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Texas and Southwestern Cattle Raisers Association Members' Preferred Sources of Animal Health Information

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Abstract
The nation's agriculture and food infrastructure is vulnerable to significant social disruption and economic loss from hazards. Biological hazards, such as animal disease epidemics, have resulted in millions of dollars of economic loss and the death of millions of livestock in the past, and it will happen again unless infrastructure stakeholders adopt proper preventative measures. From farm to plate, defense starts on the farm with producers. With the multitude of potential hazards, many factors influence livestock producers' protective action decision process. A major factor in the decision to take a protective action is from where or from whom the threat information originates. By identifying preferred sources, perceived credible sources, and preferred formats of animal health information by producers, risk communicators can more effectively develop critical animal health warnings and messages to promote rapid detection of hazards. This study targeted 7,661 members of the Texas and Southwestern Cattle Raisers Association. An online questionnaire developed from previous research with similar populations allowed TSCRA members to respond to questions related to the objectives of this study. A representative sample of TSCRA members from Texas, Oklahoma, and New Mexico responded and identified high levels of perceived trust and reliability in local veterinarians as a source of information along with livestock associations and county extension offices. TSCRA members also indicated they have multiple preferred formats for receiving animal health information. By using this information when communicating possible hazards, protective action from such threats will become more probable in this population.

Keywords
Agrosecurity, vulnerability, animal health, protective active decision model, information sources, disaster management, risk communication

Research

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Patrick R. Allen, Traci L. Naile, Tom A. Vestal and Monty Dozier

Abstract

The nation's agriculture and food infrastructure is vulnerable to significant social disruption and economic loss from hazards. Biological hazards, such as animal disease epidemics, have resulted in millions of dollars of economic loss and the death of millions of livestock in the past, and it will happen again unless infrastructure stakeholders adopt proper preventative measures. From farm to plate, defense starts on the farm with producers. With the multitude of potential hazards, many factors influence livestock producers' protective action decision process. A major factor in the decision to take a protective action is from where or from whom the threat information originates. By identifying preferred sources, perceived credible sources, and preferred formats of animal health information by producers, risk communicators can more effectively develop critical animal health warnings and messages to promote rapid detection of hazards. This study targeted 7,661 members of the Texas and Southwestern Cattle Raisers Association. An online questionnaire developed from previous research with similar populations allowed TSCRA members to respond to questions related to the objectives of this study. A representative sample of TSCRA members from Texas, Oklahoma, and New Mexico responded and identified high levels of perceived trust and reliability in local veterinarians as a source of information along with livestock associations and county extension offices. TSCRA members also indicated they have multiple preferred formats for receiving animal health information. By using this information when communicating possible hazards, protective action from such threats will become more probable in this population.

Key Words

Agrosecurity, vulnerability, animal health, protective active decision model, information sources, disaster management, risk communication

Introduction/Need for the Study

The nation's agriculture and food infrastructure is vulnerable to biological hazards that could result in significant economic and social disruptions (Breitmeyer, Whiteford, & Shere, 2004; Horn & Breeze, 2006; Spellman, 2008). Biological hazards, such as animal disease epidemics, have resulted in millions of dollars of economic loss and the death of millions of livestock in the past (Knowles, 2005; Thompson et al., 2002). Protection of the agriculture and food infrastructure is the responsibility of all stakeholders in the food supply chain. Though the chain is composed of many stakeholders, livestock producers emerge as the first line of defense against animal health hazards, such as disease epidemics that threaten food supply security and animal production (Ceddia, Heikkila, & Peltola, 2008; Dement, 2008). With varying attitudes and perceptions toward the amount of acceptable risk among livestock operations, the value placed on risk communication messages varies by individual livestock

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owner (Ceddia et al., 2008; Lindell & Perry, 2004). By identifying preferred sources, perceived credibility in these sources, and preferred formats of animal health information, risk communicators can help reduce agricultural vulnerability by more effectively reaching livestock producers with critical hazard information.

Literature Review

Agricultural vulnerability encompasses many hazards, including biological, affecting the agriculture and food infrastructure that, according to Lindell, Prater, Perry, & Nicholson (2006), is very complex due to the multitude of species involved in the agricultural sector. Spellman (2008) defines the agriculture and food infrastructure as "the physical production and distribution systems critical to supporting national security and economic well-being, including all activities essential to food, feed, and fiber production, including all techniques for raising and processing livestock" (p. 8).

In the United States, the agriculture and food infrastructure has such great importance globally that in 2003 it was listed as a critical infrastructure to be protected under Homeland Security Presidential Directive 7 (Horn & Breeze, 2006; Ceddia, Heikkila, & Peltola, 2008). The Marsh Report first defined infrastructures in 1997 as a "network of independent, mostly privately owned, manmade systems that function collaboratively and synergistically to produce and distribute a continuous flow of essential goods and services" (Lewis, 2006). In the U.S. agriculture and food infrastructure, an animal disease outbreak in the beef industry would cost an estimated $750,000 to $1 million per minute (Knowles, 2005). This potential impact was observed in the 2001 foot-and-mouth disease outbreak in the United Kingdom that led to the depopulation of more than 11 million cattle, 42 million sheep, and 6.5 million pigs (Thompson et al., 2002).

Beyond local economic impacts, biological events cause consumer distrust and trade restrictions for the infected country in an industry that exports $140 billion in goods and provides 860,000 jobs annually, as evidenced by restrictions on the United States during the 2002-2003 exotic Newcastle outbreak in California (Breitmeyer et al., 2004; Horn & Breeze, 2006; USDA-APHIS, 2007). Distrust by consumers in the agriculture and food infrastructure after a disease outbreak is very well documented, even after the outbreak has been controlled (Breitmeyer et al., 2004; Lindell & Perry, 2004; USDA-APHIS, 2007).

Producers are vital in reducing agricultural vulnerability and preventing the associated social and economic impacts (Dement, 2008). It is imperative producers adopt hazard adjustments through biosecurity measures and surveillance of herds to reduce the chance of a disease outbreak (Dement, 2008). The decision to adopt any protective action, such as monitoring a herd in conjunction with biosecurity practices, involves several stages, including an information-seeking stage (Lindell & Perry, 2004). Individuals often seek and use hazard information from perceived reliable and trustworthy sources (Lindell & Perry, 2004). A protective action decision is the decision to take pre-hazard impact actions based on cues, warnings, and receiver characteristics (Lindell & Perry, 2004).

The perception of credibility in an information source can increase compliance with protective action recommendations and is a critical part of risk communication (Lindell & Perry, 2004; Kasperson & Stallen, 1991). In risk communication, the ultimate goal is to influence a protective action in the message receiver (Lindell & Perry, 2004). Information from a credible source is more likely to reach this goal through accurately conveying the real threat of the hazard and gaining notice by the receiver (Lindell & Perry, 2004).

Credibility is built over time through reliable and trustworthy communication from the organization (Kasperson & Stallen, 1991). Kasperson and Stallen (1991) suggest trust in communication

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refers to the "expectancy that a message received is true and reliable and that the communicator demonstrates competence and honesty by conveying accurate, objective, and complete information" (p. 179). Kasperson and Stallen (1991) further break trust into five substructs: perceived competence, objectivity, fairness, consistency, and faith. Trust does not require equality from all substructs to exist due to a higher weight placed on any one over another by the receiver; however, trust exists through all five components (Kasperson & Stallen, 1991).

Trustworthy sources of information are used by stakeholders to overcome a deficiency in knowledge and are important in developing disaster resiliency (Hardenbrook, 2005; Williams & Noyes, 2007). Risk information, regardless of the hazard, is internalized by the receiver, and the process to determine a need for protective action is initialized (Eiser, Miles, & Frewer, 2002; Lindell & Perry, 2004). The level of trust and distrust in the source of the risk information influences the decision to continue the protective action process if the source is trusted or to disregard the information as unreliable from an untrusted source (Eiser et al., 2002).

In a consumer study by Rosati and Saba (2004), the government and food industry was perceived as responsible for food safety assurance. However, the same study also found government organizations perceived as least honest sources of food hazard information, while private consumer and environmental organizations were most trusted. Dunaway and Shaw (2010) found the public to place higher expectations on private organizations and local authorities for providing security and safety to their communities than on federal organizations. Further, trust in industry has eroded with government over the past 40 years (Peters, Covello, & McCallum, 1997). However, this same study cites citizen groups are trusted over other sources (Peters et al., 1997).

A source credibility problem in information sources poses a problem in effective risk management and decision-making (Peters et al., 1997). The U.S. government, through presidential directives, has been charged to protect the nation's critical infrastructures (HSPD-7, 2003; HSPD-9, 2004). Producers receive information from various organizations in an effort to prevent or rapidly control a biological hazard before it becomes on outbreak (Spellman, 2008). In an effort to influence a protective action, communicating risk to specific populations, such as producers, depends on trust and credibility in the source of information (Eiser et al., 2002; Lindell & Perry, 2004; Peters et al., 1997).

Theoretical Framwork

Lindell and Perry's (2004) protective action decision model (PADM) provided a foundation for this study. The PADM (see Figure 1) characterizes the way people typically make decisions to protect against environmental and biological hazards (Lindell & Perry, 2004). Lindell and Perry (2004) designed the model to account for various cues and warnings an individual may receive pre-hazard impact. They also factored the influence of risk communication on an individual in making protective action decisions (Lindell & Perry, 2004).

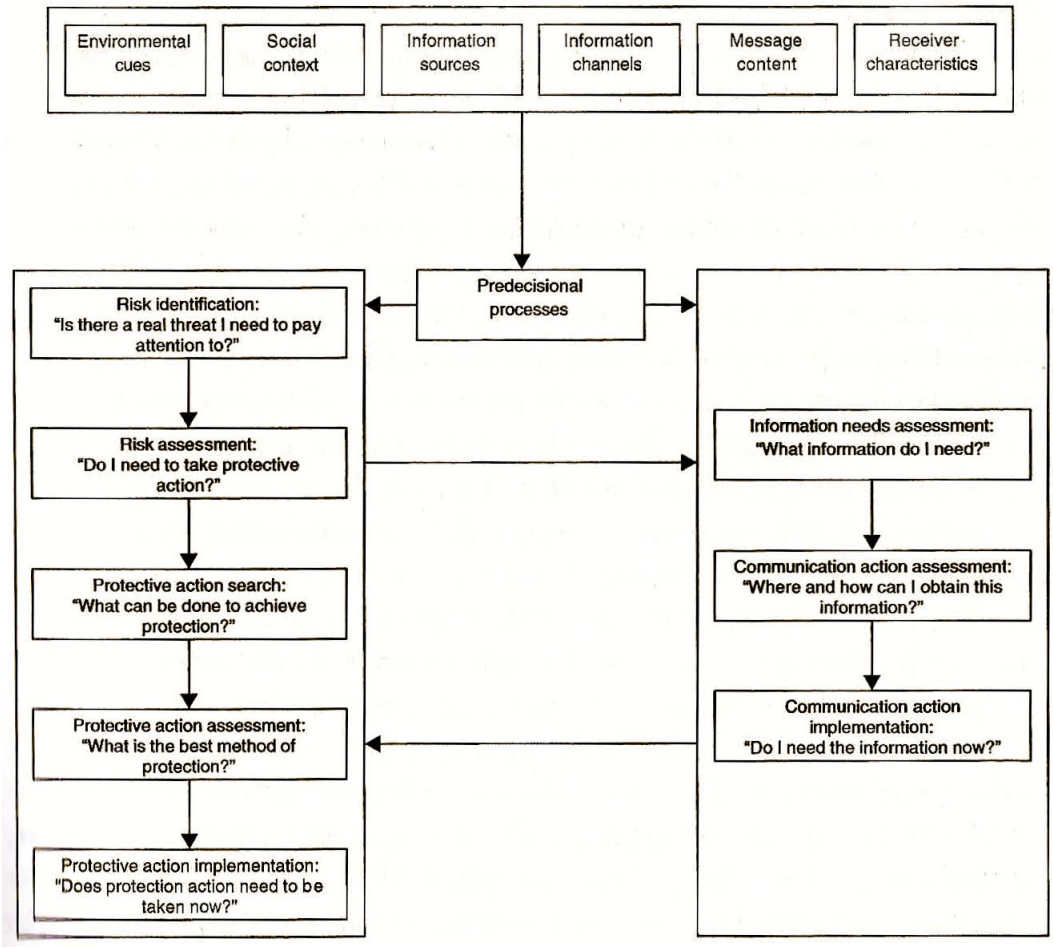

Figure 1: Protective Action Decision Model (Lindell & Perry, 2004)

The PADM requires a definitive answer for each stage and accounts for information-seeking behaviors in the search for answers. Ultimately, individuals will reach a determination as to how and when to implement protective actions after completing the stages in the model (Lindell & Perry, 2004). This study focused primarily on risk communication of animal health information opposed to the actual protective actions; therefore, only the predecisional processes and information-seeking stages of the model are used.

Predecisional processes

The PADM suggests various cues or warnings initiated through risk communication prompt three predecisional processes required to bring the hazard to the awareness of an individual: exposure to cues, attention to cues, and interpretation of cues (Lindell & Perry, 2004). For this study, cues may be characterized by a producer's or neighboring producer's animals becoming sick and dying (Lindell & Perry, 2004).

Warnings of biological threats to animals in a certain area by local, state, or federal animal health professionals serve as an example of risk communication messages. Lindell & Perry (2004) found both cues and warnings are somewhat frivolous unless individuals are exposed to, understand, and take action based on the information. Once the three predecisional processes are completed, individuals will continue to the decision stages, as noted on the left side of Figure 1 (Lindell & Perry, 2004). The decision stages encompass the actions an individual will take to make the decision to protect themselves or not (Lindell and Perry, 2004). These are supplemented by the information-seeking

activities an individual takes in order to complete each decisional stage (Lindell and Perry, 2004).

Information needs assessment

This activity is initiated by insufficient information to proceed further through the PADM core stages (Lindell & Perry, 2004). Frequency and previous exposure to the hazard affect an individual's knowledge of appropriate protective actions (Lindell & Perry, 2004). Subsequently, the next stage is where to get the information, once it is determined that more information is needed (Lindell & Perry, 2004).

Communication action assessment

The range in sources of information used is vast and varies among groups of individuals and hazards (Lindell & Perry, 2004). Individuals likely will seek information from a source they believe is credible. This may not be a government official or local authority; however, it may be a peer or local opinion leader (Lindell & Perry, 2004; Peters et al., 1997).

Communication action implementation

The final step can have one of three outcomes (Lindell & Perry, 2004). The information either is considered reliable and is used, is determined unreliable and not used, or is no longer desired and sought through another source or channel (Lindell & Perry, 2004).

Purpose and Objectives

The purpose of this study was to examine the effectiveness of risk communicators in reaching livestock operations with critical animal health hazard information and warnings. The information presented in this paper is part of a larger study that examined Texas and Southwestern Cattle Raisers Association members' perceptions related to their herds' vulnerability to disease, their preparedness to respond to animal disease outbreaks, and their preferred sources of information about animal health. Four objectives related to TSCRA members' preferences for receiving animal health information were identified:

1. Identify members' preferred sources of animal health information.
2. Identify sources of animal health information perceived by members to be reliable.
3. Identify sources of animal health information perceived by members to be trustworthy.
4. Identify members' preferred formats for receiving animal health information.

Methods

Population

The population for this study was members of the Texas and Southwestern Cattle Raisers Association who were accessible via the TSCRA email list. Founded in 1877, the TSCRA has a 138-year history with livestock producers in Texas and surrounding states and is the largest livestock association in Texas (TSCRA, 2011). With more than 15,000 member families representing more than 4 million head of cattle, TSCRA's mission is to protect "the stewards of land and livestock in the Southwest" (TSCRA, 2011).

TSCRA members include of a wide variety of livestock owners with varying degrees of ownership as implied by its membership application (TSCRA, 2011). The researchers verified livestock ownership through demographic questions regarding number of livestock owned or managed. According to TSCRA, approximately 7,661 members were contacted through the ConstantContact®

system during this study. Using this number, at a confidence level of 95% and a margin of error of 5%, the representative target sample size was determined to be 367 responses (Krejcie & Morgan, 1970). Only TSCRA members who used the ConstantContact® system were contacted for this study, which according to TSCRA's magazine The Cattleman January 2012 issue, is nearly half of its 2011 total membership of 15,500 (Haynie, 2012).

Instrumentation

An online questionnaire was developed based on instrumentation used in previous studies of Oklahoma beef producers (Ashlock, 2006) and Kansas beef feedlot managers (Riley, 2007). Additional questions were generated based on pertinent literature and expert opinions. The instrument was divided into five sections based on the research objectives of the larger study: perceptions of vulnerability, perceptions of preparedness, perceptions of barriers to making hazard adjustments, sources of information, and demographics.

Validity & Reliability

Validity of the instrument was established through panels of experts in two previous studies using the same instrument (Ashlock, 2006; Riley, 2007). An additional panel of experts reviewed the instrument and established face and content validity for this study. In this study, a post-hoc reliability analysis was performed for the two scales used in the instrument. The correlation coefficients calculated using Cronbach's alpha were .879 and .783.

Data Collection

The TSCRA ConstantContact® email system was used to distribute the survey request to members. Researchers submitted a draft notice and reminder email to the point of contact at TSCRA headquarters. This person formatted the message into the ConstantContact® program and sent it to members at the direction of the researchers. SurveyMonkey.com®, an online survey tool, was used to collect responses from the target population during a two-week period.

The first notice was sent to 7,661 members on April 19, 2011. TSCRA recorded 279 bounce backs from this initial email and 14 spam notices. After the initial notice, the survey was allowed to run for one week before a reminder email was sent via ConstantContact® on April 26, 2011. This email was sent to 7,643 recipients; however, 262 messages bounced back and 5 spam reports were recorded. The discrepancy in mailing list quantities from the first and second notice is explained through the deletion of members from TSCRA's ConstantContact® system not related to this study. The survey was closed May 3, 2011, after a representative sample was attained (n = 570). Due to the loyalty to agreements between TSCRA and TSCRA members, only two ConstantContact® emails were allowed to be distributed.

The Statistical Package for Social Sciences (SPSS®) was used to analyze the data of this study. For analysis of the objectives, descriptive statistics were used, including means, standard deviations, modes, medians, frequencies, and ranges. The scaled items used to gather participant responses were interpreted as 1.00 – 1.44 = disagree, 1.45 – 2.44 = somewhat disagree, 2.45 – 3.44 = neutral, 3.45 – 4.44 = somewhat agree, and 4.45 – 5.00 = agree.

Discussion

For objective 1, respondents were asked to rate their level of agreement for information sources (see Table 1) sought regarding animal health issues.

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Table 1
Information Sources Sought by TSCRA Members (f = 570)

Information Sources	Level of Agreement %						
	D	SDA	N	SA	A	*M*	*SD*
Local or consulting veterinarian	1.9	2.1	8.6	27.6	59.5	4.41	.881
Livestock associations	2.1	2.0	7.6	33.0	55.3	4.37	.873
Internet	4.5	3.0	10.2	40.0	42.3	4.13	1.02
Magazine	3.9	3.5	12.5	46.8	33.3	4.02	.976
Other livestock producers	2.7	4.3	13.8	47.7	31.4	4.01	.933
County extension office	8.8	7.5	20.8	31.8	31.2	3.69	1.23
State land-grant institution	15.5	6.3	24.4	25.0	28.8	3.45	1.37
USDA	13.5	8.6	26.8	29.5	21.5	3.37	1.28
Local agricultural retailers/service providers	14.2	7.3	24.1	39.6	14.8	3.34	1.23
Television news	25	10.7	20.6	28	15.7	2.99	1.42
Radio news	25.1	12	26.3	22.6	14	2.88	1.38
Weekly newspaper	34.4	7.6	16.9	27.4	13.7	2.78	1.49
Daily newspaper	40.2	9.2	18.6	21.6	10.4	2.53	1.45
High school agriculture science teacher	46.3	14.9	25.9	9.1	3.8	2.09	1.19

Note. Scale interpreted as 1.00 – 1.44 = disagree (D), 1.45 – 2.44 = somewhat disagree (SDA), 2.45 – 3.44 = neutral (N), 3.45 – 4.44 = somewhat agree (SA), and 4.45 – 5.00 = agree (A).

Respondents were given the option to provide sources of information they use other than those provided in the questionnaire in the "other (please describe)" text box. Sixteen responses were recorded and are as follows: APHIS-CDC, consult with Noble Foundation, emails from Texas Animal Health Commission (listed by three other respondents), emails from state veterinarian, fellow veterinarians, professional meeting/literature/veterinary journals, my farm manager, Texas professional school resources, i.e. Texas A&M University, trade magazines and newspapers, TSCRA, meeting at local auction barns, and Livestock Weekly.

For the information sources provided, the highest level of agreement was reported for the local or consulting veterinarians (M = 4.41, SD = .881, Mdn = 5.00) as a sought-after source of information by TSCRA respondents. Respondents somewhat agreed state land grant institution (university) (M = 3.45, SD = 1.37, Mdn = 4.00), magazines (M = 4.02, SD = .976, Mdn = 4.00), county extension office (M = 3.69, SD = 1.23, Mdn = 4.00), other livestock producers (M = 4.01, SD = .933, Mdn = 4.00),

Internet (*M* = 4.13, *SD* = 1.02, *Mdn* = 4.00), and livestock associations (*M* = 4.37, *SD* = .873, *Mdn* = 5.00) are sought-after sources of information.

Respondents were neutral on the daily newspaper (*M* = 2.53, *SD* = 1.45, *Mdn* = 3.00), weekly newspaper (*M* = 2.78, *SD* = 1.49, *Mdn* = 3.00), television news (*M* = 2.99, *SD* = 1.42, *Mdn* = 3.00), radio news (*M* = 2.88, *SD* = 1.38, *Mdn* = 3.00), USDA (*M* = 3.37, *SD* = 1.28, *Mdn* = 4.00), and local agricultural retailers/service providers (other than veterinarian or extension office) (*M* = 3.34, *SD* = 1.23, *Mdn* = 4.00) as information sources. Respondents somewhat disagreed high school agricultural science teachers (*M* = 2.09, *SD* = 1.19, *Mdn* = 2.00) were sought as animal health information sources. For the information sources provided to respondents in the questionnaire, no average respondent reported disagreement with any sources.

To identify reliable sources (objective 2) of information, respondents were given the same sources in the questionnaire and allowed the opportunity to mark their level of agreement regarding reliability of those sources (see Table 2).

Table 2

TSCRA Members' Perceived Reliable Information Sources (f = 570)

Information Sources	Level of Agreement %						
	DA	SDA	N	SA	A	*M*	*SD*
Local or consulting veterinarian	.4	1.4	4.7	22.7	70.8	4.62	.678
Livestock associations	.8	1.4	7.1	37.5	53.2	4.41	.751
County extension office	4.9	3.8	14.0	33.0	44.3	4.08	1.08
Other livestock producers	2.0	3.1	21.7	51.2	22.0	3.88	.853
State land-grant institution	7.9	3.6	21.6	27.4	39.5	3.87	1.20
Internet	3.8	5.4	23.5	48.6	18.7	3.73	.953
Magazine	5.5	6.7	20.6	45.9	21.2	3.70	1.05
USDA	8.4	4.6	25.6	32.9	28.5	3.69	1.18
Local agricultural retailers/ service providers	7.4	4.4	27.5	44.4	16.3	3.58	1.05
High school agricultural science teacher	19.6	13.0	43.0	17.2	7.2	2.79	1.16
Radio news	22.1	16.3	32.1	24.1	5.4	2.74	1.20
Weekly newspaper	26.0	16.1	24.3	27.8	5.8	2.71	1.28
Television news	26.7	16.8	28.3	23.8	4.4	2.62	1.23
Daily newspaper	32.2	19.3	28.4	16.9	3.2	2.40	1.19

Note. Scale interpreted as 1.00 – 1.44 = disagree (D), 1.45 – 2.44 = somewhat disagree (SDA), 2.45 – 3.44 = neutral (N), 3.45 – 4.44 = somewhat agree (SA), and 4.45 – 5.00 = agree (A).

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Respondents were given the opportunity to provide any reliable sources not listed in the "other (please describe)" text box.

Four responses were recorded and are as follows: APHIS – CDC, Noble Foundation is very good on research and programs offered, and the Texas Animal Health Commission. For the listed sources of information, the average TSCRA respondent agreed his or her local or consulting veterinarian (*M* = 4.62, *SD* = .678, *Mdn* = 5.00) is a reliable source of animal health information. For the magazines (*M* = 3.70, *SD* = 1.05, *Mdn* = 4.00), the Internet (*M* = 3.73, *SD* = .953, *Mdn* = 4.00), local agricultural retailers/service providers (other than veterinarian or extension office) (*M* = 3.58, *SD* = 1.05, *Mdn* = 4.00), other livestock producers (*M* = 3.88, *SD* = .853, *Mdn* = 4.00), the county extension office (*M* = 4.08, *SD* = 1.08, *Mdn* = 4.00), livestock associations (*M* = 4.41, *SD* = .751, *Mdn* = 5.00) the state land-grant institution (University) (*M* = 3.87, *SD* = 1.20, *Mdn* = 4.00), and the USDA (*M* = 3.69, *SD* = 1.18, *Mdn* = 4.00), respondents somewhat agreed these are sources are reliable.

While respondents disagreed with none of the provided sources, the average respondent felt neutral about radio news (*M* = 2.74, *SD* = 1.2, *Mdn* = 3.00), television news (*M* = 2.62, *SD* = 1.23, *Mdn* = 3.00), high school agricultural science teachers (*M* = 2.79, *SD* = 1.16, *Mdn* = 3.00), and weekly newspaper (*M* = 2.71, *SD* = 1.28, *Mdn* = 3.00) as reliable sources of information. Respondents somewhat disagreed the daily newspaper (*M* = 2.4, *SD* = 1.19, *Mdn* = 2.00) is a reliable source of animal health information.

To identify perceived trustworthy sources (objective 3) of animal health information used by TSCRA members, a five-point Likert scale was used to identify respondents' level of agreement with each source listed as trustworthy (see Table 3).

Table 3

Perceived Trustworthy Sources of Information by TSCRA Members (f = 570)

Information Sources	Level of Agreement %						
	D	SDA	N	SA	A	*M*	*SD*
Local or consulting veterinarian	.4	.4	4.5	22.3	72.3	4.65	.626
Livestock associations	1.1	.4	8.0	34.7	55.9	4.44	.747
County extension office	4.4	1.7	13.8	33.1	47.1	4.17	1.02
State land-grant institution	6.5	3.4	19.3	25.4	45.5	400	1.17
Other livestock producers	1.6	2.3	19.1	52.3	24.7	3.96	.823
USDA	6.6	4.5	23.2	31.4	32.3	3.74	1.20
Internet	3.8	6.7	27.2	45.8	16.5	3.65	.96
Local agricultural retailers/service providers	7.9	3.3	25.6	45.1	18.1	3.62	1.07
Magazine	8.3	7.2	21.9	46.4	16.1	3.55	1.10
High school agriculture science teacher	16.8	9.5	43.7	20.8	9.2	2.96	1.16
Radio news	20.1	16.1	35.4	23.0	5.4	2.78	1.17
Weekly newspaper	24.1	15.9	28.2	27.0	4.8	2.73	1.23
Television news	26.7	16.5	29.9	22.5	4.4	2.61	1.22
Daily newspaper	29.9	17.9	28.9	20.8	2.5	2.48	1.19

Note. Scale interpreted as 1.00 – 1.44 = disagree (D), 1.45 – 2.44 = somewhat disagree (SDA), 2.45 – 3.44 = neutral (N), 3.45 – 4.44 = somewhat agree (SA), and 4.45 – 5.00 = agree (A).

Following the listed sources, respondents were given the opportunity to identify trustworthy sources not listed. Four responses were recorded and are as follows: APHIS – CDC, the Cattleman Magazine, and the Texas Animal Health Commission was identified twice.

For the sources listed, TSCRA respondents agree the local or consulting veterinarian (*M* = 4.65, *SD* = .626, *Mdn* = 5.00) is a trustworthy source of animal health information. Respondents somewhat agreed magazines (*M* = 3.55, *SD* = 1.10, *Mdn* = 4.00), the Internet (*M* = 3.65, *SD* = .96, *Mdn* = 4.00), local agricultural retailers/service providers (other than veterinarian or extension office) (*M* = 3.62, *SD* = 1.07, *Mdn* = 4.00), the county extension agent (*M* = 4.17, *SD* = 1.02, *Mdn* = 4.00), livestock associations (*M* = 4.44, *SD* = .747, *Mdn* = 5.00), state land-grant institutions (universities) (*M* = 4.00, *SD* = 1.17, *Mdn* = 4.00), the USDA (*M* = 3.74, *SD* = 1.20, *Mdn* = 4.00), and other livestock producers (*M* = 3.96, *SD* = .823, *Mdn* = 4.00) are trustworthy. However, respondents were neutral on the daily newspaper (*M* = 2.48, *SD* = 1.19, *Mdn* = 3.00), weekly newspaper (*M* = 2.73, *SD* = 1.23, *Mdn* = 3.00), radio news (*M* = 2.78, *SD* = 1.17, *Mdn* = 3.00), television news (*M* = 2.61, *SD* = 1.22, *Mdn* = 3.00), and high school agricultural science teachers (*M* = 2.96, *SD* = 1.16, *Mdn* = 3.00) as trustworthy sources. Respondents neither disagreed nor somewhat disagreed with any sources of animal health information as being trustworthy.

Objective 4 aimed to identify the preferred format in which TSCRA members receive animal health information. A list of formats was provided for respondents to mark their level of agreement regarding their preferences. A five-point Likert scale was used with disagree denoting the lowest level of agreement and agree marking the highest agreement level (see Table 4).

Following the listed formats provided on the questionnaire, a free response text box marked "other (please describe)" was offered for respondents to identify formats that were not listed. Ten responses with multiple formats per response were recorded. Respondents identified educational presentations, seminars, trade shows, magazines, email, standard mail, Internet subscriptions to various daily livestock reports, my vet and livestock association magazines, peer reviewed research and statistically significant clinical trials, professional journals, Texas Animal Health Commission emails, TSCRA, USDA newsletters, and vet visits supplemented by follow-up on websites in the free response text box in this subsection.

For the formats listed in the questionnaire, the average TSCRA respondent indicated no high level of agreement for preferred formats to receive animal health information. Respondents indicated a somewhat agreement level for magazine articles (*M* = 3.70, *SD* = 1.12, *Mdn* = 4.00), newsletters (*M* = 4.04, *SD* = .984, *Mdn* = 4.00), websites (*M* = 3.75, *SD* = 1.11, *Mdn* = 4.00), standard mail (*M* = 3.8, *SD* = 1.1, *Mdn* = 4.00), county extension publications (*M* = 4.04, *SD* = 1.03, *Mdn* = 4.00), county extension meetings (*M* = 3.97, *SD* = 1.15, *Mdn* = 4.00), and livestock association meetings (*M* = 4.25, *SD* = 1.1, *Mdn* = 4.00). Respondents were neutral on radio news (*M* = 2.42, *SD* = 1.32, *Mdn* = 3.00), e-mail lists (*M* = 3.03, *SD* = 1.36, *Mdn* = 3.00), newspaper articles (*M* = 2.73, *SD* = 1.35, *Mdn* = 3.00), and e-mails (other than lists) (*M* = 3.08, *SD* = 1.33, *Mdn* = 3.00) as preferred formats to receive information.

From the listed formats, respondents disagreed on none of the preferred formats listed; however, they indicated a somewhat disagreement level for television news (*M* = 2.36 *SD* = 1.32, *Mdn* = 2.00), Facebook (*M* = 1.84, *SD* = 1.07, *Mdn* = 1.00), Twitter (*M* = 1.74, *SD* = .994, *Mdn* = 1.00), blogs (*M* = 1.85, *SD* = 1.05, *Mdn* =1.00), YouTube (*M* = 1.86, *SD* = 1.06, *Mdn* = 1.00), and RSS feeds (*M* = 2.19, *SD* = 1.15, *Mdn* = 2.00) as a preferred format.

Livestock producers have many options when it comes to gaining information regarding the health their livestock. Synthesizing this information and determining value can be a cumbersome

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Table 4

Formats Preferred by TSCRA Members (f = 570)

Formats	Level of Agreement %						
	D	SD	N	SA	A	*M*	*SD*
Livestock association meetings	2.1	2.3	12.3	35.6	47.7	4.25	.906
County extension publications	4.5	2.5	16.5	37.0	39.5	4.04	1.03
Newsletter	4.8	1.7	13.0	46.4	34.2	4.04	.984
County extension meetings	6.6	3.4	17.8	30.7	41.5	3.97	1.15
Mail	6.6	3.1	24.1	36.8	29.5	3.80	1.1
Websites I find	8	3.8	18.1	45.6	24.5	3.75	1.11
Magazine articles	8.7	3.5	18.9	47.1	21.8	3.70	1.12
E-mail, other than lists	20.8	6.9	30.3	27.5	14.6	3.08	1.33
E-mail lists	23.8	6.0	27.9	28.5	13.8	3.03	1.36
Newspaper articles	29.4	10.7	25.6	25.6	8.6	2.73	1.35
Radio news	38.4	10.8	27.2	17.3	6.3	2.42	1.32
Television news	41.1	10.1	25.6	18.0	5.2	2.36	1.32
RSS feeds	42.7	7.9	39.1	7.9	2.4	2.19	1.15
You Tube	55.7	9.6	29.4	3.6	1.7	1.86	1.06
Blogs	55.2	10.6	29.1	3.8	1.3	1.85	1.05
Facebook	56.5	10.2	27.5	3.8	1.9	1.84	1.07
Twitter	60	9.8	27.6	1.1	1.5	1.74	.994

Note. Scale interpreted as 1.00 – 1.44 = disagree (D), 1.45 – 2.44 = somewhat disagree (SD), 2.45 – 3.44 = neutral (N), 3.45 – 4.44 = somewhat agree (SA), and 4.45 – 5.00 = agree (A).

task for any individual. Identifying cues and warnings regarding animal health hazards, determining actual threat, and taking action can be even more arduous, but it is essential in the process of preparing for hazards (Lindell and Perry, 2004).

To begin the protective action process, an individual must become aware of the hazard in some way — usually through cues and warnings (Lindell & Perry, 2004). Objective 1 of this study sought to determine preferred sources of animal health information by TSCRA members. In the case of TSCRA members, local or consulting veterinarians are identified as the preferred source of animal health information. This finding was not a surprise to the researchers as it was consistent with the findings of previous studies by Ashlock (2006) and Riley (2007) where producers in Oklahoma and Kansas indicated veterinarians as the preferred source of information related to animal health issues.

Not only were veterinarians the preferred source of animal health information for TSCRA, but

they also were perceived as the most trustworthy and reliable when ranked by means. This was again consistent with Ashlock (2006) and Riley (2007) finding veterinarians a highly reliable and trustworthy source by Oklahoma and Kansas producers. Lindell and Perry (2004) identify perceived credibility as an important factor in making a protective action decision; and Kasperson and Stallen (1991) speak to its importance in efficient risk communication. By identifying TSCRA members' trustworthiness and reliability in an information source through objective 2 of this study, targeted animal health hazard information has a better chance to reach its intended audience if distributed through these sources.

Through this study and the two previous studies in Oklahoma by Ashlock (2006) and in Kansas by Riley (2007), it becomes clear veterinarians are the best source to use when attempting to reach the participants of these studies. The protection of the agriculture and food infrastructure and reduction of agricultural vulnerability is achieved through the adoption of protective actions by its stakeholders. However, as Lindell and Perry (2004) have identified, protective action decision making is not such a simple process and involves using available information.

Producers, as a vital stakeholder in the agriculture and food infrastructure, have a responsibility to protect their livestock from various hazards. However, they cannot do this without progressing through the PADM. Risk communicators have a responsibility to help with this decision process by more effectively reaching these populations. In the case of TSCRA members, this can be accomplished through the dissemination of information to local veterinarians, county extension offices, and livestock associations as these sources of information were preferred and ranked highest by means as perceived trustworthy and reliable sources.

The final objective of this study sought to identify the format in which TSCRA members prefer to receive animal health information. The data shows TSCRA members have no one preferred format to receive animal health information. This is likely explained by the large amount of information available to seeking individuals. Related to biological hazards alone, researchers found the large amount of related literature often overwhelms and confuses individuals (Moore, Merryman, Hartman, & Klingborg, 2008). In the PADM, individuals must sift through the vast amount of information to arrive at a conclusion for each of the decision stages. However, during the pre-decisional process, exposure to the hazard information may come in many formats.

Even though TSCRA members could not identify one preferred format, they indicated they prefer magazine articles, newsletters, websites, standard mail, county extension publications, county extension meetings, and livestock association meetings to receive animal health information. Dissemination of animal health information should be in these formats as opposed to television news, Facebook, Twitter, blogs, YouTube, and RSS feeds, which TSCRA members somewhat disagreed with as prefer formats.

Livestock producers vary in size of operation from non-commercial backyard animals to large commercial operations. This was consistent with the findings of TSCRA members in this study. With such a diverse audience, reaching this population efficiently and effectively increases the chances of controlling any animal-health-related hazards before they become widespread. By using preferred and perceived credible information sources as well as preferred information formats, risk communicators can quickly reach this population in all phases of disaster management.

Recommendations for Future Research

Future research should focus on information and groups not addressed in this study, including differences in educational programs for noncommercial and commercial producers as well as preferences

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of producers who are not associated with livestock associations. Noncommercial and commercial producers have similar goals for protection of animals' health, but differences in the need for and preferences related to delivering educational programs should be explored further. In addition, this study should be replicated with at least two additional groups: producers who are not associated with livestock associations and noncommercial producers who are not associated with livestock associations. Collecting data from either of these groups may be difficult without an established frame of producers. However, eliminating the potential bias of membership in livestock associations is important to developing a deeper understanding of how to design biological hazard preparedness educational programs for the broad range of producers in the cattle industry.

References

Animal Health Network: Your Local Information Link for Animal Safety and Security. (2010). *Background information.* Retrieved from http://animalhealthnetwork.org/background/

Ashlock, M. A. (2006). *The uncertainty of agroterrorism: A study of Oklahoma beef producers' risk perceptions, information sources and source trust in the pre-crisis stage.* Unpublished Doctoral Dissertation, Oklahoma State University, Stillwater.

Breitmeyer, R. E., Whiteford, A. M., & Shere, J. A.. (2003). California experience with exotic newcastle disease: A state and federal regulatory perspective. Proceedings of the 107th Annual Meeting of the

Ceddia, M. G., Heikkila, J., & Peltola, J. (2008). Biosecurity in agriculture: An economic analysis of coexistence of professional and hobby production. *Australian Journal of Agriculture and resources Economics, 4*(52), 453-470

Dement, A.I. (2008). *Quick facts about foreign and endemic animal diseases.* National Center for Foreign Animal and Zoonotic Disease Defense—A U.S. Department of Homeland Security Center of Excellence.

Dunaway, M. W., & Shaw, G. L. (2010). The Influence of Collaborative Partnerships on Private Sector Preparedness and Continuity Planning. *Journal of Homeland Security and Emergency Management*, *7*(1), Article 47.

Eiser, R. J., Miles, S., & Frewer, L. J. (2002). Trust, perceived risk, and attitudes toward food technologies. *Journal of Applied Social Psychology, 32*(11), 2423-2433

Hardenbrook, Brandon J. (2005) The need for a policy framework to develop disaster resilient regions. *Journal of Homeland Security and Emergency Management,* 2(3), Article 2.

Haynie, Tom. (2012, January). TSCRA 2011 membership beats the dow. *The Cattleman.* Retrieved from http://www.thecattlemanmagazine.com/archives/2012/january/member-notes-1-12.html

Horn, F. P., & Breeze, R. G. (2006). Agriculture and food security. *Annals of the New York Academy of Sciences*, *894*(1), 9-17.

Kasperson, R. E., & Stallen, J. M. (1991). *Communicating risk to the public: International perspectives.* Dordrecht, Netherlands: Kluwer Academic Publishers

Knowles, T., et al. (2005). *Defining law enforcement's role in protecting American agriculture from agroterrorism.* National Institutes of Justice Report.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30,* 607-610.

Lewis, T. G. (2006). *Critical infrastructure protection in homeland security: defending a networked nation*. Wiley.

Lindell, M. K., & Perry, R. W. (2004). *Communicating environmental risk in multiethnic communities.* Thousand Oaks: Sage Publications.

Lindell, M. K., Prater, C., Perry, R. W., & Nicholson, W.C. (2006). *Fundamentals of emergency management.* Retrieved from http://archone.tamu.edu/hrrc/Publications/books/fundamentals_of_emergency_managment.html

Moore, D. A., Merryman, M. L., Hartman, M. L., & Klingborg, D. J. (2008). Comparison of published recommendations regarding biosecurity practices for various production animal species and classes. *Journal of the American Veterinary Medical Association*, *233*(2), 249-256.

Peters, R. G., Covello, V. T., & McCallum, D. B. (1997). The determinants of trust and communication in environmental risk communication: An empirical study. *International Journal of Risk Analysis, 17*(1), 43-54.

Riley, K. (2007). *Kansas beef feedlot managers' perceptions of preparedness and trusted sources of information concerning an agroterrorism event: A descriptive study.* Unpublished Master's Thesis, Kansas State University, Manhattan.

Roeder, P. L., & Taylor, W. P. (2002). Rinderpest. *The Veterinary clinics of North America. Food animal practice, 18*(3), 515-515. doi: 10.1016/S0749-0720(02)00035-X

Rosati, S., & Saba, A. (2004). The perception of risks associated with food-related hazards and the perceived reliability of sources of information. *International journal of food science & technology*, *39*(5), 491-500.

Spellman, F R. (2008). *Food supply protection and homeland security.* Lanham, MD: Government Institutes.

Texas and Southwestern Cattle Raisers Association. (2011). *About Texas and Southwestern Cattle Raisers Association.* Retrieved from http://www.texascattleraisers.org/about-tscra/index.html

Thompson, D., et al. (2002). Economic costs of the foot and mouth disease outbreak in the United Kingdom in 2001. *Rev. Sci. Tech. Off. Int. Epiz*, *21*(3), 675-687.

United States Department of Agriculture, Animal and Plant Inspection Service. (2007). *Biosecurity: Protecting your livestock and poultry.* Retrieved from http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_bio_sec_07.pdf

United States Department of Homeland Security. (2004). *Homeland security presidential directive 9: Defense of United States agriculture and food.* Retrieved from http://www.fas.org/irp/offdocs/nspd/hspd-9.html

United States Department of Homeland Security. (2003). *Homeland security presidential directive 7: Critical infrastructure identification, prioritization, and protection.* Retrieved from http://www.dhs.gov/xabout/laws/gc_1214597989952.shtm

Williams, D. J., & Noyes, J. M. (2007). How does our perception of risk influence decision-making? Implications for the design of risk information. *Theoretical issues in ergonomics science*, *8*(1), 1-35.

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