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Keywords

Research Research Agroterrorism, Implications, Uncertainty, Agricultural Communicators, organizational crisis

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Agroterrorism and the Implications of Uncertainty Reduction Theory for Agricultural Communicators

Marcus A. Ashlock, James G. Leising, and D. Dwayne Cartmell II

Abstract

As a consequence of various terrorist attacks on U.S. soil the vulnerability of American agriculture to an agro-terrorist attack has come into question. The objective of this paper is to view the threat of agroterrorism through the lens of uncertainty reduction theory and extend the original application of the theory from the realm of interpersonal communication to the mass communication level. We offer a brief overview of bioterrorism and agriculture and the general concepts of crisis communication and pre-crisis preparedness. We explain the relationship between the level of uncertainty and organizational crisis with the value of pre-crisis planning efforts. We show the importance of the agricultural communicator as a source of agricultural knowledge in the pre-crisis stage, which can contribute to reducing uncertainty following an agro-terrorist event.

Introduction

“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, maintains the result of a bioterrorism attack aimed at the food and fiber system has a less offensive appearance than an attack causing the deaths of humans. Others agree, as Davis noted, agricultural terrorism is more about crippling the economy than killing animals (Peck, 2005; Monke, 2005). According to Sheeran (2002) when thinking about bioterrorist scenarios, the general public usually thinks of human threats rather than potential terrorist targets of the food and fiber system. 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).

Foxell (2003) maintained the uses of agroterrorism range from small protesting groups making political statements to organized state or sub-state factions trying to cripple the government through covert warfare. According to Casagrande (2000) internationally obtained pathogens have the potential to cause severe damage to the food and fiber system when used by knowledgeable individuals

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.

In our current state of affairs in the Middle East and Iraq, the possibility of 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.

Objective

The objective of this paper was to synthesize research affecting the agricultural communication profession within the context of Berger and Callabrese’s (1975) Uncertainty Reduction Theory. Viewing this potential threat of agroterrorism through the lens of Uncertainty Reduction Theory will increase the boundaries of the original interpersonal communication application of the theory to an organizational and mass communication level of application. To do so, the following areas were reviewed: (1) a historical overview of bioterrorism and agriculture, (2) the concepts of agromovement, (3) general concepts of organizational crisis communication response and pre-crisis preparedness.

Procedures

To gather data to meet the objectives, a search was conducted through various sources: 1) Index/Database searches including Agricola, Proquest, ERIC Digest, and Proquest Digital Dissertations, 2) books pertaining to crisis communication, and 3) Internet searches regarding historical accounts and governmental responses to the subject. Articles were grouped under themes found in the literature: types of agents and history of usage, crisis communication response, and the implication of terrorism on the food and fiber industry. A review of literature regarding Uncertainty Reduction Theory extended through recent communication theory textbooks to the origins of the theory over 50 years ago. Key word searches included publications associated with *bioterrorism*, *agroterrorism*, *food and agricultural crises*, *crisis and risk communication*, *risk assessment*, *livestock transportation*, and *uncertainty reduction theory*.

Findings

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. According to Bradac (2001) humans naturally seek explanation and predictability with the world, and do so by attempting to reduce uncertainty. In the attempt to make sense of messages and their meanings, miscommunication can result.

During human interaction, internal questions begin to arise about personal expectancy, predict-

ability, 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; and 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 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.

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 component, 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 component 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 Heider'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).

Berger and Calabrese (1975) with their seven axioms of uncertainty reduction, 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).

Why Uncertainty Reduction Theory?

Goldsmith (2001) maintains 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 “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).

More importantly, researchers have continued the expansion of the theory past its interpersonal beginnings. For example, 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).

Clearly, the two main components as described by Berger and Calabrese (1975), predictability and retroactive understanding, are two factors imbedded in the research of agroterrorism and its effect on crisis communication: terrorist acts are, by nature, unpredictable and due to the lack of empirical evidence, its is difficult to make sense of past acts in order to expand one’s ability or skill in terrorist behavior prediction.

Defining Bio/Agroterrorism

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).

History of Bioterrorism and Agriculture

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 using dead bodies to contaminate water supplies (Sheeran, 2002). “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 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 their use in warfare.

According to Casagrande (2000) history shows crop pests with the worst U.S. damage records were initially introduced by accident from international origins. 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).

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.

Agromovement: Livestock Movement and Concentration

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.)

According to Knowles, et al. (2005) a disruption, or even the potential interruption, of this system of animal movement will include subsequent economic repercussions, especially to the thousands of industry employees in the food supply chain. For example, Knowles, et al. maintains, 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).

Lane (2002) maintains effective agroterrorism prevention and response efforts should include regional and locally targeted attention to the impact to the local communities; and this focus should be coordinated nationally in order to reduce uncertainty and miscommunication. One national 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).

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).

According to Casagrande (2000) only a few animals from any one of the nation’s major feedlots would need to be contaminated in order to infect nearly all of the entire U.S. cattle population. Casagrande (2000) maintains the centralized feeding, raising, shipping and processing advantages of the livestock industry is also the “Achilles heal;” making it relatively vulnerable to the introduction of a highly contagious disease through one animal, rather than a coordinated effort of mass contamination.

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.

Crisis Communication Response

Seeger, et al. (2003) maintained the inability to move through effective recovery after a crisis can be brought on by poor communication. 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).

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.

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. Organizations can benefit from the proper handling of a crisis, but to do so, it is imperative to maintain effective communication efforts (Ulmer & Sellnow, 2000).

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)

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).

Theoretical Application to Agroterrorism

In its first postulation over 30 years ago, uncertainty reduction was applied to interpersonal communication relationships. Theorists have historically used this explanation as a method to explain the communication interaction between individuals, groups of people, and organizations. Recently, theorists have recognized its transcendence to other levels of communication; for example, Boyle, et al. (2004) maintains 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).

Thus, this theory may also be applied to larger events, such as an agroterrorism incident, when viewed from the perception of the individual experiencing the crisis and the communication interactions and information seeking with media and organizations in order to reduce the uncertainty and anxiety brought to bear through the crisis. 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). Boyle, et al. (2004) maintained through events covered through the media, such as a crisis, the public used current news coverage to seek ongoing information regarding the tragedy; this seeking of knowledge was key to reducing the discomfort associated with high levels of uncertainty in the days after 9/11. 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).

Gudykunst, et al. (1995), also maintains people have natural uncertainty thresholds, and by being above the maximum limits or below the minimum limits, cause people to feel uncomfortable and experience difficulties in attempting to communicate effectively. Gajduschek (2003) asserts by merely minimizing levels of uncertainty people greatly increase the ability to calculate and predict actions and outcomes.

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).

Seeger, Sellnow and Ulmer (2003) maintain there’s an inhibition of the public’s ability to effectively assess the potential harm and risk of a situation if an organization has failed to supply or support a healthy exchange of information. Therefore, the caveat for the field of agricultural communications is remembering the public’s ability to predict behavior is inherently affected by uncertainty, but, more importantly, if agricultural communicators fail to supply timely information, the problem is exacerbated.

Seeger, Sellnow and Ulmer (2003) go on to state, “uncertainty reduction enables organizations to diminish ambiguity, build consensual meaning, and coordinate efforts” (p.71). In an effort to reduce this uncertainty, 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.

Conclusions and Recommendations

The threat of agroterrorism is real (Sequeira, 1999; Monke, 2005). 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 outright destruction or by simply affecting the outcome of harvest yields, causing food shortages. Animals are susceptible to diseases potentially causing death or disruption to reproduction capabilities, again, causing potential food shortages. Any disruption to the food supply chain, especially an interruption of animal transportation or product shipping, could have a devastating affect on food process from farm to fork and, at the very least, an economically devastating effect to production agriculture.

Terrorism to the food and fiber system, by creating sickness in food animals or humans, can create a heightened uncertainty regarding basic food choices. This ubiquitous uncertainty can be seen with the recent issue of salmonella contaminated tomatoes and the constant change in the weekly

advice from the government, as well as its ambiguous opinions on the safety of tomato consumption and the origin of the salmonella contamination.

This paper supports the Brown (1999) assertion that increasing awareness is our only defense to such events. Proper planning, through effective crisis communication efforts, has the capability of reducing individual stress or public chaos by providing information and guidelines to be followed or replicated by any person or group. However, with the amount of information available in the digital age, 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. Ambiguous information can lead the public to question their knowledge about or their ability to understand or manage this new crisis information.

Agricultural communication professionals, who are readily positioned to provide information regarding agricultural issues, have the opportunity to reduce this miscommunication uncertainty and potentially alter the negative effects of a potential agroterrorism event. Agricultural communicators, by providing relevant and timely information to the public, will have an inherent impact on the public's ability to understand the scope of the crisis and assist those publics to effectively respond and recover from the incident. This work in the pre-crisis environment will allow agricultural communicators an opportunity to shape the way people and organizations manage their way through a crisis, once it's introduced. The potential savings of the pre-crisis planning and communication efforts not only save time but also reduce the resources expended to manage and recover from the crisis.

Recommendations for Future Research

The scope of information disruption caused by a crisis could be limited by having tested communication plans in place to assist in the management of a particular crisis. These effective agricultural communication plans could mean the difference between chaos and ordered preparedness. It is recommended future research be aimed at answering the following questions to create clarity in the field of crisis communication responses to agroterrorism events through effective agricultural communications research efforts:

What are the basic safety information requirements for society to protect individual health in the event of widespread food contamination? Researching answers to this question will lead studies down the various paths of information dissemination and communication channels, as well as research regarding the message content and framing to ensure shared meaning between the sender and receiver.

How could effective communication planning in county, state, and federal government levels aid in the prevention, handling, or management of a situation involving agroterrorism? While the immediate command and control response is vital to the successful management of a crisis, emergency planning must include the management of information before, during and after a crisis. While research regarding pre-crisis information source trust and reliability has been conducted (Ashlock, 2006), a further look into the content and usability of this information should be studied in order to determine its effectiveness in order to reduce uncertainty for stakeholder groups, from producers to consumers, as well as emergency response personnel.

What is the need for public education in the areas of hazard identification, prevention, or the remediation of the impact of an agroterrorism incident? Research should focus on studying the gap between what stakeholder groups need to know for a successful response to a crisis event and what those groups currently know or think they know. Research outcomes could assist agricultural communicators to create focused or strategic communication efforts in order to raise awareness regarding crisis planning, response and recovery by closing the knowledge gap.

What educational materials should be developed to increase the awareness of agroterrorism on the secondary and post-secondary level? Although agricultural educators were not identified as a potential source of information (Ashlock, 2006), future research should assess the strategy of disseminating information regarding agriculturally related crises at a pre-college age through the use of the high school agriculture classroom. This research has the potential for educational and training efforts to be designed to ensure agricultural education professionals become local trustworthy and reliable sources of information during an agriculturally related crisis.

Keywords

agroterrorism, uncertainty reduction theory, crisis communications

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