RESEARCH

Public Knowledge and Trust of Agricultural and Natural Resources Organizations

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ABSTRACT

The public lacks knowledge and connectedness to agriculture and natural resources in the United States, leading to a need for effective communications from agricultural and natural resources organizations. Trust is an integral component of communications, but it is not well understood how the public trusts the various organizations communicating agricultural and natural resources issues. The study evaluated non-profit, for-profit, and governmental organizations. A survey was conducted of a representative sample of the U.S. population to assess the public's awareness, knowledge, and trust of organizations and their communications. The highest number of respondents was aware and knowledgeable of governmental organizations, except for Extension. Communications from non-profit organizations tended to be trusted the most compared to for-profit organizations and governmental organizations, except for Extension. Respondents' trust of the non-profit organizations was typically higher than for-profit organizations and governmental organizations, except for Extension. The relationship between trust of an organization and trust of its communications were statistically significant for all organizations, while relationships between trust of an organization and knowledge of an organization were typically negligible and not statistically significant. For-profit organizations and governmental organizations should work to improve the public's trust. Extension should seek to improve the public's awareness and knowledge given the level of trust the knowledgeable respondents had for the organization. Future research should address what factors are influencing the public's trust in organizations and organizations' communications.

KEY WORDS

Agriculture, Communications, Natural Resources, Organizations, Trust

INTRODUCTION AND LITERATURE REVIEW

A commonly accepted problem facing agriculture in the United States is the lack of knowledge and awareness members of the public have for agricultural and natural resources issues, making it difficult for individuals to make informed decisions (Frick, Birkenholz, & Machtmes, 1995; Kovar & Ball, 2013; Meischen & Trexler, 2003). This problem is exacerbated by the low percentage of the population directly involved in agriculture (Kovar & Ball, 2013), which is caused by innovations in agricultural production (Enns, Martin, & Spielmaker, 2016; Hogberg et al., 2005). There are an estimated 3.2 million farmers operating 2.1 million farms in the U.S. (USDA, 2012) out of a total population of 308 million (U.S. Census Bureau, 2011). With so few people directly involved in agriculture, Powell and Agnew (2011) asserted that it is not feasible to expect the public to make informed decisions about agricultural issues.

A logical solution to solving the problem of low public knowledge of agricultural issues is increased media coverage, but this solution is problematic because the news coverage that occurs is often negative and reactive to adverse events

(Graves, 2005; Specht, McKim, & Rutherford, 2014; Specht & Rutherford, 2013). This leads to negative and inaccurate public perceptions of agriculture (Duncan & Broyles, 2006; Goodwin, Chiarelli, & Irani, 2011; Specht & Rutherford, 2013). Kovar and Ball (2013) said increased agricultural literacy would make the public less susceptible to emotional pleas and make better-informed decisions. To help consumers understand production and change in the agricultural industry, agricultural communicators must collect data on how to better inform the public.

While important, knowledge is not a perfect predictor of beliefs and opinions. Research that assessed scientific literacy and perceptions of climate change risk found that individuals with increased scientific literacy were more likely to have polarized opinions (Kahan et al., 2012). In other words, more knowledge led to stronger beliefs, but more knowledge did not affect what the individuals believed. Kahan (2012) contended that "People acquire their scientific knowledge by consulting others who share their values and whom they therefore trust and understand" (p. 255).

Trusting others to provide knowledge extends to organizations. Even if an individual is uninformed or misinformed, they may still pass judgment and make decisions, relying on trusted organizations to shape their opinions on science-based issues (Brossard & Nisbet, 2007). If members of the public trust an organization, they are more likely to trust the organization's communications (Brossard & Nisbet, 2007; Martin, Hill, Van Sandt, & Thilmany, 2016; West & Turner, 2014).

This study consisted of a survey to address awareness, knowledge, and trust that members of the public have for organizations communicating about agricultural and natural resources issues. The issue topics included in this study were agriculture, the environment, animal welfare, food safety, and nutrition. The organizations represented included governmental, non-profit, and for-profit organizations. The organizations also represented a variety of perspectives. The specific emphasis of this study was trust of the organizations.

Trust

Trust is integral to communicate effectively. Trust has been a topic of research for multiple areas of study, including but not limited to management, psychology, philosophy, economics, marketing, and industry (Paliszkiewicz & Koohang, 2013; Schoorman, Mayer, & Davis, 2007). Trust is not an easy construct to define, which has been an ongoing issue (Rawlins, 2008; Schoorman et al., 2007). A variety of terms have been used related to trust, including dependability, faithfulness, honesty, integrity, honor, responsibility, competence, vulnerability, goodwill, openness, and loyalty (Costigan, Itler, & Berman, 1998; Rawlins, 2008; Rosanas & Velilla, 2003; Schoorman et al., 2007).

This study used Rawlins's (2008) operational definition of trust, which is the willingness for a person to be vulnerable based on the confidence that the other party will display competence, goodwill, and integrity, which act as subconstructs of trust. These subconstructs were chosen because Rawlins' definition was specifically made for evaluating trust of organization and uses the same basic subconstructs other researchers use to define trust, including Schoorman et al. (2007) and Grimmelikhuijsen, Porumbescu, Hong, and Im (2013), and was the definition used in Auger's (2011) similar study evaluating trust of organizations.

Why Trust is Important

Agriculture and natural resources have been highly impacted by innovation over the past century (Enns et al., 2016) and for innovation-based growth to continue, agricultural and natural resources organizations depend on the public's trust to maintain legitimacy (Lang, 2013). Lubell (2007) stated trust was "the foundation for effective social, economic, and political life" (p. 237). An organization must be predictable and reliable in their actions to reduce uncertainty, which helps enable trust (Tschannen-Moran & Hoy, 2000).

The importance of the audience's trust of the communicator has been recognized for millennia, dating back to Aristotle's Rhetoric, which used logos, pathos, and ethos as the supporting structure for effective persuasion (West & Turner, 2014). Logos is the logic of the argument. Pathos is the emotional aspect of the argument. Ethos is the perceived intelligence, character, and goodwill of the communicator, which are similar to the terms Rawlins (2008) uses to describe trust. The basic idea of ethos is that the audience is more likely to believe a message from a trusted communicator (West & Turner, 2014). For an organization to communicate effectively with the public, trust is a necessary component.

How trust develops is important. Research has shown that trust can occur without any history of interaction, but that type of trust is fragile (Kim, Dirks, & Cooper, 2009). A better option for organizations is trust that is based on a history of positive experiences. Members of the public scrutinize organizations' communications, including public relations efforts, to determine trustworthiness (Schnackenberg & Tomlinson, 2014). This history of positive experiences can act as a shield that can help an organization survive a crisis that could otherwise damage public perception (Grunig, Grunig, & Dozier, 2002). A prominent example of this was the Tylenol incident of the 1980s that led to seven deaths. Tylenol was able to maintain positive public perception in the long run because of the history of positive experiences the public had with the organization (de Chernatony, 2001), in addition to the organization's response to the crisis (Lundgren & McMakin, 2004). Past experience also has the ability to prevent negative reaction in agriculture and natural resources issues. Specht et al. (2014) found that respondents with less agricultural knowledge and experience reacted more negatively to media portrayals of production agriculture than respondents with more knowledge and experience.

Building trust is an integral component for organizations as they try to build relationships with members of the public (Kang & Hustved, 2014). In the individual-organization relationship, it is generally believed the individual expects the organization to keep its promises and act in favor of individual's best interest (Kang & Hustved, 2014). Acceptance and openness will result from the initial development of trust (Rempel, Holmes, & Zanna, 1985). A loss of trust or lack of trust development in a relationship will affect how the members of public perceive an organization.

Of note in this study are the different types of organizations will be addressed: non-profit, for-profit, and governmental. Previous research has addressed comparisons between these types of organizations, though scope has varied by representativeness of samples, topics addressed, and types of organizations included. Auger (2011) studied the differences in trust on communication about a hypothetical water quality issue between non-profit and for-profit organizations and found non-profit organizations are given a higher level of trust compared to for-profit organizations when both are exhibiting transparency, but non-profit organizations received a lower level of trust than for-profit organizations when both lack transparency. In other words, non-profit organizations are held to a higher standard than for-profit organizations. The representativeness of the sample is not clear in the study. Irani, Sinclair, and O'Malley (2001) found that governmental organizations were trusted by participants more to communicate about biotechnology than for-profit organizations. Irani et al. (2001) assessed college students at the University of Florida, Florida International University, and Kansas State University. Contrary to the Irani et al. (2001) findings, Ruth (2015) found no statistically significant differences in source credibility between governmental and for-profit organizations for communicating about genetically modified food, with both groups being evaluated neutrally by the study's participants, which were Florida residents. Ruth posited that participants' views of genetically modified foods may have been strong enough that all sources were perceived the same for communicating the message. Regarding evaluation of environmental information, Brewer and Ley (2013) found that participants in the Milwaukee area trusted the EPA and environmental non-profits (e.g., Sierra Club) at a similar level. Lang (2013) found that environmental non-profits were trusted by the U.S. public more than governmental and for-profit organizations, which had similar levels of public trust. Mase, Babin, Prokopy, and Genskow (2015) assessed Midwesterners' trust for information about soil and water quality, finding Extension was trusted the most, followed by government agencies, non-profit organizations, and for-profit organizations. Martin et al. (2016) assessed Coloradoans trust of agricultural and food information from various types of sources and found universities were trusted the most, followed by governmental agencies. Farm and ranch organizations were trusted more than environmental organizations in the Martin et al. (2016) study, and the food industry was trusted the least among organizations assessed in the study. While this variety of studies exists, they were all limited in scope in various aspects. Only the Lang (2013) study was nationally representative, but its data comes from 2004 and only related to food. Martin et al. (2016) is the only study to address multiple topics but was only in Colorado.

In general, it is worth noting the public is increasingly distrustful of organizations that are expected to provide objective knowledge. Over the past 35 years, the public has become increasingly distrustful of government organizations (Birkland, 2011). This dwindling trust in the government could potentially extend to organizations that regulate in the realm of agriculture and natural resources, though past research results vary regarding perceptions of trust of government agencies

(Brewer & Ley, 2013; Irani et al., 2001; Lang, 2013; Martin et al., 2016; Mase et al., 2015; Ruth, 2015). If members of the public lack knowledge and rely on trusted organizations to shape their decisions (Brossard & Nisbet, 2007), understanding the public's trust of organizations that communicate about agricultural and natural resources issues is imperative.

PURPOSE AND OBJECTIVES

Kallendorf and Kallendorf (1985) stated, "a rhetorician need not actually be a good person, but must only be perceived as one" (p. 42). The organizations trusted the most by members of the public are more likely to be successful in communicating agricultural and natural resources information to the public (Brewer & Ley, 2013; Kahan, 2012), even if the organizations are not actually trustworthy. Similarly, trustworthy organizations are unlikely to be successful in their communications if members of the public do not believe the organizations are trustworthy and therefore do not trust the information being communicated by the organizations. Agricultural communicators need to understand which organizations members of the public trust to understand which organizations will be the most successful when communicating about agricultural and natural resources issues. While previous studies have assessed and compared trust of organizations related to agricultural and natural resources issues (Auger, 2011; Brewer & Ley, 2013; Irani et al., 2001; Lang, 2013; Mase et al., 2015; Martin et al., 2016; Ruth, 2015), none of those studies assessed multiple issues with a nationally representative sample.

The purpose of this study was to seek a more comprehensive understanding of the public's knowledge and trust of organizations that communicate about agriculture and natural resources topics. The following objectives guided the study:

1. Describe the public's awareness and knowledge of organizations that communicate about agriculture and natural resources,
2. Describe the public's trust of organizations' communications about agricultural and natural resources topics,
3. Describe the public's trust of agricultural and natural resources organizations, and
4. Describe the relationship between the public's trust of these organizations and trust of the organizations' communications, as well as between the public's trust of the organizations and the public's knowledge of the organizations.

METHODS

To achieve the objectives of this study, a nationally representative quantitative survey was conducted online through Qualtrics. Qualtrics was also used as a third-party surveying organization to access an online panel of respondents. Nonprobability quota sampling was used to ensure respondents were representative of the national population based on sex, race, and Hispanic/Latino status results from the 2010 U.S. Census. Research increasingly uses nonprobability sampling because probability samples that depend on phone and internet samples lack complete coverage and receive poor response rates (Dillman, Smyth, & Christian, 2014). One thousand and ninety-three people started the survey, and there were 524 respondents after filtering out ineligible respondents (i.e., under 18 or not U.S. residents) and incomplete responses.

An expert panel consisting of faculty members in colleges of agriculture from three universities reviewed the instrument to help ensure its validity. Their expertise included agricultural communications and evaluation. Cognitive interviews were also conducted with two graduate students to allow individuals not involved in the study to complete the questionnaire, which provided feedback on usability of the questionnaire and ability to appropriately respond to the questions.

Respondents reported their awareness, knowledge, and trust of 16 organizations. These organizations were selected to represent different types of organizations (i.e., governmental, non-profit, and for-profit), including organizations that would have contrasting perspectives on agricultural and natural resources issues. The expert panel reviewed the list to ensure key organizations were represented (i.e., organizations likely to impact public opinion), and two organizations were

added to the list based on their recommendations. The governmental organizations were the U.S. Department of Agriculture (USDA), U.S. Food and Drug Administration (FDA), U.S. Environmental Protection Agency (EPA), and Cooperative Extension Service. The non-profit organizations were U.S. Farmers and Ranchers Alliance, American Farm Bureau Federation (AFB), People for the Ethical Treatment of Animals (PETA), Humane Society of the United States (HSUS), Center for Food Integrity (CFI), Sierra Club, Greenpeace, Environmental Working Group (EWG), and World Wildlife Fund (WWF). The for-profit organizations were Monsanto, DuPont, and Syngenta.

The questionnaire addressed respondents' awareness of the organizations, knowledge of the organizations, trust of the organizations, and trust of communications from the organizations. For awareness, respondents either reported they had heard of an organization or they had not heard of an organization. For the remainder of the questionnaire, respondents only answered questions for organizations in which they were aware. For the next section, respondents indicated their level of knowledge of the organizations they were aware of on a 5-point scale, ranging from *not at all knowledgeable to extremely knowledgeable*. If a respondent had no knowledge of an organization, they no longer saw questions about that organization. These question filters were put in place to minimize the cognitive load on respondents and were based on feedback from the cognitive interviews. The number of respondents who answered questions about each organization is listed in the tables in the results section.

In the next section of the questionnaire, respondents indicated how much they trusted or distrusted communications from the organizations they were aware and knowledgeable of regarding five topics: agriculture, the environment, animal welfare, food safety, and nutrition. This section used a 5-point scale ranging from *distrust to trust*, with an option for respondents to report they were not familiar with communications about the topic from the organization. The final component addressed respondents' overall trust of each organization. This was addressed through the average of 15 semantic differential items based on the Rawlins's (2008) definition of trust and its three subconstructs: competence, goodwill, and integrity. Each subconstruct had five items. For competence, the bipolar items were unreliable/reliable, incompetent/competent, not dependable/dependable, not confident/confident, and incapable/capable. For goodwill, the items were not beneficial/beneficial, not compassionate/compassionate, selfish/unselfish, not charitable/charitable, and disrespectful/respectful. The items for integrity were dishonest/honest, unfair/fair, unethical/ethical, immoral/moral, and closed off/open. Reverse coding was used for beneficial, competent, open, compassionate, and unselfish items to mitigate directional biases in responses. When participants were evaluating each organization, items were randomized within the scales to avoid any biases based on order effects (Dillman et al., 2014).

Post-hoc reliability was addressed using Cronbach's alpha. For the five-item scales addressing respondents' trust of communications from the organizations, reliability was above .85 for each organization. For the 15-item scales assessing respondents' trust of the organizations, reliability was above .88 for each organization. Reliability scores of at least .80 are considered ideal (Norcini, 1999).

For objective 1, frequencies were used to report results. For objectives 2 and 3, means were reported. For objective 4, a Pearson's product-moment correlation was used to describe the relationship between trust of an organization and trust of an organization's communications. Kendall's tau was used to describe the relationship between trust of an organization and knowledge of the organization. Kendall's tau was used because the knowledge question was ordinal and the distribution of responses was non-normal (Field, 2013).

RESULTS

Objective 1: Describe the Public's Awareness and Knowledge of Organizations That Communicate About Agriculture and Natural Resources

Table 1 shows the public's awareness and knowledge of the organizations in the study. Respondents had the highest levels of awareness for governmental organizations, with the exception of Cooperative Extension, which only 26.0% (n = 136) of respondents were aware of. Syngenta had the lowest level of awareness (14.1%; n = 74) for all types of

organizations. World Wildlife Fund (WWF; 81.1%; *n* = 425) and People for the Ethical Treatment of Animals (PETA; 79.8%; *n* = 418) were the non-profit organizations respondents were most aware of, while Environmental Working Group (EWG; 22.7%; *n* = 119) and the Center for Food Integrity (CFI; 17.6%; *n* = 92) had the lowest levels of awareness. FDA (40.6%; *n* = 213), USDA (34.0%; *n* = 178), and EPA (30.7%; *n* = 161) had the most respondents who were either moderately or extremely knowledgeable of the organization, while Extension (8.6%; *n* = 45), CFI (7.9%; *n* = 51), and Syngenta (6.3%; *n* = 33) had the least.

Objective 2: Describe the Public's Trust of Organizations' Communications About Agricultural and Natural Resources Topics

Table 2 shows respondents' level of trust for each organization's communications about agriculture, the environment, animal welfare, food safety, and nutrition. No organizations were completely distrusted, though DuPont (*M* = 3.20) and Monsanto (*M* = 2.70) had neutral evaluations of trust for their communications overall. Extension (*M* = 4.15), CFI (*M* = 4.14), and EWG (*M* = 4.13) had the highest levels of trust in their communications. For the individual topics, Extension (*M* = 4.27) was trusted the most to communicate about agriculture, EWG (*M* = 4.26) was trusted the most to communicate about the environment, WWF (*M* = 4.32) was trusted the most to communicate about animal welfare, EWG (*M* = 4.19) was trusted the most to communicate about food safety, and CFI (*M* = 4.11) was trusted the most to communicate about nutrition.

Objective 3: Describe the Public's Trust of Agricultural and Natural Resources Organizations

Table 3 shows respondents' level of trust for each organization. The Humane Society of the United States (HSUS; *M* = 4.01), WWF (*M* = 3.98), and EWG (*M* = 3.77) had the highest levels of overall trust, while DuPont (*M* = 3.28), Syngenta (*M* = 3.18), and Monsanto (*M* = 2.89) had the lowest levels of trust, though these were still neutral on the 5-point scale used in the study. In the scope of all of the organizations addressed in the study, respondents trusted the non-profit organizations more than for-profit and governmental organizations, with the exception of Extension (*M* = 3.72). In general, respondents rated competence the highest of the trust subconstructs, while goodwill tended to be rated the lowest.

Table 1

*Respondents' Awareness and Knowledge of the Agricultural and Natural Resources Organizations by Percentage (*N *= 524)*

Organization	Respondents Aware of Organization	Not at all Knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Moderately knowledgeable	Extremely knowledgeable
FDA	94.3% (494)	5.9%(31)	23.3% (122)	24.4% (128)	26.5% (139)	14.1% (74)
USDA	91.4% (479)	7.8%(41)	25.4% (133)	24.2% (127)	23.7% (124)	10.3% (54)
EPA	87.3% (458)	9.7% (51)	23.1% (121)	23.9% (125)	18.9% (99)	11.8% (62)
WWF	81.1% (425)	11.6% (61)	23.5% (123)	19.5% (102)	18.3% (96)	8.2% (43)
PETA	79.8% (418)	9.9% (52)	19.3% (101)	20.8% (109)	20.8% (109)	9.0% (47)
DuPont	76.9% (403)	17.4% (91)	22.9% (120)	15.8% (83)	13.5% (71)	7.3% (38)
Greenpeace	76.9% (403)	11.8% (62)	22.1% (116)	18.7% (98)	14.3% (75)	8.8% (46)
HSUS	73.3% (384)	7.8% (41)	15.8% (83)	20.8% (109)	18.5% (97)	10.3% (54)
Sierra Club	64.1% (336)	14.5% (76)	16.8% (88)	15.6% (82)	10.5% (55)	6.7% (35)
Monsanto	51.7% (271)	9.5% (50)	13.7% (72)	11.8% (62)	10.9% (57)	5.7% (30)

AFB	43.7% (229)	9.9% (52)	12.2% (64)	8.6% (45)	8.4% (44)	4.6% (24)
Farmers & Ranchers	30.0% (157)	5.5% (29)	6.7% (35)	7.3% (38)	6.3% (33)	4.2% (22)
Extension	26.0% (136)	4.8% (25)	6.9% (36)	5.7% (30)	4.6% (24)	4.0% (21)
EWG	22.7% (119)	3.4% (18)	5.3% (28)	4.0% (21)	6.7% (35)	3.2% (17)
CFI	17.6% (92)	3.1% (16)	3.4% (18)	3.2% (17)	5.0% (36)	2.9% (15)
Syngenta	14.1% (74)	2.5% (13)	3.1% (13)	2.3% (12)	3.4% (18)	2.9% (15)

Note. Percentages are calculated from the total number of respondents. Respondents who were not aware of an organization did not respond to the knowledge question, therefore percentages for the knowledge of each organization do not total to 100%.

Table 2

Respondents' Mean Levels of Trust of the Organizations' Communications by Topic

	Agriculture (*SD*)	Environment (*SD*)	Animal Welfare (*SD*)	Food Safety (*SD*)	Nutrition (*SD*)	Overall Communication[a] (*SD*)
Extension (*n* = 111)	4.27 (0.89)	4.15 (0.89)	4.10 (0.93)	4.10 (0.95)	4.05 (0.94)	4.15 (0.72)
CFI (*n* = 76)	4.11 (0.98)	4.08 (0.97)	4.04 (0.91)	4.16 (0.90)	4.11 (0.96)	4.14 (0.70)
EWG (*n* = 101)	4.15 (0.97)	4.26 (0.85)	4.11 (0.88)	4.19 (0.90)	4.02 (0.95)	4.13 (0.74)
EWG (*n* = 101)	4.07 (1.02)	3.99 (1.00)	4.08 (1.04)	3.99 (1.13)	3.96 (1.02)	4.02 (0.83)
HSUS (*n* = 343)	4.18 (1.00)	3.99 (1.03)	4.30 (0.94)	3.77 (1.06)	3.67 (1.08)	3.95 (0.89)
AFB (*n* = 177)	4.11 (0.96)	4.01 (0.98)	3.88 (0.98)	3.88 (1.00)	3.95 (1.00)	3.95 (0.82)
WWF (*n* = 364)	4.12 (0.96)	4.10 (1.00)	4.32 (0.93)	3.71 (1.03)	3.65 (1.03)	3.94 (0.86)
USDA (*n* = 438)	3.94 (1.11)	3.79 (1.13)	3.60 (1.18)	3.85 (1.15)	3.84 (1.19)	3.79 (1.01)
Sierra Club (*n* = 260)	3.87 (1.08)	3.94 (1.11)	4.01 (1.06)	3.62 (1.03)	3.55 (1.10)	3.78 (0.93)
EPA (*n* = 408)	3.89 (1.14)	3.91 (1.15)	3.71 (1.11)	3.74 (1.08)	3.52 (1.17)	3.75 (0.99)
Syngenta (*n* = 61)	3.76 (1.33)	3.63 (1.35)	3.73 (1.38)	3.64 (1.32)	3.70 (1.37)	3.74 (1.21)
Greenpeace (*n* = 335)	3.78 (1.17)	3.92 (1.16)	3.85 (1.07)	3.63 (1.09)	3.56 (1.09)	3.74 (0.98)
FDA (*n* = 463)	3.78 (1.21)	3.64 (1.20)	3.56 (1.18)	3.88 (1.23)	3.84 (1.20)	3.73 (1.06)
PETA (*n* = 366)	3.64 (1.31)	3.62 (1.27)	3.85 (1.29)	3.46 (1.20)	3.38 (1.24)	3.58 (1.13)
DuPont (*n* = 312)	3.34 (1.29)	3.19 (1.34)	3.14 (1.26)	3.14 (1.28)	3.14 (1.31)	3.20 (1.22)
Monsanto (*n* = 221)	2.82 (1.56)	2.77 (1.55)	2.79 (1.49)	2.72 (1.50)	2.67 (1.50)	2.70 (1.46)

Note. Scale was 1 = *Distrust*, 2 = *Slightly distrust*, 3 = *Neither trust nor distrust*, 4 = *Slightly trust*, 5 = *Trust*.
[a]Calculated by averaging the means of each communication topic.

Table 3

Respondents' Mean Levels of Trust for the Organizations

	Integrity (*SD*)	Competence (*SD*)	Goodwill (*SD*)	Overall Trust (*SD*)
HSUS (*n* = 343)	4.03 (0.86)	4.03 (0.84)	3.98 (0.88)	4.01 (0.83)
WWF (*n* = 364)	4.00 (0.80)	3.98 (0.79)	3.97 (0.82)	3.98 (0.76)
EWG (*n* = 101)	3.86 (0.80)	3.86 (0.74)	3.60 (0.75)	3.77 (0.71)
Extension (*n* = 111)	3.75 (0.80)	3.79 (0.79)	3.61 (0.82)	3.72 (0.75)
AFB (*n* = 177)	3.73 (0.85)	3.74 (0.89)	3.58 (0.84)	3.69 (0.82)
Sierra Club (*n* = 260)	3.71 (0.96)	3.71 (0.96)	3.63 (0.94)	3.68 (0.92)
Greenpeace (*n* = 335)	3.67 (0.94)	3.67 (0.90)	3.61 (0.91)	3.64 (0.88)
Farmers & Ranchers (*n* = 128)	3.67 (0.84)	3.71 (0.81)	3.50 (0.78)	3.63 (0.76)
CFI (*n* = 76)	3.73 (0.71)	3.72 (0.70)	3.42 (0.68)	3.62 (0.63)
EPA (*n* = 407)	3.57 (0.97)	3.61 (0.94)	3.39 (0.91)	3.52 (0.90)
USDA (*n* = 438)	3.53 (0.97)	3.60 (0.98)	3.38 (0.87)	3.50 (0.90)
PETA (*n* = 366)	3.40 (1.18)	3.53 (1.09)	3.42 (1.12)	3.45 (1.10)
FDA (*n* = 463)	3.42 (1.04)	3.52 (1.01)	3.28 (0.91)	3.41 (0.94)
DuPont (*n* = 312)	3.17 (1.06)	3.50 (0.96)	3.17 (0.95)	3.28 (0.93)
Syngenta (*n* = 61)	3.23 (1.08)	3.27 (0.97)	3.03 (0.98)	3.18 (0.94)
Monsanto (*n* = 221)	2.72 (1.32)	3.22 (1.13)	2.73 (1.16)	2.89 (1.14)

Note. Semantic differential items ranged from 1 = *Dishonest, Unfair, Immoral*, etc., to 5 = *Honest, Fair, Moral*, etc.

Objective 4: Describe the Relationship Between the Public's Trust of These Organizations and Trust of the Organizations' Communications, as well as Between the Public's Trust of the Organizations and the Public's Knowledge of the Organizations.

The relationships between trust of an organization and trust of its communications were statistically significant for every organization in the study (Table 4). Using Davis's (1971; as cited in Miller, 1998) descriptors for relationship strength, six of the relationships were very high, with the relationships being strongest for Monsanto (r = .86), PETA (r = .77), and EPA (r = .74). The three weakest relationships were moderate in strength, which were for Extension (r = .48), CFI (r = .45), and EWG (r = .37). The remaining seven relationships were substantial. The relationships between trust of the organization and knowledge of the organization were not as strong. Only six of the correlations were statistically significant, with those relationships being low in strength. The organizations with statistically significant relationships between trust and knowledge of the organization were for Syngenta (r_τ = .25), Sierra Club (r_τ = .17), PETA (r_τ = .13), Greenpeace (r_τ = .15), WWF (r_τ = .12), and HSUS (r_τ = .12). The relationships for the remaining organizations were negligible in strength.

Table 4

The Correlation between Trust of an Organization and Trust of an Organization's Communications, and the Correlation between Trust of an Organization and Knowledge of the Organization

Trust of Organization[a]	Trust of Organization's Communications[b]	Knowledge of Organization[c]
Monsanto (n = 221)	.86*	.04
PETA (n = 366)	.77*	.13*
EPA (n = 407)	.74*	.02
Greenpeace (n = 335)	.74*	.15*
DuPont (n = 312)	.72*	.08
USDA (n = 438)	.70*	.06
Sierra (n = 260)	.69*	.17*
FDA (n = 463)	.69*	.05
Syngenta (n = 61)	.67*	.25*
WWF (n = 364)	.63*	.12*
HSUS (n = 343)	.59*	.12*
Farmers & Ranchers (n = 128)	.55*	.04
AFB (n = 177)	.55*	-.02
Extension (n = 111)	.48*	.03
Extension (n = 111)	.45*	.10
EWG (n = 101)	.37*	-.03

[a]Aggregation of semantic differential scale ranged from 1 = *Distrust to* 5 = *Trust*
[b]Scale was 1 = *Distrust*, 2 = *Slightly distrust*, 3 = *Neither trust nor distrust*, 4 = *Slightly trust*, 5 = *Trust*
[c]Scale was 1 = *Not at all knowledgeable*, 2 = *Slightly knowledgeable*, 3 = *Somewhat knowledgeable*, 4 = *Moderately knowledgeable*, 5 = *Extremely knowledgeable*

CONCLUSIONS

Lack of knowledge is often cited as problem that limits the public's ability to make informed decisions about agricultural and natural resources issues (Frick et al., 1995; Kovar & Ball, 2013; Meischen & Trexler, 2003; Powell & Agnew, 2011). Despite lacking knowledge, the members of the public still make decisions related to agricultural and natural resources issues (Brossard & Nisbet, 2007). Members of the public are likely to rely on organizations they trust to provide information about agricultural and natural resources issues (Brossard & Nisbet, 2007; Kahan, 2012). Therefore, it is important to understand how well organizations are known and trusted by the public, which were the aims of this study.

The results showed that respondents were most aware and knowledgeable of governmental organizations, particularly the FDA, USDA, and EPA. However, trust in the communication of these organizations was neutral to slightly positive, and overall trust was also neutral for the governmental organizations. The neutral evaluation aligned with the neutral evaluation of government source credibility in the Ruth (2015) study results. This may indicate that the history of interactions the respondents have had with these government entities had not always been favorable as possible, which potentially decreased the trust in the organizations (Kim et al., 2009). Extension, while also a government organization, did not have high awareness among the respondents. Those who were aware and knowledgeable about Extension rated

Extension's communications among of the most trustworthy, especially when communicating about agriculture. Trust of Extension and universities was also found by Mase et al. (2015) and Martin et al. (2016). The respondents possibly had more positive interactions with Extension.

Aside from Extension, communication from non-profit organizations was the most trusted, which is similar to the Auger (2011) results indicating a halo effect for non-profit organizations when no negative information is available about the organizations. When looking at specific communication topics, the Environmental Working Group's communication was the most trusted on topics of the environment and food safety; communication from the World Wildlife Federation was most trusted on the topic of animal welfare; lastly, when thinking about nutrition, respondents trusted communication from the Center for Food Integrity the most. Additionally, those organizations with overall communication trust scores representing slightly trust or higher were all non-profit organizations, with the exception the governmental organization of Extension. Aside from PETA, all non-profit organizations ranked higher in overall trust than the for-profit organizations and governmental organizations, except Extension. The higher levels of trust among non-profit organizations may be reflective of organizational structure of non-profit organizations. Non-profit organizations operate either on charitable support or through the support of their members or communities. The ultimate success of a non-profit organization relies on its ability to keep promises and act in favor of its supporters' best interests (Kang & Hustved, 2014). The lower levels of trust in for-profit organizations compared to government organizations and non-profit organizations is consistent with some study results (Auger, 2011; Irani et al., 2001; Martin et al., 2016; Mase et al., 2015), but not with the results of Ruth (2015), which indicated comparable levels of source credibility between government and for-profit organizations when communicating about genetically modified food.

Trust of an organization was linked to trust of the organization's communications in this study, verifying past assertions (Brossard & Nisbet, 2007; Kahan, 2012; Martin et al., 2016; West & Turner, 2014), which is important when uninformed members of the public are likely to rely on trusted sources of information to make their decisions that relate to agricultural and natural resources issues (Brossard & Nisbet, 2007). The relationships between trust of the communication and overall trust of the organization were found to be substantial-to-high for the majority of organizations. Interestingly, the three organizations whose communications were trusted the most (Extension, CFI, EWF) were found to have the weakest relationships between trust of the communication and overall trust.

The results of this study indicate that knowledge about an organization is not enough to affect trust of an organization. Even though agricultural knowledge is assumed as necessary to make informed decisions (Frick et al., 1995; Kovar & Ball, 2013; Meischen & Trexler, 2003; Powell & Agnew, 2011; Specht et al., 2014), knowledge does not appear to have a strong link to trust of the organizations that are communicating about agricultural and natural resources issues based on the results of this study. Ideally, members of the public would be knowledgeable about all agricultural and natural resources issues affecting their lives, but pragmatically individuals will continue to depend on sources of information they trust to help shape their opinions and decisions (Brossard & Nisbet, 2007; Kahan, 2012), even when the individuals are not knowledgeable about the organizations. This study took a step toward understanding which organizations members of the public are likely to believe regarding agricultural and natural resources issues.

RECOMMENDATIONS

Efforts should specifically be made to improve the public's awareness and knowledge of Extension. Extension was found to be highly trusted among those who were aware and knowledgeable of the organization. While reported knowledge of an organization was not a good indicator of trust, a complete lack of knowledge and awareness would prevent trust in an organization because members of the public will not even know the organization exists. With high levels of trust, Extension is well positioned to communicate with the public about agricultural and natural resource topics and issues from a research perspective. State Extension services should work to identify how they can best reach the public audiences in their states who are currently being missed.

For-profit organizations and government organizations, aside from Extension, tended to have lower levels of trust than non-profit organizations. Government organizations should work to improve trust among the public through consistent and reliable actions. Government organizations are well positioned to reach a lot of people with information about agricultural and natural resource topics because of high levels of public awareness, but to do so successfully trust must improve. For-profit organizations should also consider their role in educating the public about agriculture and natural resource topics. Some for-profit organizations, such as Monsanto, DuPont, and Syngenta, may not have historically considered the general public to be part of their target audience. However, members of the public have the ability to influence the organizations through personal purchasing decisions and policy-related behaviors, such as voting.

As the agricultural industry continues to struggle with the public's lack of knowledge and awareness members for agricultural and natural resources issues, it is important that the awareness, knowledge, and trust of organizations communicating about agricultural and natural resource issues continue to be assessed (Brewer & Ley, 2013; Frick et al., 1995; Kovar & Ball, 2013; Mase et al., 2015; Meischen & Trexler, 2003). By understanding levels of awareness, knowledge, and trust of organizations that communicate about agricultural and natural resources issues, the industry can better understand how to improve communications and consumer understanding in the future.

The scope of this study limited the number of organizations that could be included. Future research should address additional organizations involved in communicating about agricultural and natural resources issues, including media entities, such as talk shows that discuss nutrition. Additionally, a qualitative study may be beneficial to gather a greater understanding of what is influencing respondents' perceptions of trust in relation to agricultural and natural resource organizations. This is important when research projects related to different types of issues have shown incongruent results for how the public views categories of organizations (Auger, 2011; Irani et al., 2001; Ruth, 2015). There is also a need for research documenting how communication media impact public opinion of these organizations due to the increasingly fragmented media environment compared to previous decades. From an organizational perspective, completing a case study of an organization undergoing a concerted effort to increase trust among the public is also recommended. As it relates to awareness, a similar case study would be warranted for an organization making a concerted effort to increase awareness and knowledge. This study also acts a snapshot in time, so research to document trends will be necessary as organizations and public opinion continue to change.

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