to 999 Head	3.82	20
1000 + Head	2.80	10
Education Level		
No Formal education	3.70	57
High School	3.54	224
Associate's	3.66	77
Bachelor's	3.71	62
Master's	3.51	35
Education Specialist	4.00	1
Professional	5.00	1
Doctorate	3.80	5

Note: Classification based on the scale:  $\underline{M}$  = 4.20 or higher = Agree; 3.40 – 4.19 = Somewhat agree; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Somewhat Disagree; and 1 – 1.79 = Disagree

Question three asked respondents to state whether they felt their own operation was susceptible to an agroterrorism event. Of the respondents, 62.8% disagreed with the possibility; 26.8% agreed; and 10.4% answered “don’t know” to the question (Figure 2).

Question four asked respondents to answer “Yes” or “No” to: “Do you believe you have enough information about protection if a terrorist act was directed to the beef industry in Oklahoma?” Of the respondents, 58.7% said “No;” 27.2% said “yes;” and 14.0% answered “Don’t Know” to the question (Figure 3).

Question five sought to determine the perceptions of beef producers regarding bio-security measures. When asked “How confident are you in your own bio-security measures,” 60.2% were confident in their bio-security measures; of those 38.7% were confident and 21.5% were very confident. By contrast, 20% were neutral in their response, 10.4% were slightly confident, and 9.4% were not confident ( $\underline{M} = 3.53$ ) (Table 6).

Examining this question further by age, farm size, and education level, the data revealed no trend based on the demographics within each group when answering a question regarding beef producers’ level of confidence in their own bio-security measures.

The mean scores for each age decade showed a slight increase in the trend of the means, but all scores remained in the neutral range (Table 7): 20s  $\underline{M} = 3.00$ , 30s  $\underline{M} = 3.21$ , 40s  $\underline{M} = 3.58$ , 50s  $\underline{M} = 3.62$ , 60s  $\underline{M} = 3.42$ , 70s  $\underline{M} = 3.68$ , 80s  $\underline{M} = 3.48$ , and 90s  $\underline{M} = 3.00$ .

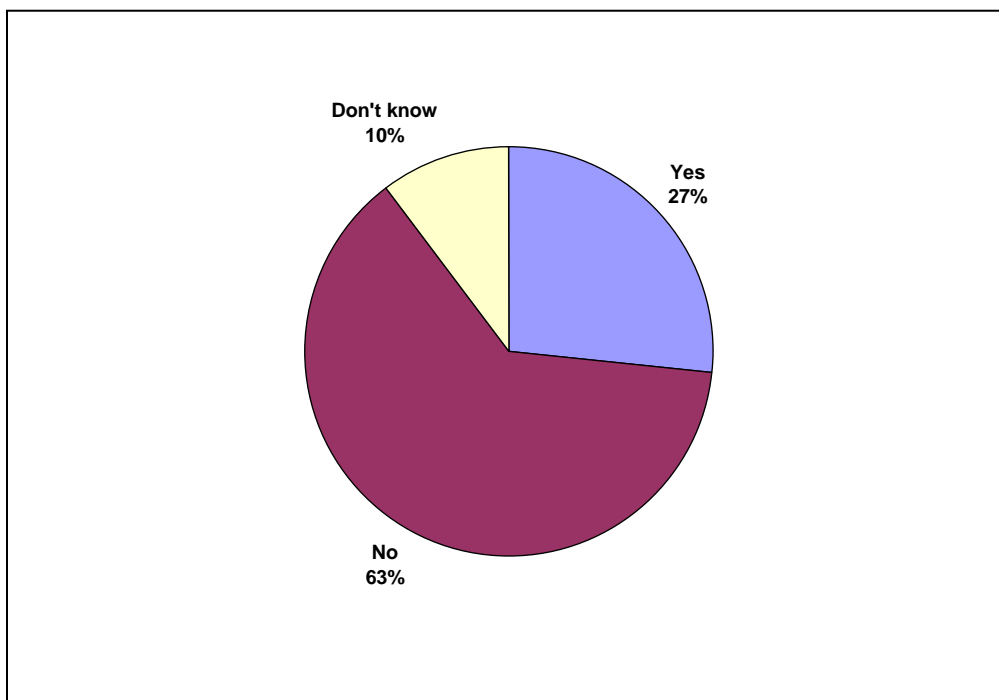
When analyzing the same question as compared to farm size and its effect on perceptions relating to each beef producers’ own confidence level of bio-security, the

Table 5

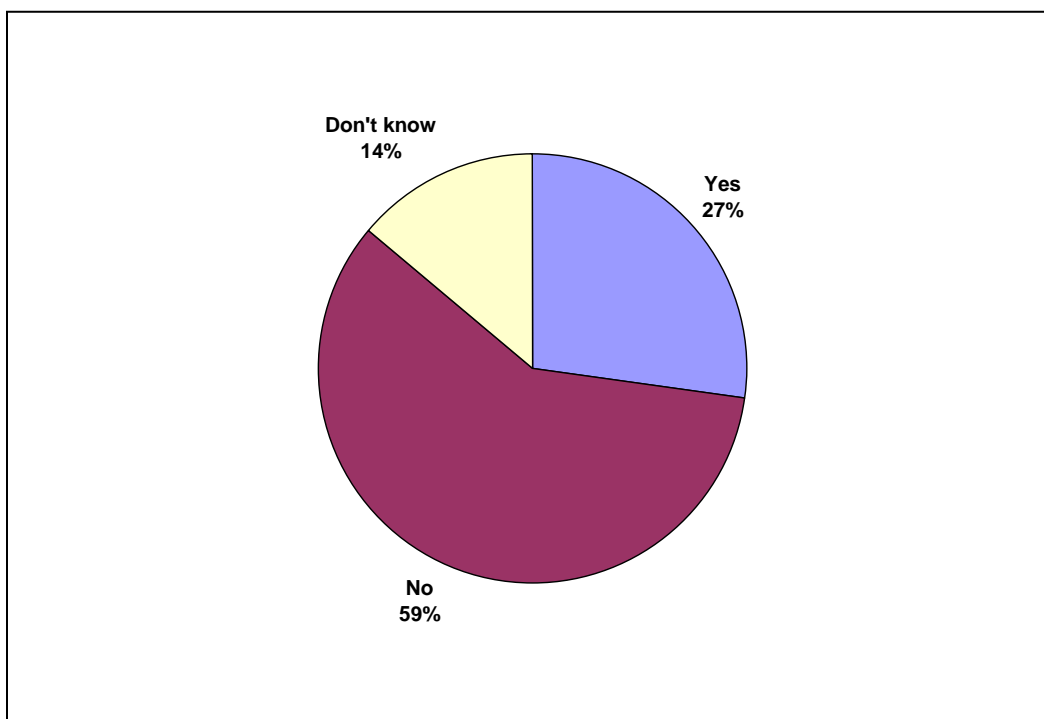
*Beef Producers' Perceptions Regarding Level of Threat to Multiple Operation Types*

Operation Type	Threat Level Percent					<u>M</u>	<u>SD</u>
	Low	Guarded	Elevated	High	Severe		
Ranches	<b>52.60</b>	26.80	12.80	4.90	2.60	1.78	1.02
Livestock Exhibitions	<b>37.20</b>	31.50	16.40	12.80	1.70	2.51	6.41
Local Marketing						2.11	1.12
Facility	<b>38.70</b>	28.30	18.70	11.70	2.60		
Reg. Marketing						2.57	4.59
Facility	26.60	<b>31.30</b>	24.70	13.80	3.40		
Background Operation	<b>48.10</b>	26.40	16.80	6.40	1.90	2.29	6.41
Stocker Operations	<b>41.30</b>	30.40	17.20	7.40	3.40	2.22	4.60
Feedlots	18.50	23.00	<b>30.40</b>	19.40	8.30	3.17	6.38

Note: Classification based on the scale: M = 4.20 or higher = Severe; 3.40 – 4.19 = High; 2.60 – 3.39 = Elevated; 1.80 – 2.59 = Guarded; and 1 – 1.79 = Low



*Figure 4. Beef Producers' Perceptions Regarding Susceptibility of Own Operation to Agroterrorism*



*Figure 5. Beef Producers' Perceptions Regarding Protection Information from Agroterrorism*

Table 6

*Level of Confidence in Own Bio-Security Measures*

Confidence Level	Percent	<u>M</u>	<u>SD</u>
Not Confident	9.40	3.53	1.21
Slightly Confident	10.40		
Neutral	20.00		
Confident	<b>38.70</b>		
Very Confident	21.50		

Note: Classification based on the scale: M = 4.20 or higher = Very Confident; 3.40 – 4.19 = Confident; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Confident; and 1 – 1.79 = Not Confident

trend remained somewhat constant until it reached beef producers with 1,000 head of cattle or greater: 1-49 head M = 3.63, 50-99 head M = 3.48, 100-499 head M = 3.44, 500-999 head M = 3.57, and 1,000 or more head of cattle M = 2.80.

Finally, when assessing the beef producers' bio-security level of confidence, educational level was inversely related with perceptions of confidence level. The level of confidence generally decreased as the educational level of beef producers increased: no formal education M = 3.75, high school M = 3.62, associate's degree M = 3.35, bachelor's degree M = 3.39, master's M = 3.37, education specialist M = 1.00, professional degree M = 4.00, and doctorate degree M = 3.00. This trend was prevalent in all groups except the two groups with only one respondent, education specialist and professional.

### **Findings Related to Preferred Information Sources**

During the survey, respondents were asked three questions regarding preferred information sources. Two questions gave the respondents a choice of "Yes" or "No" to a list of information sources and an opportunity to give an open-ended response for additional sources (Table 8). When asked "When you seek information about animal

health issues, where do you first look,” respondents indicated “Veterinarian” 34.9% of the time; “Other” and “Internet” were 12.55% and 11.70%, respectively. Responses to the “Other” category provided additional sources as being “County Extension Agent,” “OSU,” “Law Enforcement,” “Family,” and the “Cattleman’s Association.” The

Table 7

*Beef Producers’ Perception of Confidence Cross-Tabulated by Age, Farm Size, and Education Level*

	Confidence	
Age Decade	<u>M</u>	(n)
20s	3	5
30s	3.21	29
40s	3.58	66
50s	3.62	97
60s	3.42	135
70s	3.68	107
80s	3.48	23
90s	3	1
Farm Size	<u>M</u>	
1 to 49 Head	3.63	158
50 to 99 Head	3.48	112
100 to 499 Head	3.44	146
500 to 999 Head	3.57	20
1000 + Head	2.8	10
Education Level	<u>M</u>	
No Formal education	3.75	57
High School	3.62	224
Associate's	3.35	77
Bachelor's	3.39	62
Master's	3.37	35
Education Specialist	1	1
Professional	4	1
Doctorate	3	5

Note: Classification based on the scale: M = 4.20 or higher = Very Confident; 3.40 – 4.19 = Confident; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Confident; and 1 – 1.79 = Not Confident

remaining 40.86% of responses were divided between “Magazines” – 10.70%, “USDA” – 9.36%, “Television” – 9.15%, “Newspaper” – 6.59%, “Radio” – 2.98%, and “Word of Mouth” – 2.76%.

Question eight asked “When you seek information about an agriculturally related crisis, where do you first look.” Respondents indicated “Veterinarian” 26.81% of the time; “Television” 14.25% of the time; and the “Internet” 13.62% of the time (Table 9).

Table 8

*Beef Producers’ Preferred Information Sources Regarding Animal Health Issues*

Information Source	Percent	n
Internet	<b>11.70</b>	55
Magazine	10.70	47
Newspaper	6.59	31
Radio	2.98	14
Television	9.15	43
USDA	9.36	44
Veterinarian	<b>34.89</b>	164
Word of Mouth	2.76	13
Other	<b>12.55</b>	59

The remaining 45.32% of responses were divided between “Other” – 12.98%, “USDA” – 11.70%, “Newspaper” – 10.00%, “Magazines” – 3.62%, “Radio” – 3.19%, “Word of Mouth” – 2.55%, and the “OADFF” – 1.28%. Responses to the “Other” category provided additional sources as being “County Extension Agent,” “Oklahoma State University,” “Local Agricultural Department,” “Law Enforcement,” “Government Agencies,” “Family,” “OSU Veterinarian Services,” “Noble Foundation,” “Cattleman’s Association,” and the “High Plains Journal.”



Question number nine asked respondents to identify preferred methods for receiving information. When asked “What would be your number one preference to receive information about an agriculturally related crisis,” 49.36% of the respondents identified through a “County Extension Publication” (Table 10). Of the remaining 50.64%, “Other” methods were identified 15.11% of the time, “Local Meetings” were identified 10.21% of the time, “Mail” was identified 6.59% of the time; “Newspapers” were identified 6.38% of the time; “Don’t Know” was a choice 4.25% of the time, “Email” was identified 3.62% of the time, and the “Internet” was chosen 2.76% of the time.

Table 9

*Beef Producers’ Preferred Information Sources Regarding Agriculturally Related Crisis*

Information Sources	Percent	n
Internet	<b>13.62</b>	64
Magazine	3.62	17
Newspaper	10.00	47
Radio	3.19	15
Television	<b>14.25</b>	67
USDA	11.70	55
ODAFF	1.28	6
Veterinarian	<b>26.81</b>	126
Word of Mouth	2.55	12
Other	12.98	61

Responses to the “Other” category provided additional sources as being “Television,” “Friends,” “Radio,” “Sale Barns,” “OSU,” and the “Noble Foundation.”

### Findings Related to Level of Trust in Preferred Information Sources

Research question three sought to determine the Oklahoma beef producers' perceived level of trust of multiple information sources. Survey questions seven and ten were designed to answer this research question.

Table 10

#### *Beef Producers' Preferences Regarding Receiving Agricultural Crisis Information*

Information Method	Percent	n
County Extension Publication	<b>49.36</b>	232
Email	3.62	17
Internet	2.76	13
Local meetings	10.21	48
Magazine articles	1.70	8
Mail	6.59	31
Newspapers	6.38	30
Other (see text)	15.11	71
Don't Know	4.25	20

Question seven asked respondents to rate their level of reliability regarding multiple information sources using a five-point Likert-type scale (1 = Not Reliable, 2 = Slightly Reliable, 3 = Neutral, 4 = Reliable, 5 = Very Reliable). When asked "What sources do you believe to be the most reliable," 56.8% of respondents reported the "Local Veterinarian" as very reliable; "Area Livestock Specialist (45.4%)," "County Extension Agent (50.0%)," "Local Daily Newspaper (36.2%)," "Local Weekly Newspaper (31.3%)," "USDA (44.5%)," and "OADFF (41.5%)" as reliable; "AgriNet (43.4%)," "Breed Association (43.4%)," "Cowman Magazine (54.5%)," "High Plains Journal (56.6%)," and the "Internet (49.1%)" as neutral (Table 11).

Question ten asked respondents to rate their level of trust regarding multiple information sources using a five-point Likert-type scale (1 = Not Trustworthy, 2 = Slightly Trustworthy, 3 = Neutral, 4 = Trustworthy, 5 = Very Trustworthy). When asked “What is your level of trust in the following sources of information,” 54.7% of respondents reported the “Local Veterinarian” as very reliable; “AgriNet (35.7%),” “Area Livestock Specialist (46.4%),” “County Extension Agent (50.4%),” “Local Daily Newspaper (35.3%),” “USDA (49.8%),” and “OADFF (43.8%)” as reliable; “Breed Association (40.9%),” “Cowman Magazine (53.8%),” “High Plains Journal (54.5%),” and the “Internet (48.3%)” as neutral (Table 12).

The data were cross-tabulated by examining the level of trust in the multiple information sources in comparison to age, farm size, education level, and computer/internet usage. The data reinforced the veterinarian as the trusted information source and age had no effect on perceptions of trust in the veterinarian (Table 13).

The findings also revealed age as having no effect on perceptions of trust toward the internet or local/weekly newspapers, as all age groups reported lower trust scores for these three information sources.

When analyzing the same question as compared to farm size and its affect on perceptions relating to each beef producers’ trust in information sources, the trend remained the same as reported above with the local veterinarian as the most trusted source (Table 14). The findings also showed the same decreasing trend in trust toward the internet and local/weekly newspapers. When assessing the beef producers’ level of trust in information sources by education level (Table 15), beef producers’ trust level appeared to increase as the amount of education level increased.

Table 11

*Beef Producers' Perception of Reliability in Information Sources*

Information Sources	Not Reliable	Slightly Reliable	Neutral	Reliable	Very Reliable	<u>M</u>	<u>SD</u>
AgriNet	4.50	4.50	<b>43.40</b>	34.50	13.20	3.47	0.934
Area Livestock Specialist	3.40	7.40	32.10	<b>45.40</b>	10.60	3.53	0.904
Breed Association	4.90	7.20	<b>43.40</b>	37.40	7.00	3.34	0.898
County Extension Agent	3.60	5.30	15.30	<b>50.00</b>	25.70	3.89	0.969
Cowman Magazine	4.50	6.20	<b>54.50</b>	29.40	5.50	3.25	0.832
High Plains Journal	4.30	4.90	<b>56.60</b>	26.40	7.90	3.29	0.847
Internet	15.70	13.80	<b>49.10</b>	18.10	3.20	2.79	1.018
Local Daily Newspaper	20.00	22.10	19.80	<b>36.20</b>	1.90	2.78	1.189
Local Weekly Newspaper	18.90	19.60	28.50	<b>31.30</b>	1.70	2.77	1.134
Local Veterinarian	1.10	1.70	5.30	35.10	<b>56.80</b>	<b>4.45</b>	<b>0.765</b>
USDA	3.40	6.40	17.70	<b>44.50</b>	28.10	3.87	1.003
ODAFF	2.80	3.60	34.0	<b>41.50</b>	18.10	3.69	0.904

Note: Classification based on the scale: M = 4.20 or higher = Very Reliable; 3.40 – 4.19 = Reliable; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Reliable; and 1 – 1.79 = Not Reliable

Table 12

*Beef Producers' Perception of Trust in Information Sources*

Information Sources	Not Trust- worthy	Slightly Trust-worthy	Neutral	Trustworthy	Very Trustworthy	<u>M</u>	<u>SD</u>
AgriNet	6.60	4.50	46.00	<b>35.70</b>	7.20	3.33	0.923
Area Livestock Specialist	3.80	6.20	33.40	<b>46.40</b>	10.20	3.53	0.899
Breed Association	5.10	7.40	<b>40.90</b>	40.40	6.20	3.35	0.899
Co. Extension Agent	4.30	6.80	13.60	<b>50.40</b>	24.90	3.85	1.010
Cowman Magazine	6.20	6.40	<b>53.80</b>	28.70	4.70	3.19	0.887
High Plains Journal	5.20	6.40	<b>54.50</b>	26.40	6.80	3.21	0.906
Internet	14.90	14.00	<b>48.30</b>	18.10	4.50	2.82	1.049
Local Daily Newspaper	16.80	20.20	25.30	<b>35.30</b>	2.10	2.85	1.152
Local Weekly Newspaper	16.20	20.20	<b>31.30</b>	30.40	1.70	2.80	1.104
Local Veterinarian	2.80	2.80	4.30	35.30	<b>54.70</b>	4.36	0.937
USDA	4.00	6.60	11.90	<b>49.80</b>	27.40	3.89	1.032
ODAFF	4.90	4.50	28.70	<b>43.80</b>	17.90	3.64	1.007

Note: Classification based on the scale: M = 4.20 or higher = Very Trustworthy; 3.40 – 4.19 = Trustworthy; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Trustworthy; and 1 – 1.79 = Not Trustworthy

Table 13

*Beef Producers' Information Source Trust Cross-Tabulated by Age*

Information Source	Age      Decade      (N)							
	20s (5)	30s (29)	40s (66)	50s (97)	60s (135)	70s (107)	80s (23)	90s (1)
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>
AgriNet	4.00	3.69	3.52	3.35	3.24	3.15	3.39	4
Area Livestock Spec.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Breed Association	3.40	3.38	3.53	3.44	3.26	3.24	3.48	3
Co. Exten. Agent	3.80	4.07	4.00	3.70	3.85	3.83	3.91	4
Cowman Magazine	3.40	3.38	3.38	3.26	3.15	3.05	3.26	3
High Plains Jrnl.	3.40	3.48	3.35	3.37	3.14	3.05	3.26	3
Internet	3.20	3.24	3.05	2.98	2.67	2.67	2.78	3
Local Daily newspaper	3.20	2.69	2.86	2.81	2.81	2.88	3.48	1
Local Weekly paper	3.20	2.79	2.74	2.74	2.80	2.79	3.35	4
Local Veterinarian	3.40	4.48	4.50	4.35	4.30	4.36	4.30	5
USDA	3.80	4.00	4.17	3.92	3.90	3.77	3.74	4
ODAFF	4.20	4.03	3.80	3.72	3.61	3.47	3.48	5

**Note:** Classification based on the scale: M = 4.20 or higher = Very Trustworthy; 3.40 – 4.19 = Trustworthy; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Trustworthy; and 1 – 1.79 = Not Trustworthy

Table 14

*Beef Producers' Information Source Trust Cross-Tabulated by Farm Size*

Information Source	Farm Size by Head Count (N)				
	1 to 49 (158)	50 to 99 (112)	100 to 499 (146)	500 to 999 (20)	1000 + (10)
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>
AgriNet	3.20	3.45	3.34	3.39	3.40
Area Livestock Specialist	3.56	3.59	3.47	3.5	3.90
Breed Association	3.33	3.34	3.37	3.5	3.50
County Extension Agent	3.88	3.84	3.84	3.96	3.50
Cowman Magazine	3.15	3.23	3.17	3.54	3.30
High Plains Journal	3.05	3.22	3.35	3.57	3.40
Internet	2.76	2.95	2.86	2.71	3.00
Local Daily Newspaper	2.95	2.79	2.82	2.89	2.40
Local Weekly Newspaper	2.87	2.79	2.78	2.93	2.40
Local Veterinarian	4.35	4.37	4.36	4.46	4.10
USDA	3.96	3.95	3.82	3.82	3.80
ODAFF	3.71	3.65	3.56	3.86	3.40

Note: Classification based on the scale: M = 4.20 or higher = Very Trustworthy; 3.40 – 4.19 = Trustworthy; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Trustworthy; and 1 – 1.79 = Not Trustworthy

Table 15

*Beef Producers' Information Source Trust Cross-Tabulation by Education Level*

Information Source	Education Level (N)							
	No Formal (57)	High School (224)	Assoc. (77)	Bach. (62)	Mast. (35)	Educ. Spec. (1)	Profsnl (1)	Doct. (5)
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>
AgriNet	2.98	3.28	3.48	3.35	3.69	3.00	3.00	4.00
Area Livestock Spec.	3.26	3.5	3.66	3.47	3.89	3.00	4.00	4.20
Breed Association	3.09	3.55	3.42	3.39	3.49	3.00	4.00	3.60
Co. Extension Agent	3.54	3.86	3.87	4	3.89	2.00	4.00	4.40
Cowman Magazine	3.07	3.19	3.22	3.24	3.26	3.00	4.00	3.60
High Plains Journal	3.04	3.24	3.32	3.23	3.17	3.00	4.00	3.60
Internet	2.77	2.79	2.96	2.9	2.77	4.00	3.00	2.80
Local Daily newspaper	2.65	2.9	2.88	2.68	3.06	1.00	4.00	3.40
Local Weekly paper	2.77	2.85	2.68	2.68	3.06	1.00	4.00	3.40
Local Veterinarian	3.91	4.41	4.49	4.31	4.57	5.00	4.00	4.60
USDA	3.72	3.95	3.95	3.76	4.2	4.00	4.00	4.60
ODAFF	3.53	3.63	3.79	3.53	3.94	4.00	4.00	4.60

Note: Classification based on the scale: M = 4.20 or higher = Very Trustworthy; 3.40 – 4.19 = Trustworthy; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Trustworthy; and 1 – 1.79 = Not Trustworthy



This increasing trend is prevalent if the two groups with only one respondent, education specialist and professional, are removed. Although the internet and local daily/weekly newspaper were continuing to be categorically low, all areas of trust showed slight increasing trends of trust as educational level increased. When assessing the beef producers' level of trust in information sources by computer usage with internet access, data revealed a higher amount of trust with the beef producers who owned an internet accessible computer (Table 16).

Table 16

*Beef Producers' Information Source Trust Cross-Tabulation by Computer/Internet Usage*

Information Source	Computer with Internet Usage (N)	
	Yes (293)	No (176)
	<u>M</u>	<u>M</u>
AgriNet	3.46	3.10
Area Livestock Spec.	3.60	3.41
Breed Association	3.41	3.24
Co. Extension Agent	3.93	3.72
Cowman Magazine	3.29	3.03
High Plains Journal	3.3	3.10
Internet	2.99	2.57
Local Daily newspaper	2.86	2.85
Local Weekly paper	2.82	2.8
Local Veterinarian	4.38	4.35
USDA	3.97	3.78
ODAFF	3.72	3.54

Note: Classification based on the scale: M = 4.20 or higher = Very Trustworthy; 3.40 – 4.19 = Trustworthy; 2.60 – 3.39 = Neutral; 1.80 – 2.59 = Slightly Trustworthy; and 1 – 1.79 = Not Trustworthy

Although the internet and local daily/weekly newspapers were categorically low, all areas of trust showed an increased level of trust regarding each information source with the

exception of the local daily and weekly newspapers and the local veterinarian. In each of these three categories, the trust level means were virtually equal.

Data revealed the veterinarian was a highly trusted source regardless of computer usage/internet access and the local daily and weekly newspapers were regarded less trustworthy regardless of computer usage/internet access.

### **Chapter Summary**

This descriptive study used a telephone survey to assess perceptions of Oklahoma beef producers regarding level of risk to the beef industry, information sources, and trust in those sources of information during times of an agriculturally related crisis.

The findings described the typical Oklahoma beef producer as male (69.72%); with at least a high school education (47.70%), 59 years old, and owns a computer with access to the internet (62.3%). The producer's primary employment was in the beef industry (57.90%), owning a cow – calf operation (87.45%), with one to 49 head of cattle (35.12%).

Beef producers perceived the Oklahoma beef industry was susceptible to an agroterrorism event (63.0%); believed the feedlots to be at an elevated level of threat; were confident in their own operation's bio-security measures (60.2%); believed their own operation was not susceptible to an agroterrorism event (62.8%); did not believe they had enough information about protection from terrorism to the beef industry (58.7%).

Producers looked to their veterinarians when seeking information about animal health issues (34.9%) and any agriculturally related crisis (26.8%); and preferred to receive information through county extension publications (49.4%). They also noted the

local veterinarian as the most trusted (54.7%) and reliable (56.8%) source of information available. The OSU County Extension agent, USDA, and local area livestock specialists were also trustworthy and reliable sources.

## **CHAPTER V**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

Chapter I addressed the importance of identifying information sources and their perceived value to beef producers prior to a crisis event. Chapter I also described how recent events in the world have made an impact on vigilance in the agricultural industry. The purpose of the study and research questions guiding the project were also discussed.

Chapter II provided the conceptual and theoretical framework for research on agroterrorism and crisis. Specifically, the underlying theory of uncertainty reduction provides the contextual base for this study. Conceptual frameworks of crisis communication, organizational risk, and the history of agroterrorism were also presented.

Chapter III described the methods and procedures for data collection to address the research objectives. Specifically, the chapter focused on the research design, description of the population, sampling procedures, survey accuracy, reliability, validity, instrumentation, data collection procedures, and data analyses.

Chapter IV focused on the findings obtained from this study. The results addressed the specific questions regarding beef producers' perceptions about potential risk and preferred and trusted information sources.

This chapter provides a summary of the research problem, the rationale for the study, purpose, procedures, and a summary of findings for the study. Conclusions are presented in this chapter, as well as a discussion of implications. Recommendations are made based upon the findings of this study.

### **Statement of the Problem**

In the event of a terrorist attack against agriculture, the public will be forced to make life-sustaining decisions in regard to their health, safety and the food they provide to their families. State agencies, special interest groups and the media will have the responsibility of disseminating hazard information to consumers and producers alike.

Correct and helpful information is critical for the public to traverse through a crisis. Many public relations professionals suggest openness and a forthcoming attitude with information helps the organization minimize or avoid damage to its reputation (Newsom, et al., 1989; Pinsdorf, 1987)

The problem addressed the lack of information about where beef producers seek information and the sources of information trusted by those beef producers in the context of an agriculturally related crisis such as an incident of agroterrorism.

### **Need for the Study**

Although the threat to the food supply has always been prevalent, events in recent years have moved the possibility of the threat into the minds of mainstream America. Even before September 11, 2001, it was recognized that the United States was a target for terrorism against agriculture. “The U.S. is vulnerable to an agricultural bioterrorism incident specifically targeting key animal or plant commodities” (Horn, 1999, p. 3). Horn further maintained the awareness of this threat has increased within the intelligence and counterterrorism communities during the past two years; USDA has worked with these intelligence communities to position agriculture to anticipate and respond to such a threat (1999).

After September 11, 2001, the intentional threat to agricultural safety became a reality. Agriculture Secretary Ann Veneman stated, “the intentional threats to agricultural products and our food supply have required us to do much more; we have been working closely with other federal agencies, state agriculture departments, academia, and the agriculture sector on many fronts to secure and strengthen planning and preparedness” (2002, p. 1).

Recent threats of security have forced the U.S. government to create new agencies and measurement systems to respond to the national crisis. Deputy Agriculture Secretary Jim Moseley stated, “the centerpiece of this new homeland security is the largest reorganization of the federal government since 1947, when Harry Truman sought to prepare our defense infrastructure for the challenges of the post-war world” (2002, p.2).

Planning for these incidents is more important now than ever. Assessing potential areas of affect and the methods that will be used could assist the government in reducing the possible risks of long-term chaos on American agriculture. “The best way to fight terrorists who would target our food supply is to simply take their options off the table by having an effective response plan in place” (Moseley, 2002, p.3).

### **Purpose**

The primary purpose of this study was to determine the perception of the level of risk of Oklahoma beef producers concerning an agriculturally related crisis, such as an agroterrorism event, and the sources of information Oklahoma beef producers use and trust when seeking information about agriculturally related issues. Specifically this study addressed the following research questions:

1. What are Oklahoma beef producers' perceptions of the susceptibility of the beef industry in Oklahoma experiencing an agroterrorism event?
2. What are the sources of information Oklahoma beef producers use when seeking information about an animal health issue?
3. What are Oklahoma beef producers' level of trust in the information sources used?
4. How did Oklahoma beef producers' perceptions toward the susceptibility of the Oklahoma beef industry to agroterrorism differ based upon the demographic variables of age, farm size, and education level?
5. How did Oklahoma beef producers' perceptions toward information source trust and reliability differ based upon the demographics of age, farm size, education level, and access to a computer with internet access?

### **Procedures**

This study is a descriptive study of beef producers in Oklahoma using a telephone survey. Descriptive research was chosen as the research design since the study dealt with perceptions of beef producers and their preferred sources of information used when seeking to learn more about animal health issues.

A random sample ( $n = 2,000$ ) was drawn from the overall target population of beef producers in Oklahoma ( $N = 48,000$ ). Of the sample, 678 completed calls were made providing the researcher with 470 usable responses.

The instrument used for the collection of data was designed by the researcher. The questionnaire was designed into four parts, the first three parts coincided with the three objectives of the study: risk perception, information sources, and source trust; the final part ascertained demographic information. Questions 1-5 ascertained attitudinal

perceptions of risk using categorical questions and five-point Likert-type questions.

Questions six, eight, and nine assessed the respondent's perceptions about sources of information they would choose first and the medium in which they would like information presented to them. These questions were categorical type questions.

Questions seven and ten obtained the respondent's level of reliability and trust in specific sources of information using Likert-type questions. Questions eleven through seventeen were questions regarding the demographics of the survey population.

The instrument was reviewed by a panel of experts for content and face validity. The panel included eight faculty members and two instructors in the Department of Agricultural Education, Communications and 4-H Youth Development, one faculty in the Department of Sociology at Oklahoma State University. The panel also included the director of the Oklahoma Beef Industry Council, the Board of Directors of the Oklahoma Cattleman's Association, the Director of the Oklahoma Agricultural Statistics Service, and the state veterinarian. The panel found the questionnaire to be valid for this survey, and any revisions of the instrument were made based upon the recommendations of the panel. Most recommendations pertained to grammar and style of the wording choices for each question. The Oklahoma Cattleman's Association identified a more detailed list of information sources beef producers use in Oklahoma.

Reliability was analyzed post-hoc. Since the data set was provided to the researcher in chronological order of survey completion, reliability testing was completed as if the instrument was tested prior to execution. The researcher assessed the reliability of all 470 survey responses by calculating a Cronbach's Alpha coefficient of .84.



Data collection was done by the Oklahoma Agricultural Statistics Service, a state division of the National Agricultural Statistics Service, a department of the United States Department of Agriculture. The survey was conducted using the telephone for six days during the month of July 2005 and six days during August 2005, for a total of twelve days.

An initial letter was mailed to 2,000 beef producers randomly selected from the OASS list of approximately 48,000 available beef producers in Oklahoma. The letter invited each producer to complete the telephone survey if called.

Interviewers at the OASS used an in-house Computer Assisted Telephone Interview (CATI) system to aid in the collection procedures. The population frame was entered into the computer system, which randomly selected numbers to be called by the interviewers. The computer provided the interviewer with the potential respondent's name and phone number. All answers were entered directly into a database. The database was reviewed at the end of each day to update the OASS frame. Once data collection had ended, the database was saved into an Excel spreadsheet document and provided to the researcher.

Data were analyzed using statistical analysis tools through SPSS and Microsoft Excel Statistical Analysis Tool Pack. Frequencies, percentages, means, modes, standard deviations and cross tabulations were used to analyze and interpret the data.

Grand means were calculated for all the Likert type questions in the survey. A grand mean comparison using a *t-test* was applied at a 95% confidence interval with 468 degrees of freedom. The calculated *t-test* value for the grand means was 1.58, being

lower than the critical  $t$  value of 1.96, there was no significant difference between early and late respondents.

### **Summary of Findings/Conclusions**

#### **Findings Related to Beef Producers' Perceived Risk**

The typical beef producer believes the Oklahoma beef industry is susceptible to an agroterrorism event (63.0%). Typical beef producers also believe feedlot operations ( $\bar{M} = 3.17$ ) and local marketing facilities ( $\bar{M} = 2.57$ ) to be the most threatened types of operations, at an elevated and guarded level of threat, respectively. The typical beef producer is confident in his own operation's bio-security measures (60.2%). The typical beef producer also believes his own operation is not susceptible to an agroterrorism event (62.8%). But, the typical beef producer does not believe he has enough information about protection from terrorism to the beef industry (58.7%).

When comparing the cross-tabulated mean scores of the demographic variables of age, farm size, and education level, no significant effect was shown to influence perceptions of the level of agreement the beef producer reported when asked about the susceptibility of the Oklahoma beef industry to agroterrorism. When looking at the variable of farm size, beef producers reporting herd sizes of 1,000 or more head declined in opinion to a "neutral" agreement level regarding susceptibility.

The same trend was found when beef producers were asked to provide a level of confidence in their own operation's bio-security measures. The beef producers' confidence level did not change based on age, farm size, or education level. Only in the case of reported farm sizes with herd size above 1,000 head was there any movement in agreement level. As with susceptibility, beef producers perceived a decline in confidence

to the “neutral” level in comparison to the other producer’s answers remaining in the “somewhat confident” level.

#### Conclusions related to Beef Producers’ Perceived Risk

Based upon the findings, it was concluded the typical Oklahoma beef producer perceives the Oklahoma cattle industry is susceptible to terrorist activities targeting the beef industry. Specifically, operations with large numbers of cattle and public access are perceived to be more susceptible to an agroterrorism event versus smaller, private cattle operations.

It was concluded while the typical beef producer in Oklahoma feels confident in his or her own operation’s bio-security measures, this feeling may be overconfidence due to the lack of information about protection from terrorism to the beef industry.

Finally, it was concluded primary sources of information have poorly communicated pertinent agroterrorism information to the typical Oklahoma beef producer regarding bio-hazard safety and protection, which may be a result of those primary sources’ lack of awareness of the need to communicate such information. This conclusion supports previous research by Fink, 1986; Henry, 2000; Seeger, et al. 2003; and Lane, 2002 which implore the need for pre-crisis communication efforts to effectively plan and recover from a crisis event.

#### Findings related to Beef Producers’ Preferred Sources of Information

The typical Oklahoma beef producer looks first to his or her veterinarian when seeking information about animal health issues and any agriculturally related crisis. Secondly, producers turn to the internet and television. In addition, beef producers prefer to receive information through county extension publications. These findings

support previous research showing value of extension publications, internet, and television as preferred information sources (Okai, 1986; and Taylor & Perry, 2005); especially the television in the event of bioterrorism, and the influence of the internet on crisis communication (Pollard, 2003). College graduates and older audiences preferred print publications; as compared to audiences under 30 who preferred radio and television forms of media (Reina, 1995).

#### Conclusions related to Beef Producers' Preferred Sources of Information

Based upon the findings above, it was concluded the veterinarian services profession should be prepared to provide Oklahoma beef producers any type or form of information regarding preparatory actions for or protection from terrorist activities.

It was also concluded the OSU Cooperative Extension Service's print publications are considered a primary method of disseminating information for Oklahoma beef producers regarding agroterrorism or beef industry crisis issues.

#### Findings Related to Level of Trust in Preferred Information Sources

The typical Oklahoma beef producer views the local veterinarian as the most trusted and reliable source of information. The county extension agent, USDA, and local area livestock specialists are also trustworthy and reliable sources. While findings from Okai (1986) show a lack of preference for area extension specialists, this study revealed beef producers in Oklahoma having a high level of trust for the area livestock specialists, supporting previous research by Padgitt (1987).

When comparing the cross-tabulated mean scores of the demographic variables of age and farm sizes, no significant effect was shown to influence beef producer's perceptions of trust in the varied information sources. However, when comparing the

means by education level, the level of trust increased as the beef producers' education level increased. The same trend was found when comparing computer usage and internet access; beef producers reported higher levels of trust if they owned a computer with internet access.

It is important to note only in the instance of the internet and local daily or weekly newspapers did the variables of age, farm size, education level, or computer usage/internet access have no affect on trust. In all cases, the level of trust in these three sources of information remained lower than any other source. While previous studies show the internet (Newport & Saad, 1998), and local daily or weekly newspapers (Reina, 1995; and Denton, 1996) as trustworthy sources, this study supports research by Newport and Saad (1998) showing local newspapers having low credibility.

#### Conclusions Related to Level of Trust in Preferred Information Sources

Rogers (2003) defines opinion leadership as “the degree to which an individual is able to influence other individuals’ attitudes or overt behavior in a desired way with relative frequency” (p. 27). Based upon the findings above, it can be concluded veterinarians, county extension agents, the USDA, or local area livestock specialists can be influential in shaping the opinions of Oklahoma beef producers.

It can also be concluded veterinarians, county extension agents, the USDA, or local area livestock specialists should have the requisite knowledge of preparedness levels, crisis planning, and agroterrorism protection to provide or disseminate information regarding agroterrorism or crisis communications. This conclusion supports the findings of Fink, 1986; Henry, 2000; and Seeger, et al., 2003 who found for crisis management to

be effective there is a need for a strong foundation of effective planning and communication before an incident.

### Discussion of Findings and Implications

Each day, the public is bombarded with pages upon pages of information from many different sources. The uncertainty lies within the challenge of determining which sources of information are providing a correct account of the day's information and what portion of the information to believe.

When receiving information about subjects with which the public is previously familiar, the challenge is lessened. But terrorism on U.S. soil has been a relatively infrequent occurrence. The two major incidents targeted at the U.S. were the bombing in Oklahoma City in 1995 and the 9/11 attacks in 2001. Terrorism to the food and fiber system, by creating sickness in food animals or humans, can create a fear of the basic need for food.

The public begins to question their knowledge about or ability to understand or manage this new crisis information. Brashers (2001) maintained a belief in one's own ability or cognitive level of deriving meaning may cause perceptions of uncertainty, which will cause the individual to be uncertain. Seeger, Sellnow, and Ulmer (2003) stated, "the public seeks information to determine whether the crisis will affect them, how they should think, and what they should do" (p. 71).

Uncertainty will affect the public's ability to predict behavior. Gajduschek (2003) maintained "the minimization of uncertainty maximizes predictability and calculability of actions, procedures, and outputs" (p.715). To reduce this uncertainty of a potential crisis, the public turns to those information sources whose position is to provide information:

organizations of individuals. Organizations, especially those who may be involved in some phase of the crisis event, are caught between maintaining profit and reducing liability through openness.

The organization providing information to the public has an inherent impact on the public's ability to deal with the crisis. Seeger, et al. (2003) maintain organizations may inhibit the public's ability to effectively assess the potential harm and risk of a situation if the organization has failed to supply or support a healthy exchange of information. Wilson (2002) maintained what is done and how communication occurs in the first few minutes or first hours of a crisis may well shape public opinion for hours, days, weeks, and possibly forever.

#### Perceptions of Risk

Oklahoma beef producers reported larger, publicly accessible operations, such as feedlots and local marketing facilities, were at a higher risk than the smaller, ranch-type operations. While these beef producers also reported high levels of confidence in their own bio-security measures, they also reported a lack of enough information about protection from terrorism to the cattle industry.

Does this lack of information about protection imply the typical beef producer is overconfident in their own ability to prepare for an agroterrorism event or does the lack of information imply the inability to assess or predict the level of threat to the beef industry as a whole? Regardless, there are different levels of uncertainty. It is unclear through this level of inquiry whether the typical beef producer is more certain about his or her own operation and uncertain about larger operations. The producer may simply not have a level of knowledge of agroterrorism protection to allow an informed opinion. In

either situation, more information must be provided. Therefore, it is imperative to further explore this knowledge level gap and its affect on the four crisis preparedness levels. This implication is supported by Seeger, et al. (2003) who suggest poor communication can influence the ability to move through effective crisis recovery efforts.

### Preferred Information Sources

Oklahoma beef producers report to seek information regarding any animal health issue or agriculturally related crisis through their veterinarian first and then turn to the internet or television as secondary sources. Beef producers also reported preferring information to be disseminated through county extension publications as a first choice.

This study was not designed to assess agroterrorism and crisis literacy or knowledge levels of those organizations of individuals providing information to the public. The findings above highlight important implications to the agricultural communications profession. For example, what is the type and quality of the information being provided by veterinarians, the internet, on television, or by county extension publications? What level of knowledge of agroterrorism or crisis planning do these individuals possess? If the typical Oklahoma beef producer is looking toward these sources of information, should it be imperative to know to what level these sources are informed?

It may be interesting to investigate why beef producers cite the internet as a preferred secondary source of information, but continually rate it as a neutrally trusted source. Are beef producers using the internet to guide their knowledge seeking engagements with the local veterinarian, while remaining cautious or wary of the information found on the internet?



Once beef producers agricultural crisis planning literacy level is assessed, an exploration of the types and quality of information found is essential to determine the information gap between what a beef producer receives and the level of uncertainty remaining. This implication is supported by Berger and Calabrese's (1975) third axiom, which maintains during times of high levels of uncertainty information seeking behavior increases to reduce the uncertainty. This implies the level of uncertainty can increase when information seeking behavior uncovers inaccurate information.

A study by Okai (1986) showed the area extension specialist as a low ranked source of information by small-scale Missouri farmers. This study showed the opposite in reporting the area livestock specialist as a preferred source of information by Oklahoma beef producers.

#### Information Source Trust

Oklahoma beef producers view the local veterinarian as the most trusted and reliable source of information available. The County Extension agent, USDA, and local area livestock specialists are also viewed as trustworthy and reliable sources.

This finding's implication reinforces the fact the veterinarian, county extension agent, USDA, and area livestock specialists are a vital channel for the dissemination of information to Oklahoma beef producers. This implication is important since it helps the beef cattle industry identify and document the opinion leaders of the group.

The final implication of the findings on trust involves not so much which sources beef producers trust and rely upon, but more importantly, who they do not. In chapter IV, the internet was found to be a neutral information source when it came to both trust and reliability. The importance of this point can be seen in the above discussion; the internet

was reported to be a secondary source of information to the veterinarian, but not seen as a highly trusted or reliable source of information.

If the USDA, county extension agents, and area livestock specialists are seen as trusted and reliable sources, and the internet is not, why do beef producers report the internet's usage so highly? Is it because the internet is a medium available 24 hours per day with no office hours or scheduling problems? If so, then an exploration of the content found at frequented sites by beef producers is needed to ensure accurate and timely information.

How do the USDA, county extension agents, and area livestock specialists move upwards on the list of sources of information if they are so trusted? It may imply if beef producers trust the USDA, county extension agent, and area livestock specialists so much and use the internet as an important source of information, there is an opportunity for these entities to deliver or disseminate information via the internet to Oklahoma beef producers.

## **Recommendations**

### **Recommendations for Future Research**

Pre-crisis dissemination of information is imperative. Effective preparation levels are dependent upon accurate information. It can be recommended to assess the level of preparedness of the larger, publicly accessed marketing facilities and feedlots which were identified by Oklahoma beef producers as at a higher risk to agroterrorism. This initial assessment will allow for the determination of the type of information needed to provide feedlots and marketing facilities opportunities to create a more effective crisis plan based upon current preparedness levels. It is also recommended future research be conducted to

determine the perceptions of feedlot and marketing facility owners and managers in regards to perceived preparation levels, as well as their perceptions of risk to their operations.

Once the gap of knowledge regarding preparedness is assessed on the large, public operation level, it is recommended the private beef producer in Oklahoma participate in the assessment of their own operation to determine the local level knowledge gap. Once these gaps are identified, the information needed to increase the level of knowledge can be disseminated, thereby reducing the uncertainty the lack of information creates.

Neulip and Grohskopf (2000) stated “communication satisfaction may be a part of communication competence, in that competent interactants may be especially adept at reducing uncertainty” (p. 74). It is suggested future research be conducted to determine how communication competence affects the communication satisfaction and uncertainty reduction of beef producers when seeking information about possible crisis events. This type of study may be used to correlate levels of communication competency with levels of perceived uncertainty or lack of information.

Based upon the findings regarding the identification of information sources, it is recommended content analysis research be completed to determine the quality and type of information being disseminated to Oklahoma beef producers. Once information type and quality is identified, researchers can determine the information gap and adjust the quality level and type of information dissemination.

Through this study, the question of *where* beef producers seek information was identified. It is suggested researchers use this knowledge to identify *what* types of

information Oklahoma beef producers are interested in learning from the identified sources of information. This information will provide an insight into the areas of uncertainty beef producers are seeking to reduce through preferred and trusted communication channels.

### Recommendations for Practitioners

Primary sources of information, i.e. the veterinarian, USDA, county extension agents, and local livestock specialists, should maintain a well informed breadth of knowledge about agroterrorism and the affects it can bring to the Oklahoma beef industry. While their preparedness levels should include knowledge for their own level of expertise, they should anticipate being sought for questions regarding preparedness on protection and bio-security issues from producers.

Since this study identified sources of information used by Oklahoma beef producers, it is suggested these sources of information be used to deliver information to the beef producer in a proactive manner, rather than simply waiting for the beef producer to seek information. This identification of preferred sources of information reinforces the need to reduce Riesenberg and Gor's (1989) suggested "communication gap stumbling block" between the extension service personnel and the farmer through effective information diffusion.

Past studies of farmers and agriculturalists show the preference of both interpersonal and mass media methods of information diffusion (Riesenberg & Gor, 1989). This research allows practitioners to understand the preferred information needs of beef producers; thereby increasing the effectiveness of future communication efforts

by disseminating information more directly to beef producers through these identified preferred sources.

Based upon the findings that the veterinarian, USDA, county extension agents, and area livestock specialists are the most trusted and reliable sources for Oklahoma beef producers, it is suggested these sources use combined efforts to disseminate information through the preferred channels of veterinarians, internet Web sites, and television. More specifically, use combined knowledge from all trusted sources of information to support a multi-sourced Web site sponsored by these primary trusted sources for dissemination of information through the internet to beef producers.

#### Recommendations for Education

Frazier (1999) maintained for the future of education and information dissemination:

There is a clear need to develop effective educational programs for stimulating continued attention of congressional decision-makers, for alerting companies that may be perceived as infrastructure targets to terrorists, and for training first responders who will come into contact with affected people, pets, or livestock after an bioterrorism attack occurs (p. 4).

Oklahoma State University finds itself at the fountainhead of this information. Three of the four primary sources identified by beef producers (veterinarians, county extension agents, and area livestock specialists) are within the confines of the OSU system. The land-grant university mission of research, teaching, and extension are essential to the role

of increasing the information levels and knowledge of students, employees, and the public.

It is recommended the agricultural communications profession seek to determine the levels of information veterinarians are receiving, both in school as well as through continuing education, to provide opportunities for veterinarians to realize the vital role they play as opinion leaders within the beef industry.

It is recommended the same manner of assessment be conducted to determine the most effective method for educating those members of the Cooperative Extension Service about their role as opinion leaders and providers of information to the beef industry. It is essential for extension personnel to realize their importance as highly respected sources of information to rural America (Martin, Omar, 1988; Richardson and Mustian, 1994; Buford, et al., 1995).

Finally, in a study by Okai (1986), vocational agricultural instructors were reported as a low ranked source of information by small-scale Missouri farmers. It is recommended the Oklahoma agricultural education profession is assessed to determine its level of involvement in the dissemination of information to beef producers. Agricultural educators have an opportunity to educate youth in matters of potential threats to agriculture. This information dissemination to young adults may have the potential to increase the agricultural educator's position as a preferred source of information when students graduate and become working adults in society.

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## APPENDICES

### APPENDIX A

#### Oklahoma State University Institutional Review Board

Date: Thursday, July 07, 2005

IRB Application No AG061

Proposal Title: When it Matters Most: A Study of Beef Producer Communication Channels for Crisis Communication

Reviewed and  
Processed as: Exempt

**Status Recommended by Reviewer(s): Approved Protocol Expires: 7/6/2006**

Principal  
Investigator(s)

Marcus A. Ashlock  
437 Ag Hall  
Stillwater, OK 74078

Dwayne Cartmell  
436 Ag Hall  
Stillwater, OK 74078

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

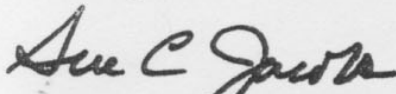
☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 415 Whitehurst (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Sue C. Jacobs, Chair  
Institutional Review Board

## APPENDIX B

Name  
Address  
Address 2  
City, State zip

May 8, 2006

Dear Beef Producer:

We need your help! To better prepare for effectively communicating during a crisis in the beef industry, we will be conducting a survey of select beef producers in the state. In particular, we want to obtain your thoughts on the security of the beef industry in Oklahoma, and how we can best prepare for a crisis. We also want to identify where you would go for information in the event a crisis were to happen to the beef industry in Oklahoma.

Within the next week you will be receiving a phone call from a representative of the Oklahoma Agricultural Statistics Service. You will be one of a select number of beef producers in Oklahoma that are asked to participate in this important research project. We would greatly appreciate it if you would take a few moments to answer the questions asked during this phone survey. The survey will last no longer than 15 minutes.

Your answers will be anonymous and the entire set of data will be stored on a department computer and reported to the USDA. A copy of the report is available to you for free. The OSU Institutional Review Board (IRB) has the authority to inspect consent records and data files to assure compliance with approved procedures. For information on subjects' rights, contact Sue Jacobs, Chair of IRB Committee, 431 Willard Hall, 405-744-9895.

If you have any questions about this research project, please feel free to contact us at (405) 744-8135 or at [marcus.ashlock@okstate.edu](mailto:marcus.ashlock@okstate.edu).

Thank you in advance for your cooperation. Without your assistance it would be impossible to acquire this valuable information.

Sincerely,



Marcus Ashlock  
Doctoral Student  
Agricultural Communications



Dwayne Cartmell  
Assistant Professor  
Agricultural Communications

## APPENDIX C

### Beef Producer Attitudinal Survey

Hello, my name is \_\_\_\_\_ and I am with the Oklahoma Agricultural Statistics Service in Oklahoma City. I am calling on behalf of a research project conducted by Oklahoma State University in Stillwater.

You recently received a letter asking for your participation in a study to understand the attitudes and opinions of beef producers in our state. During this survey, we will ask you questions about your opinions about bio-security, agroterrorism, and the information sources you would use and trust if there were an animal health crisis incident in the state of Oklahoma. Your answers will be completely anonymous.

The survey has only 19 questions and should last no more than 15 minutes. Will you please take a few moments of your time to participate in this important research?

If “YES,” proceed to question 1

If “NO,” thank them for their time and proceed to the next available respondent.

1. In this survey, the term “agroterrorism” refers to an act of terrorism or violence to the beef industry intending to disrupt production or sale of beef cattle; specifically, the use of fast acting and quick spreading biological agents, such as foot and mouth disease.

Please tell me the level of agreement with the following statement by answering if you disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or agree? (SCALE CODE: 1=disagree, 2=somewhat disagree, 3=neither agree nor disagree, 4=somewhat agree, 5=agree)

1a. **The Oklahoma cattle industry is susceptible to an agroterrorism event** .....\_\_\_\_\_

2. For question 2, we will ask you to gauge the threat level of different types of cattle operations found in Oklahoma. Using the Department of Homeland Security Threat Level codes, please answer from 1 to 5, where 1 is a low threat, 2 is a guarded threat, 3 is an elevated threat, 4 is a high threat and 5 is a severe threat. You may use any number between 1 and 5. (SCALE CODE: 1=Low, 2=Guarded, 3=Elevated, 4=High, 5=Severe)

**In your opinion, what is the level of threat for the following cattle operations?**

- 2a. Ranches ..... \_\_\_\_\_
- 2b. Livestock exhibitions ..... \_\_\_\_\_
- 2c. Local livestock marketing facilities ..... \_\_\_\_\_
- 2d. Regional livestock marketing facilities ..... \_\_\_\_\_
- 2e. Background operations ..... \_\_\_\_\_
- 2f. Stocker operations ..... \_\_\_\_\_
- 2g. Feedlots ..... \_\_\_\_\_

For questions 3 and 4 you will answer with either a “Yes” or “No.”

3. **Do you believe your cattle operation is susceptible to an agroterrorism event?**

- ☐ **YES** – (Enter code 1 and continue) ..... \_\_\_\_\_
- ☐ **NO** – (Enter code 3 and continue)
- ☐ **Don’t Know** (Enter code 9 and continue)

4. **Do you believe you have enough information about protection if a terrorist act was directed at the beef industry in Oklahoma?**

- ☐ **YES** – (Enter code 1 and continue) ..... \_\_\_\_\_
- ☐ **NO** – (Enter code 3 and continue)
- ☐ **Don’t Know** (Enter code 9 and continue)

5. Please tell me your level of confidence with the following question by answering if you are not confident, slightly confident, neutral, confident, or very confident?  
(SCALE CODE: 1=not confident, 2=slightly confident, 3=Neutral, 4=confident, 5= very confident)

5a. **How confident are you in your own operation’s bio-security measures?** ... \_\_\_\_\_

6. **When you seek information about a beef animal health issue, where do you first look?**

- ☐ Internet
- ☐ Magazine
- ☐ Newspaper
- ☐ Radio
- ☐ Television
- ☐ USDA
- ☐ Veterinarian
- ☐ Word of mouth
- ☐ Other \_\_\_\_\_

7. For question 7, the term “reliable” means to provide information that is consistent and well-balanced. Please answer from 1 to 5, where 1 is not reliable, 2 is slightly reliable, 3 is neutral, 4 is reliable and 5 is very reliable. You may use any number between 1 and 5. (Scale code: 1=not reliable, 2=slightly reliable, 3= neutral, 4=reliable and 5=very reliable)

**What types of sources of information do you believe to be the most reliable?**

- 7a. AgriNet ..... \_\_\_\_\_
- 7b. Area livestock specialist ..... \_\_\_\_\_
- 7c. Breed Association ..... \_\_\_\_\_
- 7d. County Extension Agent ..... \_\_\_\_\_
- 7e. “Cowman” Magazine ..... \_\_\_\_\_
- 7f. High Plains Journal ..... \_\_\_\_\_
- 7g. Internet ..... \_\_\_\_\_
- 7h. Local Daily Newspaper ..... \_\_\_\_\_
- 7i. Local Weekly Newspaper ..... \_\_\_\_\_
- 7j. Local Veterinarian ..... \_\_\_\_\_
- 7k. USDA ..... \_\_\_\_\_

8. **What method do you prefer to use when seeking information about an agriculturally related crisis in the beef industry?**

- ☐ Internet
- ☐ Magazine
- ☐ Newspaper
- ☐ Radio
- ☐ Television
- ☐ USDA
- ☐ Veterinarian
- ☐ Word of mouth
- ☐ Other \_\_\_\_\_

9. **How would you prefer to receive information about an agriculturally related crisis?**

- ☐ County Extension publications
- ☐ E-mail
- ☐ Internet/E-Mail
- ☐ Local meetings
- ☐ Magazine articles
- ☐ Mail
- ☐ Newsletters
- ☐ Other \_\_\_\_\_

10. For question 10, the terms “trust” and “trustworthy” mean your level of belief in the information you read or receive. Please answer from 1 to 5, where 1 is not trustworthy, 2 is slightly trustworthy, 3 is neutral, 4 is trustworthy and 5 is very trustworthy. You may use any number between 1 and 5. (Scale code: 1=not trustworthy, 2=slightly trustworthy, 3= neutral, 4=trustworthy and 5=very trustworthy)



**What is your level of trust in the following sources of information?**

- 10a. AgriNet .....
- 10b. Area livestock specialist .....
- 10c. Breed Association .....
- 10d. County Extension Agent .....
- 10e. "Cowman" Magazine .....
- 10f. High Plains Journal .....
- 10g. Internet .....
- 10h. Local Daily Newspaper .....
- 10i. Local Weekly Newspaper .....
- 10j. Local Veterinarian .....
- 10k. USDA .....

11. Of the list of sources in the previous question, **which sources of information do you trust the most?** (Read the list once again if needed.) Of the 11 sources please give your top 3 most trusted sources, where 1 is the most trusted source, 2 is the second most trusted, and 3 is the third most trusted source. (Scale code: 1=most trusted source, 2= second most trusted, and 3=third most trusted source.)

- 11a. AgriNet .....
- 11b. Area livestock specialist .....
- 11c. Breed Association .....
- 11d. County Extension Agent .....
- 11e. "Cowman" Magazine .....
- 11f. High Plains Journal .....
- 11g. Internet .....
- 11h. Local Daily Newspaper .....
- 11i. Local Weekly Newspaper .....
- 11j. Local Veterinarian .....
- 11k. USDA .....

The last 7 questions are for demographic purposes:

12. **At any one given time, what is the largest number of cattle you have in your operation, regardless of ownership?** .....

13. **What is your type of cattle operation?** .....

14. **What is your age?** .....

15. **What is your gender?**

- ☐ **Male** (enter code 1 and continue) .....
- ☐ **Female** (enter code 3 and continue) .....

16. **What is the highest level of education you have achieved?**

- ☐ None
- ☐ High School
- ☐ Associate
- ☐ Bachelors
- ☐ Masters
- ☐ Education Specialist
- ☐ Professional (J.D., etc.)
- ☐ Doctorate

17. **Are you employed in other work besides cattle production?**

- ☐ **YES** – (Enter code 1 and continue) .....
- ☐ **NO** – (Enter code 3 and continue)
- ☐ **Refuse to Answer** (Enter code 9 and continue)

18. **Do you own a computer?**

- ☐ **YES** – (Enter code 1 and continue) .....
- ☐ **NO** – (Enter code 3 and continue)
- ☐ **Refuse to Answer** (Enter code 9 and continue)

19. **Does your home/office have internet access?**

- ☐ **YES** – (Enter code 1 and continue) .....
- ☐ **NO** – (Enter code 3 and continue)
- ☐ **Don't Know or Refuse to Answer** (Enter code 9 and continue)

We would like to thank you for your time and involvement in this important research. You have the opportunity of receiving the final report outlining the responses to this survey. If you would like a copy, I will be glad to take your name and place your mailing information on a list for the future mailing.

## **APPENDIX D**

Cindy Blackwell, Ph.D.  
Assistant Professor  
Agricultural Education, Communications, & 4-H Youth Development  
Oklahoma State University

Dwayne Cartmell, Ph.D.  
Assistant Professor  
Agricultural Education, Communications, & 4-H Youth Development  
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Charles Cox, Ed.D.  
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William Weeks, Ph.D.  
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Scott Dewald  
Executive Vice President  
Oklahoma Cattlemen's Association

Board of Directors  
Oklahoma Cattlemen's Association

Heather Buckmaster  
Executive Director  
Oklahoma Beef Industry Council

Becky Brewer, DVM  
State Veterinarian for Oklahoma

## VITA

Marcus Anthony Ashlock

Candidate for the Degree of

Doctor of Philosophy

Dissertation: THE UNCERTAINTY OF AGROTERRORISM: A STUDY OF  
OKLAHOMA BEEF PRODUCERS' RISK PERCPETIONS, INFORMATION  
SOURCES AND SOURCE TRUST IN THE PRE-CRISIS STAGE

Major Field: Agricultural Education

### Biographical:

Personal Data: Born in Walnut Ridge, Arkansas, on January 6, 1970, the son of Anthony and Janene Ashlock

Education: Graduated from Valley Springs High School, Valley Springs, Arkansas in May 1988; received Bachelor of Science in Agriculture degree from Arkansas State University, Jonesboro, Arkansas in May 1994 and a Master of Arts degree in Interpersonal and Organizational Communication from the University of Arkansas at Little Rock, Little Rock, Arkansas in December 2004 and currently enrolled at Oklahoma State University, Stillwater, Oklahoma seeking a Doctor of Philosophy degree in Agriculture Education, expected graduation May 2006.

Experience: Employed by Tyson Foods, Inc. as a line supervisor, 1994-1995, 1996-1998; Plant Safety Manager, 1998-1999; Corporate Trainer for Management/ Leadership Development, 1999-2003. Employed by Oklahoma State University as a doctoral Research Associate in the Department of Agriculture Education, Communication, and 4-H Youth Development, 2003 – present.

Professional Memberships: American Society of Training and Development, American Association of Agriculture Educators, Agriculture Communicators in Education, International Communication Association, Southern Association of Agricultural Scientists.

Name: Marcus Anthony Ashlock

Date of Degree: May, 2006

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: THE UNCERTAINTY OF AGROTERRORISM: A STUDY OF  
OKLAHOMA BEEF PRODUCERS' RISK PERCEPTIONS,  
INFORMATION SOURCES AND SOURCE TRUST IN THE  
PRE-CRISIS STAGE

Pages in Study: 116

Candidate for the Degree of Doctor of Philosophy

Major Field: Agricultural Education

Scope and Method of Study: The purpose of this statewide study was to determine Oklahoma beef producers' perceptions of the susceptibility of the Oklahoma beef industry to a terrorist attack, and the sources of information Oklahoma beef producers use and trust when they seek information about agriculture during a crisis. Participants in this study were randomly selected from a population of 48,000 beef producers in Oklahoma. All 470 respondents completed a telephone survey conducted by the Oklahoma Agricultural Statistics Service. Descriptive statistics, *t-tests*, and cross tabulations were used to analyze the data.

Findings and Conclusions: Oklahoma beef producers perceived the beef industry was susceptible to an agroterrorism event; believed the feedlots to be at an elevated level of threat; were confident in their own operation's bio-security measures; believed their own operation was not susceptible to an agroterrorism event; and did not believe they had enough information about protection from terrorism to the beef industry. Producers looked to their veterinarians when seeking information about animal health issues and any agriculturally related crisis; and preferred to receive information through county extension publications. They also perceived the local veterinarian as the most trusted and reliable source of information available. The OSU Cooperative Extension Service, through the county extension agents and the local area livestock specialists, and the USDA were also trustworthy and reliable sources.

ADVISER'S APPROVAL: Dr. James G. Leising

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