

## Introduction

This study explored the relationship between the source of new information in an online training video relating to *Escherichia coli* (*E. coli*) control strategies for cattle producers and factors related to behavior adoption. While using videos has become an attractive communication strategy for online education, more research is needed to better utilize this medium to communicate to the cattle producer audience. This study provides a start to this research by examining if manipulating one element of a video, the source of information presenting the advocated message, has an effect on the producer's attitudes, subjective norms, perceived behavior control and intention to adopt the behaviors advocated in the video. Understanding this relationship, if it exists, will help inform future education programs and communication campaigns on how best to present messages to cattle producers about pre-harvest *E. coli* contamination control strategies.

*E. coli* is a type of bacteria that resides in the gastrointestinal tract of humans and animals as part of the normal flora for healthy individuals. Generic *E. coli* is essential in that it aids in the digestion process for healthy individuals (Centers of Disease Control and Prevention, 2012). *E. coli* is part of a bacteria family that consists of several species that are both pathogenic (disease-causing) and non-pathogenic (non-disease-causing). One species of *E. coli* that results in ongoing significant concern is *E. coli* O157:H7, which is found to reside in the gastrointestinal tract of wildlife, domestic animals and livestock. Cattle are known as a major reservoir of *E. coli* O157:H7 and, although not pathogenic to animals, *E. coli* O157:H7 is pathogenic to humans. Fecal shedding of the *E. coli* O157:H7 from cattle is a major contamination source for food and water (Gansheroff and O'Brien, 2000). Since 1982, when it was recognized as a human pathogen following two outbreaks, *E. coli* O157:H7 has been declared a public health concern in North America and several European countries (Buchanan & Doyle, 1997).

In the United States, it is estimated that 9.4 million cases of foodborne illness occur each year, resulting in 1,351 deaths annually (Scallan, Hoekstra, Angulo, Tauxe, Widdowson, Roy et al., 2011). *E. coli* O157:H7 infections are preventable by proper food preparation, implementation of pre-harvest practices for beef cattle operations and

strong enforcement of HACCP (Hazard Analysis Critical Control Point) regulations for food processing facilities (Food and Agriculture Organization of the United Nations, 2011). In addition to being a great public health concern, *E. coli* O157:H7 also results in significant economic losses for the beef cattle industry. The United States Department of Agriculture (USDA) estimates almost 90,000 pounds of beef were recalled in 2013 *E. coli* O157:H7 contamination (USDA, 2014a).

As a result of the public health issues and the economic impact on the beef industry, the beef industry has adopted procedures to reduce the occurrence of *E. coli* O157:H7 in meat processing facilities (Dargatz et al., 2013). In addition, the use of pre-harvest *E. coli* management strategies has been recognized as an important part of a safe beef products system (USDA, 2014b). The existence of these pre-harvest interventions creates the opportunity to positively impact human health by focusing on modifying behaviors and management strategies carried out in cattle production. There are many ways to educate cattle producers about the behaviors they can adopt to help reduce *E. coli* contamination on their operations. One method is using online videos to present these educational messages. This strategy is especially interesting in light of the growth in the popularity of online videos. Since 2009, the percentage of adults online who have watched or downloaded videos grew from 69% to 78% in 2013. In addition, 50% of adults online have said they watched educational videos using the Internet, and 56% of these viewers have watched how-to videos (Purcell, 2013).

Using the Internet to deliver educational training videos is appealing when considering the number of cattle producers who use the Internet. According to the National Cattlemen's Beef Association – an organization with members that manage 90% of the nation's cattle – 83% of its members have Internet access and 48% of them have used smart phones to access the web to learn more about beef industry issues ("NCBA updated 2017 media kit," n.d.). In fact, when the USDA awarded a \$25 million grant to 11 land-grant universities toward the control of *E. coli* contamination in the beef industry, one third of the grant was targeted toward extension and outreach efforts (Moser, 2012). As a result, in fall 2013 the Beef Cattle Institute at Kansas State University released a series of training videos that describe pre-harvest practices to help with the control of *E. coli* (Hambright, 2014). For communication and education

efforts like these to succeed, it is important that communication designers consider how best to present messages to an audience so it can positively inform and impact the audience's behavior.

## **Theoretical Framework**

To explore the relationship between the source of new information relating to *E. coli* control strategies and factors related to behavior adoption, concepts regarding source credibility and the theory of planned behavior were used to inform this study. Source credibility has been studied for many years and has long been identified as an important part of the communication process, "whether the goal of the communication effort be persuasion or the generation of understanding" (McCroskey & Young, 1981, p. 24). Credibility has been described as the judgments an audience member makes about the believability of the communicator (Callison, 2001). Through the years, research into the concept has identified many elements of credibility, but the two that have received the most attention are trustworthiness and expertise (Pornpitakpan, 2004).

Trustworthiness is the extent to which the audience sees the assertions made by communicator to be valid. Expertise is the extent to which the speaker is seen to be capable of making correct statements (Hovland, Janis, & Kelley, 1953).

For those in agriculture, there has been some research that has suggested that certain attributes of information sources can be quite powerful. In 2010, Blackstock et al. reviewed literature to shed light on the best mechanisms to influence behavior change in farmers to improve water quality on ranches. Their review suggested that "experience" and "occupation" were important attributes of sources and that farmers were more likely to process "in-group messages," or messages from individuals who share a similar agricultural background (p. 5632). Because of this finding they wrote, "the use of people from farming backgrounds or trusted networks is likely to enhance message uptake" (Blackstock et al., 2010, p. 5632). Other research looking at information-source preferences support this interpretation (Vergot, Isreal & Mayo, 2005; Brunson & Price, 2009; Russel & Bewley, 2013). These studies found that farmers and other rural landowners prefer to get information from other producers, extension agents and veterinarians (Vergot, Isreal & Mayo, 2005), friends and relatives, and extension

sources (Brunson & Price, 2009), or consultants, nutritionists, and veterinarians (Russell & Bewley, 2013). Another study that sought to map a group of farmers' social and information-learning network found that local sources and practical experience were valued. The top sources for information were high-achieving farmers (Sligo & Massey, 2007).

There is also evidence that how the information source is labeled can affect perceived credibility. In 2013, Garnett conducted a study involving DTN/The Progressive Farmer subscribers, most of whom were active or retired agricultural producers. The participants were presented with a news story that was either labeled as coming from a farm media source (DTN) or a mainstream source (The Chicago Tribune). This label significantly altered perceived credibility, with respondents who had seen the farm media story perceiving the article as fair, more trustworthy, and less biased than the participants who read the mainstream media story. Earlier research carried out by Marquart, O'Keefe and Gunther (1995) also supported the perceived difference in the credibility of different information sources. In their research, they found that dairy farmers perceived different levels of trust and expertise for different sources for receiving information about manufactured bovine growth hormone (BGH). For example, other dairymen were perceived to have higher levels of trust than expertise. The reverse was true for government officials. Assuming that cattle producers are similar to these dairy producers, this research provides evidence that it is important to consider trustworthiness and expertise when considering the credibility of sources of information.

Another study examining cattle producers' likelihood to use different sources for information related to *E. coli* control strategies found similar results. The study used a questionnaire delivered to a convenience sample of cattle producers that asked the participants to rate information sources such as veterinarians, other cattle producers, extension personnel and government sources on expertise and trustworthiness. The study found that the perceived credibility of veterinarians was significantly higher than the other sources; government sources had the lowest credibility rating. The other sources were similar in credibility (Chapes, 2016). Using the concepts of expertise and

trustworthiness, this current study built on these earlier studies to gauge the perceived credibility of the sources in a training video

This study also uses concepts from the theory of planned behavior (TPB). This theory, an expansion of the theory of reasoned action, proposes that intention is the most important determinant of behavior (Ajzen, 1991). According to the TPB, the stronger the intention to perform a certain behavior, the stronger the likelihood of its performance., the theory Also presents a model wherein intention is informed by attitudes toward the behavior, subjective norms and perceived behavior control. It is proposed that the more positive the attitudes and norms toward a behavior, and the greater the perceived control, the greater the intention to perform a certain behavior when given the opportunity (Ajzen, 2006). Reviews of research that used the TPB have found support for using this theory in relation to a wide variety of behaviors (Ajzen, 1991; Armitage & Conner, 2001). Based on this theory, the questionnaire used in this study featured items that allowed participants to rate their attitudes, subjective norms, perceived behavior control and intentions to adopt strategies that can be used to help control *E. coli* contamination on their cattle production facilities.

### **Hypotheses and Research Questions**

The current study was interested in how source attributes, such as occupation/title, can affect perceived source credibility for online training videos. It studied the following hypotheses based on previous research suggesting veterinarians, other producers and government officials would have different perceived credibility.

H<sub>1</sub>: When comparing an online training video featuring a cattle producer with one featuring a government source, the video with the cattle producer will be seen as having more positive source credibility.

H<sub>2</sub>: When comparing an online training video featuring a veterinarian with one featuring a government source, the video with the veterinarian will be seen as having more positive source credibility.

This study was also interested in how the source's attributes in the training video can also have an impact on possible behavior adoption related to *E. coli* contamination.

H<sub>3</sub>: An online training video featuring a cattle producer will have a more positive relationship with attitudes, perceived norms, perceived behavior control and intention to adopt pre-harvest strategies related to *E. coli* contamination than a video featuring a government source.

H4: An online training video featuring a veterinarian will have a more positive relationship with attitudes, perceived norms, perceived behavior control and intention to adopt pre-harvest strategies related to *E. coli* contamination than a video featuring a government source.

RQ<sub>1</sub>: What will have a more positive relationship with attitudes, perceived norms, perceived behavior control and intention to adopt pre-harvest strategies related to *E. coli* contamination: a video featuring a cattle producer or a video featuring a veterinarian?

This study was also interested with the relationship between source credibility and possible behavior adoption.

H5: Higher source credibility will correlate with positive attitudes toward adopting pre-harvest strategies related to *E. coli* contamination.

H6: Higher source credibility will correlate with positive perceived norms toward adopting pre-harvest strategies related to *E. coli* contamination.

H7: Higher source credibility will correlate with positive perceived behavior control toward adopting pre-harvest strategies related to *E. coli* contamination.

H8: Higher source credibility will correlate to intention to adopting pre-harvest strategies related to *E. coli* contamination.

## Methods

This study examined the relationship between the perceived source credibility of sources that presented information relating to the pre-harvest control of *E. coli* in an online training video and the potential adoption of these endorsed strategies. An online questionnaire was used to conduct an experiment examining this relationship between source credibility and variables related to behavior adoption. This study used a post-test only/control group experimental design, with one independent variable related to information source. The dependent variables of interest for this research were concepts related to source credibility (trustworthiness and expertise) and the theory of planned behavior (attitudes, subjective norms, perceived behavior control and intention to adopt behavior). This study measured source credibility using a scale similar to ones used in previous studies (McCroskey & Young, 1981; Sinaga & Callison, 2008; Johnston & Warkentin, 2010). The survey instrument was designed to create a source credibility rating through a series of 8-point semantic differential scales. Expertise is composed of

five dimensions: Experienced/Inexperienced, Informed/Uninformed, Trained/Untrained, Qualified/Unqualified, and Expert/Not Expert. Trustworthiness is composed of five dimensions: Honest/Dishonest, Trustworthy/Untrustworthy, Open minded/Closed minded, Fair/Unfair, and Ethical/Unethical. Attitudes, subjective norms, perceived behavior control and intention to adopt a behavior was also measured using a scale similar to ones found in literature (Ajzen, 2006; Bae & Kang, 2008; Fielding, Terry, Masser & Hogg, 2008).

## **Procedure**

The 9:22 minute training videos with content based on information provided by the Beef Cattle Institute at Kansas State University was presented to participants in Qualtrics. While it is usually suggested that online videos should be kept short to increase attention and reduce viewer fatigue (Guo, Kim & Rubin, 2014), the 9:22 length was used to reflect the duration of similar training videos produced and hosted by the Beef Cattle Institute at that time. The training videos were exactly the same, each featuring the same talent to represent a veterinarian, a cattle producer or government official. The only difference between the video for each condition was the lower-third graphic presented toward the start and the end of the video that identifies the name and title of the presenter.

Participants were individuals involved in cattle production. These included individuals who were managers or employees on ranches. The participants could be involved in feedyard, cow-calf or stocker operations. For this particular study, the information and link to the questionnaire was distributed to cattle producers through the weekly news e-mail distributed by organizations whose membership includes cattle producers. The organizations that assisted with this research included the Kansas Farm Bureau, the Beef Cattle Institute at Kansas State University, the American Angus Association and the Kansas Livestock Association. The survey link was included in the Kansas Farm Bureau's semiweekly e-mail that was sent to 11,221 addresses on October 13, 16, 20, 23, 27 and 30, and on November 10 and 13, 2015. The addresses on this list include Kansas Farm Bureau voting members, or members who have an agricultural interest with income earned through production agriculture. The link was also sent to 960 members of the Beef Cattle Institute's e-mail newsletter subscriber list

on October 16 and 22, and November 3, 2015. Also, the survey link was included in the American Angus Association's 3,448 member Angus Journal Daily newsletter e-mail on October 13 and 22, and November 6, 2015. The link was also shared on the Angus Journal's Facebook page on October 16 and November 7. The information and link was also sent to 1,200 members of the Kansas Livestock Association on October 19, 2015. As a way to recruit more cattle producers for the study, All Beef Quality Assurance state coordinators and advisory boards were also given a chance to distribute the link to the survey to producers in their states on October 29, 2015. It is estimated that the link was sent to at least 16,829 e-mail addresses, though it is hard to estimate how many of these addresses were on multiple e-mail lists.

When a participant followed the link from the e-mail message or newsletter, they were presented with a consent message. After agreeing to participate in the research, the user was randomly sorted into one of the four conditions in the experiment. Once starting the questionnaire, the participants were presented with a question that asked if they are involved in cattle production. After this, the participants were presented with the training video, either the program featuring a presenter identified as a veterinarian, a cattle producer, a government official or an unidentified source. Participants were prevented from skipping past the video for 9:22. After watching the video, the participant was shown the questions related to the credibility of the presenter in the video and the theory of planned behavior. Before the final demographic questions, the participants were presented with a manipulation check question that asked if they could remember how the presenter in the video was identified. At the end of the questionnaire, the participants were given a message that thanked them for their time and an explanation for the research.

## **Data Analysis**

Questions intended to measure the same theoretical variable, such as trustworthiness or intention, were tested for reliability. Only items that score higher than a 0.8 in Cronbach's alpha analysis were used. A score of 0.8 in this analysis is a reflection of good internal consistency and suggests the items are measuring the same concept (Field & Hole, 2003). The data from each item related to each dependent

variable were recoded into a composite score for trustworthiness, expertise, attitudes, subjective norms, perceived behavior control and intention. An Analysis of Variance (ANOVA) test was used to test for statistical differences between the four conditions in the experiment for these dependent variables. Also, a Pearson's r correlation was used to check for the relationship between credibility and the variables related to the theory of planned behavior.

## **Results**

For this study, 168 questionnaires were collected. After removing incomplete data sets and participants who did not identify themselves as being a cattle producer at the start of the survey, 106 complete questionnaires were included in the data analysis. While this number of participants would mean this study's questionnaire had a very low response rate, which is estimated to be 0.01 percent, the study's experimental design did not require a representative sample usually required by survey-based research. Of the 106 participants, 27 watched the video with the veterinarian, 26 watched the video with the government official, 26 watched the video with the cattle producer and 27 watched the video with the unidentified presenter.

Cattle producers who participated in the study were different ages, with nearly half (48.1 percent) being 55 years old or older. The rest included 22.6 percent who were younger than 35, and 29.2 percent who were between 35 and 54 years old. Sixty-nine (65.1 percent) identified themselves as male, with the rest identifying themselves as female (33.0 percent), other (0.9 percent) or preferred not to answer (0.9 percent). Most of the participants identified themselves as non-Hispanic white (88.7 percent), with the second largest group being producers who preferred not to answer (10.4 percent). A large group of the participants had spent 10 or more years in cattle production (82.1 percent). Most of the participants worked at a Cow-Calf operation (79.2 percent), with the rest working at Stocker (7.5 percent), Feedyard (5.7 percent) or other types (7.5 percent) of cattle production operations. Operations represented by the participants included those with 49 head of cattle or less (22.7 percent), 50-199 head (39.6 percent) or 200 or more head (37.7 percent). Kansas was the most represented state (52.8 percent), with Idaho (7.5 percent), Ohio (6.6 percent) and Nebraska (4.7 percent) being the next most represented. The participants had mix of education levels, from some

college or less (26.4 percent), college degree (38.7 percent), or some post-graduate work or degree (34.9 percent).

Of the 106 participants, 66 of them (62.3 percent) correctly identified how the presenter was identified in the manipulation check question, while the 22 (20.7 percent) either misidentified the presenter or couldn't remember. Of the 27 producers who watched the video with the veterinarian, 24 (88.9 percent) correctly identified the presenter. Of the 26 who watched the government official video, 15 (57.7 percent) correctly identified their presenter, and of the 26 who watched the video with the cattle producer, 18 (69.2 percent) correctly remembered their presenter. Finally, of the 27 who watched the video where the presenter was not identified, 9 (33.3 percent) correctly noticed that the presented was not identified.

Next, the five items related to expertise were averaged into a combined score ( $\alpha=.84$ ), as were the five items related to trustworthiness ( $\alpha=.89$ ). The items for expertise and trustworthiness were averaged to create a combined score for credibility. Following this, the three items related to attitudes and belief were averaged into a composite score ( $\alpha=.89$ ). This was also done for the three items related to subjective norms ( $\alpha=.76$ ), perceived behavior control ( $\alpha=.81$ ), and intention ( $\alpha=.82$ ).

## **Data Analysis**

### ***Source and Credibility***

Hypothesis 1 predicted that when comparing the online training video featuring the cattle producer with the video with the government source, the cattle producer video would have more positive perceived credibility. In addition, Hypothesis 2 predicted that the video with the veterinarian would also have more positive perceived credibility than the video with the government official. To test these hypotheses, a one-way between subjects ANOVA was conducted to compare the effect of how the source in the video was identified on perceived credibility of the source in the video. This test found that there was not a significant effect of source on perceived credibility at the  $p<.05$  level for all of the videos [ $F(3, 102) = 0.59, p = 0.62$ ]. Since no significant differences were found,  $H_1$  and  $H_2$  were not supported. See Table 1.

Following this first test, one-way between subjects ANOVAs were also conducted to compare the effect of how the source in the video was identified on perceived

credibility on the perceived trustworthiness and expertise, the component elements of source credibility. At the  $p < .05$  level, these tests found that there was no significant effects of source on trustworthiness [ $F(3, 102) = 0.36, p = 0.78$ ] or expertise [ $F(3, 102) = 0.77, p = 0.51$ ]. These findings provide additional evidence that  $H_1$  and  $H_2$  were not supported.

**Table 1**

***Perceived Credibility of Sources in Online Training Videos***

<u>Information Source</u>	<u>Expertise Mean</u>	<u>Trustworthiness Mean</u>	<u>Credibility Mean</u>	<u>Standard Deviation</u>
Veterinarian	7.1	7.0	7.1	0.8
Government Sources	6.9	6.9	6.9	1.1
Cattle Producer	6.6	6.7	6.7	1.4
Unidentified	6.9	7.0	7.0	1.1

*Note:* Sources ranked with eight-point semantic differential scales.

Next, data from respondents who did not correctly identify how the source was labeled in the video were removed so only participants who noticed how the host was identified were included. This left 66 data sets to analyze. With this data, a one-way between subjects ANOVA was run to compare the effect of source on credibility for these participants. This test found that there was still not a significant effect of source on perceived credibility at the  $p < .05$  level for all of the videos [ $F(3, 62) = 0.29, p = 0.83$ ]. Additional one-way between subjects ANOVAs conducted also found no significant effects of source on trustworthiness [ $F(3, 62) = 0.41, p = 0.75$ ] or expertise [ $F(3, 62) = 0.24, p = 0.87$ ]. These findings further suggest that that  $H_1$  and  $H_2$  were not supported.

***Source and the Theory of Planned Behavior***

Hypothesis 3 predicted that an online training video featuring a cattle producer would have a more positive relationship with attitudes, perceived norms, perceived behavior control and intention to adopt suggested behaviors than a video featuring a government official. Hypothesis 4 also predicted that the video featuring the veterinarian would also have a more positive relationship with these measures related to the theory of planned behavior. Also, Research Question 1 asked what would have a more positive relationship with attitudes, norms, perceived behavior control and intention, the video

with the cattle producer or the veterinarian. To test these hypotheses, a one-way between subjects ANOVA was conducted to compare the effect of source on attitudes for all videos. This test found that source did not have a significant effect on attitudes at the  $p < .05$  level [ $F(3, 102) = 1.72, p = 0.17$ ]. Further one-way between subjects ANOVAs also did not find a significant effect of source on subjective norms [ $F(3, 102) = 1.61, p = 0.19$ ], perceived behavior control [ $F(3, 102) = 1.59, p = 0.20$ ], and intention to adopt behavior [ $F(3, 102) = 1.18, p = 0.32$ ]. These findings suggest that how the source was identified in the training video, whether as a veterinarian, cattle producer, government official or unidentified, had no effect on the measures related to the theory of planned behavior and possibly potential behavior adoption. Thus,  $H_3$  and  $H_4$  were not supported. Also, the findings suggest the answer to  $RQ_1$  is that neither the video with the cattle producer nor the video with the veterinarian has a more positive effect on attitudes, subjective norms, perceived behavior control or intention to adopt pre-harvest strategies related to *E. coli* contamination. See table 2.

**Table 2**

***Theory of Planned Behavior Measures***

<u>Information Source in Video</u>	<u>Attitudes</u>	<u>Subjective Norms</u>	<u>Perceived Behavior Control</u>	<u>Intention to Adopt Behavior</u>
Veterinarian	6.7	6.3	5.8	5.9
Government Sources	6.3	5.9	5.5	5.6
Cattle Producer	6.5	6.6	6.2	6.3
Unidentified	7.2	6.6	6.3	6.3

*Note:* Sources ranked with eight-point semantic differential scales.

Next, data from the 66 respondents who correctly recognized how the source was identified in the manipulation check question were used to run a one-way between subjects ANOVA to compare the effect of source on attitudes for all videos. This test found that source did not have a significant effect on attitudes at the  $p < .05$  level for these participants [ $F(3, 62) = 2.14, p = 0.11$ ]. Further one-way between subjects ANOVAs also did not find a significant effect of source on subjective norms [ $F(3, 62) = 2.32, p = 0.08$ ] and perceived behavior control [ $F(3, 62) = 1.57, p = 0.21$ ]. However, an ANOVA run to compare the effect of source on intention to adopt behaviors did find a

significant effect [ $F(3, 62) = 4.91, p = 0.004$ ]. Post hoc comparisons using the Tukey HSD test found that the mean score for intention for unidentified source video ( $M=7.48, SD=0.91$ ) was significantly different from the veterinarian ( $M=5.91, SD=1.34$ ), government official ( $M=5.47, SD=1.98$ ) and cattle producer videos ( $M=6.78, SD=1.23$ ). There were no significant differences between the other sources for intention. While a significant difference was found, these findings provide further evidence that  $H_3$  and  $H_4$  were not supported.

### ***Credibility and the Theory of Planned Behavior***

Hypothesis 5 predicted that higher perceived source credibility would correlate with positive attitudes toward adopting pre-harvest strategies related to *E. coli* contamination. To test this hypothesis, a Pearson's  $r$  correlation was computed to assess the relationship between credibility and attitudes. For this test, it was assumed that a result of  $r = 0.5$  or greater was seen as a large effect, while  $r = 0.03$  was seen as a medium effect (Field, 2013). This test found a positive correlation between the two variables,  $r = 0.624, n = 106, p = 0.000$ . This finding suggests that higher perceived credibility of the source in the video positively relates to more positive attitudes toward pre-harvest *E. coli* control strategies. Thus,  $H_5$  was supported. See table 3.

Hypothesis 6 predicted that higher source credibility would also correlate with positive perceived norms. A Pearson's  $r$  correlation was computed to assess the relationship between credibility and norms to test this hypothesis. This test found a positive correlation between the two variables,  $r = 0.333, n = 106, p = 0.000$ . While this was also not a strong relationship, the finding also suggests that higher credibility positively relates with positive subjective norms. Thus,  $H_6$  was also supported.

In addition, Hypothesis 7 predicted that higher source credibility would correlate with positive perceived behavior control. A Pearson's  $r$  correlation was also computed to test the relationship between credibility and perceived behavior control. A positive correlation was found between the two variables,  $r = 0.219, n = 106, p = 0.024$ . While less strong than the relationships found with the previous two variables, this finding still suggests that higher credibility positively relates with positive perceived behavior control. Thus,  $H_7$  was supported as well.

Finally, Hypothesis 8 predicted that higher source credibility would correlate with more positive intentions to adopt pre-harvest strategies related to *E. coli* contamination. A final Pearson's r correlation was computed to test the relationship between credibility and intention. This test found a positive relationship between the two variables,  $r = 0.258$ ,  $n = 106$ ,  $p = 0.008$ . Though not very strong, this finding suggests that higher perceived credibility positively relates with positive intentions to adopt pre-harvest control strategies for *E. coli* contamination mentioned in the online training videos. Thus,  $H_8$  was supported.

**Table 3**

***Pearson's r correlation coefficients***

	<u>Attitudes</u>	<u>Subjective Norms</u>	<u>Perceived Behavior Control</u>	<u>Intention to Adopt Behavior</u>
Source Credibility	0.624*	0.333*	0.219**	0.258***

*Note: \*p=0.000, \*\*p=0.024, \*\*\*p=0.08*

## Discussion

The current study's findings provide further evidence for the importance of source credibility in the presentation of messages. The importance of source is seen in the finding that no matter how the source is labeled, higher perceived credibility correlates with more positive attitudes, perceived norms, perceived behavior control and reported intention to adopt the suggested behaviors. The finding of this correlation provides evidence that perceived credibility is related to possible behavior adoption, indicating that credibility of the source is an important consideration when video designers are constructing educational messages for their training videos. These video producers will need to decide on the best way to make sure the information source in their videos is perceived to be highly credible.

This study's other findings suggest that how the presenter in the video is labeled may not affect the perceived credibility of the source. The findings found that identifying

the presenter's role as a veterinarian, a cattle producer or a government official, or no with no label had no effect on either the presenter's credibility or on the video's effect on the variables related theory of planned behavior. While previous studies found that cattle producers place more importance on certain sources for acquiring new information, especially related to *E. coli* control, this preference does not appear to apply when the information is presented in the form of training videos. The one finding at odds with other results in this study is that participants who remembered that the source was unidentified reported significantly higher intentions to adopt suggested behaviors than respondents who watched videos with identified sources. This discrepancy provides further evidence that source does not translate to video form when the presenter is only identified through the use of a lower-third graphic.

Future research should consider exploring how other considerations that go into designing a training video's message can affect perceived credibility of the presenter in the video and of the video itself. These factors could include the sponsor or creator of the video, types of supporting footage used, length of the video or even the music used in the production. This research should also explore if these factors have stronger effects on attitudes, norms, perceived behavior control and intention to adopt behaviors than the perceived credibility of the information source. More immediately, this study could be repeated with a stronger visual manipulation to better differentiate the presenter's role in each video. This is discussed more in the limitations section below. Future research should also explore the long-term results of presenting a message that is seen as highly credible with a training video, which could correlate to higher reported values for the variables derived from the theory of planned behavior, and if the use of the credible message would translate to actual behavior performance. The fact that there are hundreds of decisions related to the production of a video creates seemingly endless avenues of possible research.

## **Limitations**

The current study has several limitations that must be considered when examining the research findings. This study found that no matter how a source in a video was labeled, through the use of the lower-third graphic, there was no difference

on perceived credibility of the information source and the video's effect on the variables related to the theory of planned behavior. It is entirely possible that the use of the lower-third graphic, and only the graphic, to change how the source was perceived may not have been a strong enough manipulation. Even if the source was labeled as a veterinarian, the presenter was dressed the same and looked the same as he did in the video where he was labeled as a cattle producer or government source. This simple manipulation was chosen to control for the effect of other variables and to reduce video production time. Nonetheless, it is possible if the source had more visual clues of his role, such as wearing a stethoscope, it would have further highlighted the role the source was supposed to take. The same is true for the government source and cattle producer.

Another limitation that must be considered is the sample frame used to recruit the participants for this experiment. In order to recruit from the population of interest of actual cattle producers, the link to the online questionnaire was sent to the members of the e-mail news mailing lists of several cattle industry organizations. It's possible that this sample frame of cattle producers does not fully represent the larger population of cattle producers in the United States. Also, the low response rate to the request to watch the video and complete the questionnaire also created the possibility that the group of producers who volunteered to participate does not represent the entire sample frame. Though the random presentation of video treatment condition that each participant viewed used in this experiment should help to control for these effects, it is a limitation that exists.

## **Conclusion**

Despite these limitations, the findings of this study are applicable to efforts that intend to use online training videos to educate cattle producers about pre-harvest *E. coli* control strategies. Using videos to educate has grown in popularity and video producers must consider how to persuade viewers to accept their message and adopt suggested behaviors. This study provides evidence that perceived source credibility of the presenter of the message in the video correlates with more positive attitudes, perceived norms, perceived behavior control and intention to adopt the suggested behaviors. This

suggests that credibility affects behavior adoption. Also, this research suggests that changing the type of source in the video, from government official to cattle producer to veterinarian, does not affect how the video is perceived. While future research is needed, the findings of this study only highlights the importance of crafting the message of a video to appeal to the intended audience.



Joseph Chapes is a digital media specialist with the Center for Online and Distance Learning at the University of Kansas and a PhD student in instructional technology in the KU School of Education. He was previously a video producer at the Kansas State University College of Veterinary Medicine.

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211. [http://dx.doi.org/10.1016/0749-5978\(91\)90020-I](http://dx.doi.org/10.1016/0749-5978(91)90020-I)
- Ajzen, I. (2006). Constructing a theory of planned behavior questionnaire. Retrieved from <http://people.umass.edu/aizen/tpb.html>.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of Social Psychology*, 40, 471-499. doi:10.1348/014466601164939
- Bae, H., & Kang, S. (2008). The influence of viewing an entertainment-education program on cornea donation intention: A test of the theory of planned behavior. *Health Communication*, 23(1), 87-95. <http://dx.doi.org/10.1080/10410230701808038>
- Blackstock, K. L., Ingram, J., Burton, R., Brown, K. M., & Slee, B. (2010). Understanding and influencing behaviour change by farmers to improve water quality. *Science of the Total Environment*, 408(23), 5631-5638. doi:http://dx.doi.org/10.1016/j.scitotenv.2009.04.029
- Brunson, M., & Price, E. A. (2009). Information use and delivery preferences among small acreage owners in areas of rapid exurban population growth. *Journal of Extension*, 47(5), 5FEA4.
- Buchanan, R. L., & Doyle, M.P. (1997). Foodborne Disease Significance of Excherichia coli O157:H7 and Other Enterohemorrhagic E. coli. *Food Technology*, 51(10), 69-76.
- Callison, C. (2001). Do PR practitioners have a PR problem?: The effect of associating a source with public relations and client-negative news on audience perception of credibility. *Journal of Public Relations Research*, 13(3), 219-234. [http://dx.doi.org/10.1207/S1532754XJPRR1303\\_2](http://dx.doi.org/10.1207/S1532754XJPRR1303_2)
- Centers of Disease Control and Prevention (2012). E. coli (Escherichia coli). Retrieved from <http://www.cdc.gov/ecoli/>
- Chapes, J. (2016). Credibility and Likelihood to Use Information Sources by Cattle Producers For Learning E. coli Control Strategies. *Online Journal of Rural Research & Policy*, 11(4). <http://dx.doi.org/10.4148/1936-0487.1077>
- Dargatz, D.A., Bai, J., Lubbers, B.V., Koprak, C.A., An, Baoyan, & Anderson, G.A. (2013). Prevalence of Escherichia coli O-Types and Shiga-Toxin Genes in Fecal

Samples from Feedlot Cattle. *Foodborne Pathogens and Disease*, 10(4), 392-396. doi: <http://dx.doi.org/10.1089/fpd.2012.1289>.

Field, A., & Hole, G. (2003). *How to design and report experiments*. Los Angeles: SAGE Publications.

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics* (4<sup>th</sup> ed). Los Angeles: SAGE Publications.

Fielding, K. S., Terry, D. J., Masser, B. M., & Hogg, M. A. (2008). Integrating social identity theory and the theory of planned behavior to explain decisions to engage in sustainable agricultural practices. *British Journal of Social Psychology*, 47, 23-48.

Food and Agriculture Organization of the United Nations. (2011). Preventing E. coli in Food. Retrieved from [http://www.fao.org/fileadmin/user\\_upload/agns/pdf/Preventing\\_Ecoli.pdf](http://www.fao.org/fileadmin/user_upload/agns/pdf/Preventing_Ecoli.pdf)

Gansheroff, L.J.; O'Brien, A.D. (2000). Escherichia coli O157:H7 in beef cattle presented for slaughter in the U.S.: higher prevalence rates than previously estimated. *Proceedings of the National Academy of Sciences of the United State*, 97(7), 2959-2961. <http://dx.doi.org/10.1073/pnas.97.7.2959>.

Garnett, E. (2013). The effect of source on agricultural producers' perceptions of credibility. (Masters project). Retrieved from <https://mospace.umsystem.edu/xmlui/handle/10355/41122>

Guo, P. J., Kim, J., & Rubin, R. (2014, March). How video production affects student engagement: An empirical study of MOOC videos. In *Proceedings of the first ACM conference on Learning@ scale conference* (pp. 41-50). ACM.

Hambright, A. (2014, October 7). BCI develops training modules in collaboration with \$25 million research effort. *K-State Research and Extension News*. Retrieved from [http://www.ksre.ksu.edu/news/story/BCI\\_training100714.aspx](http://www.ksre.ksu.edu/news/story/BCI_training100714.aspx).

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change* (8th ed.). New Haven: Yale University Press.

Johnston, A. C., & Warkentin, M. (2010). The influence of perceived source credibility on end user attitudes and intentions to comply with recommended IT actions. *Journal of Organizational and End User Computing (JOEUC)*, 22(3), 1-21. doi:10.4018/joeuc.2010070101

Marquart, J., O'Keefe, G. J., & Gunther, A. C. (1995). Believing in biotech: Farmers' perceptions of the credibility of BGH information sources. *Science*

Communication, 16(4), 388-402.  
<http://dx.doi.org/10.1177/1075547095016004002>.

McCroskey, J. C., & Young, T. J. (1981). Ethos and credibility: The construct and its measurement after three decades. *Central States Speech Journal*, 32(1), 24-34.  
doi: <http://dx.doi.org/10.1080/10510978109368075>.

Moser, D. (2012, January 23). UNL leads \$25 million project targeting E. coli threat to food safety. UNL Announce. Retrieved from  
<http://newsroom.unl.edu/announce/todayatunl/918/5534>

NCBA updated 2017 media kit (n.d.). Retrieved from  
[http://www.beefusa.org/CMDocs/BeefUSA/Updated 2017 Media Kit.pdf](http://www.beefusa.org/CMDocs/BeefUSA/Updated%202017%20Media%20Kit.pdf)

Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology*, 34(2), 243-281.  
<http://dx.doi.org/10.1111/j.1559-1816.2004.tb02547.x>.

Purcell, K. (2013). Online video 2013. Washington, D.C.: Pew Research Center.  
Retrieved from <http://www.pewinternet.org/2013/10/10/online-video-2013/>

Russell, R. A., & Bewley, J. M. (2013). Characterization of kentucky dairy producer decision-making behavior. *Journal of Dairy Science*, 96(7), 4751-4758.  
doi:<http://dx.doi.org/10.3168/jds.2012-6538>

Scallan, E., Hoekstra, R. M., Angulo, F. J., Tauxe, R. V., Widdowson, M. A., Roy, S. L., et al. (2011). Foodborne illness acquired in the United States--major pathogens. *Emerging Infectious Diseases*, 17(1), 7-15. doi: 10.3201/eid1701.P11101

Sligo, F. X., & Massey, C. (2007). Risk, trust and knowledge networks in farmers' learning. *Journal of Rural Studies*, 23(2), 170-182.  
doi:<http://dx.doi.org/10.1016/j.jrurstud.2006.06.001>

Sinaga, S., & Callison, C. (2008). Credibility of PR practitioners: The impact of professional journalism background on trustworthiness, expertness, and homophily evaluations. *Public Relations Review*, 34(3), 291-293.

U.S. Department of Agriculture (USDA). (2014a). Summary of Recall Cases in Calendar Year 2013. Retrieved from <http://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts/recall-summaries>

U.S. Department of Agriculture (USDA). (2014b). Pre-Harvest Management Controls and Intervention Options for Reducing Shiga Toxin-Producing Escherichia coli Shedding in Cattle: An Overview of Current Research. Retrieved from  
<http://www.fsis.usda.gov/wps/wcm/connect/d5314cc7-1ef7-4586-bca2-f2ed86d9532f/Reducing-Ecoli-Shedding-in-Cattle.pdf?MOD=AJPERES>.

Vergot III, P., Israel, G., & Mayo, D. E. (2005). Sources and channels of information used by beef cattle producers in 12 counties of the northwest Florida extension district. *Journal of Extension*, 43(2).