

## Examining Consumers' Trust in the Food Supply Chain

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## Examining Consumers' Trust in the Food Supply Chain

### Abstract

Consumers are concerned about the quality and safety of their food at all times during the food supply chain, but sensationalized media coverage, lack of knowledge, and recent recalls have made it difficult for consumers to trust the agricultural industry. Because trust drives risk perceptions and acceptance, it is important for agricultural communicators to understand how personal characteristics influence trust in the food supply chain. To fulfill the purpose of this study, a national quota sample of 847 responses to an online questionnaire were collected in March 2019. The results indicated respondents held a moderate level of trust toward production agriculture, food processing, food retail, and food safety regulation, with the greatest level of trust assigned to production agriculture. Trust in these sectors of the food supply chain were also positively correlated to one another. Regression models for trust in each agricultural sector were significant but only accounted for 9% of the variance in the dependent variable at most. Direct engagement in agriculture was a positive predictor in trust across all four areas, and use of social media was a negative predictor for trust. Income and gender were also found to be predictors of trust in production agriculture, food processing, food retail, and food safety regulation. The findings from this study can be used to guide future communication to increase the level of trust in the food supply chain, which would also increase consumers' purchasing intent.

### Keywords

trust, food safety, food supply chain, personal characteristics

### Cover Page Footnote/Acknowledgements

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### Introduction

As the American public moves away from its agrarian roots (The World Bank, 2018), consumers have found it increasingly difficult to make decisions related to their food (Sivadasan, Efstathiou, Calinescu, & Huaccho Huatuco, 2006). Consumers have been inundated with information about their food through labeling, marketing, news reports, and personal conversations (Kent, Pauze, Roy, Billy, & Czoli, 2019; Leal, Ruth, Rumble, & Simonne, 2017). Additionally, recent interest in the traceability of food has piqued consumer interest in the safety of their food during all phases of the supply chain (Aung & Chang, 2014). Farmers' markets have seen an increase in sales in recent years due to consumer interest in purchasing their food directly from the source (Agricultural Marketing Resource Center [AMRC], 2019), and consumers want assurances that the safety and the quality of the food is guaranteed from the farm to the table (Aung & Chang, 2014).

Unfortunately, consumers often lack the knowledge to understand the process through which their food is grown and rely on personal conversations or television to learn about food safety (Leal et al., 2017). Media coverage can be a poor source for information about food topics because it typically only focuses on reporting crises related to food production (Duffy, Fearne, & Healing, 2005). For example, food safety recalls, like the 2018 recall of lettuce and cauliflower due to *e. coli* (Centers for Disease Control and Prevention [CDC], 2019). The complex supply chain for food production makes it difficult to pinpoint the source of contamination, which decreases consumers' trust toward the agricultural industry (Sivadasan et al., 2006).

One of the outcomes related to increased consumer concern of food production has been the growing demand for organic products (McNeil, 2018). Researchers have found consumers may trust the overall safety of organic products compared to conventionally farmed food (Magkos, Arvaniti, & Zampelas, 2007). However, research has concluded there is no scientific evidence to support organic food as being safer than conventional agricultural products (Smith-Spangler et al., 2012). Fisher (2017) stated,

Consumers of the future, through the internet and using social media, are likely to decide what a fact is and what a myth is regardless of what peer-reviewed science has to say about it. This creates a void for trust... (para. 4)

Because trust has been identified as a primary driver of purchasing intention (Yee, Yeung, & Morris, 2005), it is important for agricultural communicators to understand how to increase trust in agriculture to also increase sales of food grown via conventional agricultural practices. However, examining trust in the different sectors of the food supply chain would provide agricultural communications practitioners a more nuanced understanding of the issue. Therefore, the purpose of this study was to understand how personal characteristics influenced U.S. residents' trust in the food supply chain.

### Conceptual Framework

The concept of trust provided the conceptual framework for this research. While the concept of trust can represent a variety of definitions, this research has operationalized trust as *the confidence that a party is benevolent and honest, and that the party's words, actions, and decisions fulfill their obligations in any exchange relationship* (Rousseau, Sitkin, Burt, & Camerer, 1998). Trust has been difficult to conceptualize due to constantly changing psychological and social influences, but Huang and Wilkinson (2013) aimed to create a dynamic

model of trust. The researchers determined trust was influenced primarily by perception, experience, outcomes of actions, and other events within the environment (Huang & Wilkinson, 2013).

The concept of trust is important for communicators to consider because it has been found to be instrumental in influencing attitudes and acceptance when risk perceptions are high (Kim & Benbasat, 2003) or when people are not motivated to process the information in the communication (Petty & Cacioppo, 1986). Prior research has concluded consumers are often not giving communication related to food and agriculture a great deal of thought and rely on peripheral cues in the communication, like trust, to form attitudes (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Ruth & Rumble, 2017). Additionally, researchers have found consumers are uncertain about how they feel toward their food (Frewer, Howard, Hedderley, & Sheherd, 1997), and perceptions of risk can also drive attitudes (Frewer, Howard, & Shepherd, 1998).

Past research has already concluded consumers give little thought toward communication related to food, but their risk perceptions can influence attitudes and acceptance (Frewer et al., 1998; Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Ruth & Rumble, 2017). Since trust is an important determinant of risk perception (Kim & Benbasat, 2003), agricultural communicators will need to understand what influences trust in agriculture to decrease perceptions of risk and increase acceptance. While past research has found trust in science to be relatively stable, if not increasing (Funk, Hefferon, Kennedy, & Johnson, 2019), researchers have identified differences in trust across types of science, like trust in climate science versus trust in general science (Myers et al., 2016). Consumers have also reported trusting non-profits in the agricultural industry more than for-profit organizations (Settle, Rumble, McCarty, & Ruth, 2017). Specific events, like a product recall, have also been found to have negative impacts on trust in a company, ultimately effecting both short-term and long-term purchasing behavior (Vassilikopoulou, Lepetsos, & Siomkos, 2018). Additionally, demographic influences, like gender and income, have been identified as important predictors for trust in science (Miller, Bell, & Buys, 2007; Strijbos et al., 2016).

Despite high levels of trust in general science (Funk et al., 2019), trust in the media to share information has been decreasing (Hanitzsch, Van Dalen, & Steindl, 2017). People are no longer passively watching television or reading papers to receive the news and can now pick and choose the news sources that align with their values and attitudes (Iyengar & Hahn, 2009; Prior, 2007). The majority of Americans now receive the news through social media (Shearer & Matsa, 2018). However, these people expect the information they receive on social media to be inaccurate (Shearer & Matsa, 2018). This general lack of trust toward information shared on social media (Shearer & Matsa, 2018) coupled with the recent emergence of “fake news” has influenced how credible the public finds both the media and the institutions the media reports on (Mihailidis & Viotty, 2017). Due to the spread of fake news and the emergence of social media, where people can self-select where they receive the news, the public has become increasingly distrusting and spending more and more time in homophilous networks (Mihailidis & Viotty, 2017).

Because the food supply chain involves multiple agricultural sectors, like production agriculture, food processing, food retail, and food safety regulation (Aung & Chang, 2014), there is a need to explore how trust is influenced in each of these areas. Specifically exploring how consumers’ personal characteristics, like agricultural engagement (Huang & Wilkinson, 2013), use of media (Mihailidis & Viotty, 2017), and demographics (Miller et al., 2007; Strijbos et al.,

2016), influence trust in these agricultural sectors in the food supply chain would help agricultural communicators target specific audiences to influence trust, which would lead to increased purchasing intent of agricultural products.

### Objectives

The objectives of this study were to understand the influence of personal characteristics on consumers' level of trust in the food supply chain.

1. Describe U.S. residents' top information sources and their personal engagement in agriculture.
2. Describe U.S. residents' trust in production agriculture, food processing, food retail, and food safety regulation.
3. Identify relationships between consumers' trust in production agriculture, food processing, food retail, and food safety.
4. Determine the influence of demographic characteristics, media use, and personal engagement in agriculture on U.S. residents' trust in production agriculture, food processing, food retail, and food safety regulation.

### Methodology

The population of interest for this study was U.S. residents. Researchers collected primary, quantitative data using an online survey, which was compatible with both desktop and mobile devices. The questionnaire consisted of 28 questions that asked respondents about their trust and experiences related to agriculture. The instrument was designed using Qualtrics and distributed by CINT, an online insights exchange platform. Respondents answered questions using varying response methods, including text entry, multiple choice, agreement using slider scales, and rank ordering. This was done, in part, to help keep respondents engaged, encouraging them to complete the survey and provide honest information. One attention check was included in the survey as a simple method of determining which respondents were paying attention to the questionnaire (Oppenheimer, Meyvis, & Davidenko, 2009).

A quota sample was used to collect a total of 1,031 responses from respondents across the U.S. Quotas to match the U.S. Census for race and gender were established to help generalize the findings from the study (Baker et al., 2013). This initial dataset was screened for discrepancies in the responses. Surveys where the respondent failed to accurately answer the attention check were removed because this signaled the respondent was not reading the individual questions. One-hundred and seventy-four responses were removed from the dataset due to failed attention checks. Responses less than three minutes indicated the respondent was not reading the questions closely enough to fully understand the information and were removed from the study ( $n = 10$ ). The pre-test determined it would take between eight and 12 minutes to complete this survey. With the exception of excessively long response times, to accommodate for respondents who left the survey and returned later, average response time was 8.9 minutes (533 seconds).

The resulting dataset had a total of 847 responses. Basic demographic information was collected from survey participants ( $n = 847$ ). The sample was representative of the U.S. population for gender and race (United States Department of Commerce, 2019). The percent of respondents who indicated they were Hispanic or Latino (9.93%) was much lower than the census value of 18.1% (United States Department of Commerce, 2019). Annual income data were also collected, but the distribution is not representative of the U.S. population. A full description of demographic characteristics can be found in Table 1.

Table 1  
Description of Sample Demographics

	%	n
Gender		
Female	51.2	435
Male	48.5	411
Neither/Prefer Not to Answer	0.1	1
Annual Household Income		
Less than \$19,999	17.4	147
20-39,999	25.1	213
40-59,999	19.0	161
60-79,999	14.4	122
80-99,999	9.8	83
100-199,999	5.1	43
120-139,999	3.2	27
Greater than 140K	6.0	51
Age		
18-24	10.5	89
25-34	18.1	153
35-44	22.8	193
45-54	20.1	170
55-64	13.2	112
65 or older	15.3	130
Race/Ethnicity		
White	77.0	652
Black or African American	12.0	102
Hispanic	9.9	84
Asian	4.7	40
Other	4.3	36
American Indian or Alaska Native	1.7	14
Native Hawaiian or Pacific Islander	.4	3

The variables of interest were researcher developed and included trust in production agriculture, trust in food processing, trust in food retail, trust in food safety regulation, personal engagement in agriculture, and top information sources, along with demographic characteristics. The four trust variables were measured on the same, 100-point sliding scales with the labels of completely disagree (0), neutral (50), and completely agree (100). Real limits were created to help interpret the findings for this study (Sheskin, 2004): minimal trust = 0 - 24.99, low trust = 25 - 49.99, moderate trust = 50 - 74.99, high trust = 75 - 100. Trust in production agriculture was measured with the following five items:

1. I trust that conventional farming and ranching practices have no negative long-term health effects.
2. I trust that farmers and ranchers are good stewards of the land
3. I believe that farmers and ranchers do everything in their power to prevent the spread of diseases, to aid in the prevention of recalls.

4. I trust that farmers are properly educated on the safety and application of the pesticides and fertilizers they use on crops.
5. I trust that ranchers are properly educated on the safety and administration of antibiotics and hormones they use on animals.

The five items were averaged to create the construct for trust in production agriculture and were found to be reliable with a Cronbach's  $\alpha$  greater than .70 (Field, 2013; Cronbach's  $\alpha$  =0.90). Trust in food processing was measured with four-items, which were found to be reliable ( $\alpha$  =0.87). The following items were averaged to create the construct:

1. I trust that food processors are upholding the highest safety and sanitary requirements.
2. Labels on processed food accurately represent the contents and nutritional information of the item.
3. I trust that the ingredients in processed foods are safe for consumption.
4. Processed foods are just as healthy as food I prepare from scratch myself.

Trust in food retail was measured with four items that were averaged once again to create the construct (Cronbach's  $\alpha$  =0.84). The items in the construct were:

1. I trust that grocery stores and other food retailers only stock high quality food items.
2. I trust that grocery stores and other food retailers do not sell recalled items.
3. I trust that restaurants use only high-quality ingredients in the food that they prepare.
4. Food prepared by restaurants is just as healthy as the food I prepare myself.

The final trust construct measured in this study was trust in food safety regulation. This construct also consisted of four items that were averaged to create the construct (Cronbach's  $\alpha$  =0.95). The items measuring trust in food safety regulation included:

1. I trust that current food safety regulations are strict enough to keep food safe.
2. I trust that the agencies who govern food safety regulations do a good job at enforcing the regulations.
3. I trust that governing agencies are ensuring the ingredients in processed foods meet food safety requirements.
4. I trust that governing agencies are ensuring labels on processed foods are accurate.

The measurement for *personal engagement in agriculture* was transformed from two questions. One question asked respondents about how many generations they were removed from agriculture, with the options of they were currently involved in agriculture, their parents were involved in agriculture, their grandparents were involved in agriculture, their great-grandparents were involved in agriculture, or they did not know. Respondents who reported their grandparents were involved in agriculture, their great-grandparents were involved in agriculture, or they did not know how many generations they were removed from agriculture were asked to answer a second question that asked if they had any close acquaintances involved in agriculture with a yes or no response. These two questions were transformed to create the personal engagement in agriculture construct by coding those who were currently involved or had parents involved in agriculture as having *direct engagement*, those who said yes to the follow-up question as having *acquaintances*, and those who said no to the follow-up question as having *no engagement*.

*Top information source* was measured with one, five-item ranking question. Each respondent was asked to rank information sources from most to least used to learn about news and current events. The sources included televised news, social media, blogs and podcasts, print media (newspapers, books, etc.), and family and friends. The responses were transformed to

create one variable that represented the most used source of each respondents. The demographic variables measured in this study included age, ethnicity/race, income, and gender.

Prior to distribution, [State University] faculty and staff along with [State] Department of Agriculture representatives reviewed the survey for face and content validity and did not identify issues. Data were collected in March of 2019 and analyzed in Statistical Package for the Social Sciences (SPSS) version 25. Objectives one and two were fulfilled with the use of simple, descriptive statistics. Objective three used a Pearson Product-Moment Correlations to explore the relationships between the trust variables. Davis' (1971) guidelines were used to interpret the effect size and were as follows: .01 to .09 = negligible, .10 to .29 = low, .30 - .49 = moderate, .50 - .69 = substantial, and .70 - .99 as very high.

Four multiple, linear regressions were used to fulfill objective four with trust in production agriculture, trust in food processing, trust in food retail, or trust in food safety regulation as the dependent variable for each model. The predictors in the models were personal engagement in agriculture, information source, income level, and gender. Because these were categorical variables, they were dummy-coded to prepare for regression analysis. Some of the categories were condensed to have large enough samples in each category. For example, blogs and podcasts ( $n = 43$ ) were condensed with social media ( $n = 135$ ) for analysis. Similarly, income levels above \$80,000 were condensed. Variables with the largest percent of responses were selected as the control variable (Field, 2013). No engagement in agriculture was the control for personal engagement and television was the control for information source. Prior literature had indicated that people with higher income had more trust in science and regulatory agencies related to science (Myers et al., 2016), so an annual household income greater than \$80,000 was treated as the control for income (Field, 2013). Additionally, since prior literature had also concluded men had lower levels of risk perception compared to women (Miller et al., 2007), they were treated at the control for gender. All assumptions were met for regression. The continuous, dependent variables had a normal distribution with a skewness and kurtosis that fell within  $\pm 2$ . Additionally, multicollinearity was not a concern and the tolerance and variance inflation factor (VIF) for each predictor variable fell within acceptable limits outlined by Field (2013).

## **Results**

### **Objective 1**

Objective 1 explored respondents' personal engagement related to agriculture and where they most often received their news. The majority of respondents (52.7%,  $n = 446$ ) had no engagement in the agricultural industry. Approximately one-third of the respondents were involved in agriculture through acquaintances (30.2%,  $n = 257$ ), and 17% ( $n = 144$ ) had a direct engagement in agriculture.

The top sources of news and information for the respondents was television (34.7%,  $n = 294$ ) followed closely by friends and family (32.3%,  $n = 274$ ). One-fifth of the respondents reported social media, podcasts, or blogs as their top source of information (21.0%,  $n = 178$ ); only 11.9% of the respondents indicated their top news source was print media.

### **Objective 2**

Objective 2 sought to describe consumers' trust in production agriculture, food processing, food retail, and food safety regulations. All items were measured using a sliding scale were 0 indicated disagree completely, 50 was neutral, and 100 was agree completely. The means and standard deviations for the items reporting trust in production agriculture have been reported in

Table 2. Respondents indicated high trust in farmers doing everything they can to prevent the spread of disease ( $\mu = 76.92$ ,  $SD = 21.10$ ) and were good stewards of the land ( $\mu = 75.97$ ;  $SD = 21.09$ ). They indicated moderate levels of trust toward the other three statements related to how farmers have been educated on food safety with the application of pesticides or use of hormones, and that conventional farming practices would have no long-term health effects. The overall mean value of trust in production agriculture was  $\mu = 70.71$  ( $SD = 20.11$ ), which indicated a moderate level of trust.

Table 2  
*Respondents' Trust in Production Agriculture*

	$\mu$	$SD$
I believe that farmers and ranchers do everything in their power to prevent the spread of diseases, to aid in the prevention of recalls.	76.92	21.10
I trust that farmers and ranchers are good stewards of the land	75.97	21.09
I trust that farmers are properly educated on the safety and application of the pesticides and fertilizers they use on crops.	69.21	25.07
I trust that ranchers are properly educated on the safety and administration of antibiotics and hormones they use on animals.	66.70	25.43
I trust that conventional farming and ranching practices have no negative long-term health effects.	64.69	25.24

*Note.* Real Limits: minimal trust = 0 - 24.99, low trust = 25 - 49.99, moderate trust = 50 - 74.99, high trust = 75 - 100.

Consumers' trust in food processing was measured using four items reported in Table 3. Respondents showed low to moderate levels of trust in food processing. Consumers had a low level of trust with the statement "processed foods are just as healthy as food I prepare from scratch myself" ( $\mu = 33.99$ ,  $SD = 28.24$ ) and moderate trust with the remaining items. The overall mean value of trust in production agriculture was  $\mu = 52.25$  ( $SD = 22.77$ ), which was a moderate level of trust.

Table 3  
*Respondents' Trust in Food Processing*

	$\mu$	<i>SD</i>
Labels on processed food accurately represent the contents and nutritional information of the item.	58.94	26.02
I trust that food processors are upholding the highest safety and sanitary requirements.	58.22	26.48
I trust that the ingredients in processed foods are safe for consumption.	57.75	27.17
Processed foods are just as healthy as food I prepare from scratch myself.	33.99	28.24

*Note.* Real Limits: minimal trust = 0 - 24.99, low trust = 25 - 49.99, moderate trust = 50 - 74.99, high trust = 75 - 100.

Consumers' rating of trust in food retailing are displayed on Table 4. Respondents' level of trust ranged from a low trust of 45.84 ( $SD = 28.30$ ) for the item "Food prepared by restaurants is just as healthy as the food I prepare myself" to a moderate trust of 67.25 ( $SD = 25.74$ ) for the item "I trust that grocery stores and other food retailers do not sell recalled items." The overall mean value of trust in food retailing was  $\mu = 56.73$  ( $SD = 21.80$ ), which reflected a moderate level of trust.

Table 4  
*Respondents' Trust in Food Retailing*

	$\mu$	<i>SD</i>
I trust that grocery stores and other food retailers do not sell recalled items.	67.25	25.74
I trust that grocery stores and other food retailers only stock high quality food items.	57.78	25.89
I trust that restaurants use only high-quality ingredients in the food that they prepare.	56.06	26.27
Food prepared by restaurants is just as healthy as the food I prepare myself.	45.84	28.30

*Note.* Real Limits: minimal trust = 0 - 24.99, low trust = 25 - 49.99, moderate trust = 50 - 74.99, high trust = 75 - 100.

Consumers' rating of trust in food safety regulation are displayed on Table 5. Respondents did not vary much in their responses and indicated a moderate level of trust for all four items. The overall mean value of trust in food retailing was  $\mu = 62.32$  ( $SD = 24.69$ ).

Table 5  
*Respondents' Trust in Food Safety Regulation*

	$\mu$	<i>SD</i>
I trust that the agencies who govern food safety regulations do a good job at enforcing the regulations.	63.02	26.18
I trust that current food safety regulations are strict enough to keep food safe.	62.70	26.65
I trust that governing agencies are ensuring labels on processed foods are accurate.	61.89	26.17
I trust that governing agencies are ensuring the ingredients in processed foods meet food safety requirements.	61.65	26.59

*Note.* Real Limits: minimal trust = 0 - 24.99, low trust = 25 - 49.99, moderate trust = 50 - 74.99, high trust = 75 - 100.

### Objective 3

Objective 3 was to identify relationships between consumers' trust in production agriculture, food processing, food retail, and food safety. The relationship between consumer trust in production agriculture, food processing, food retail, and food safety were calculated using Pearson product moment correlation. The correlations are displayed in Table 6. There was a positive substantial correlation between trust in production agriculture and food processing ( $p = .52$ ), food retail ( $p = .54$ ), and food safety regulation ( $p = .58$ ). There was a positive substantial relationship between trust in food processing and trust in food retail ( $p = .69$ ) and trust in food safety regulation ( $p = .69$ ). The correlation between trust in food retail and trust in food safety regulation was substantial and positive ( $p = .67$ ).

Table 6  
*Correlations between trust in production agriculture, food processing, food retail, and food safety regulation*

	Production Agriculture	Food Processing	Food Retail	Food Safety Regulation
<i>Production Agriculture</i>	-	.52	.54	.58
<i>Food Processing</i>		-	.69	.69
<i>Food Retail</i>			-	.67
<i>Food Safety Regulation</i>				-

### Objective 4

Objective 4 was to determine the influence of demographic characteristics, media use, and personal agricultural engagement on consumers' trust in production agriculture, food processing, food retail, and food safety regulation. The linear model that predicted trust in production agriculture was significant ( $F(10, 835) = 3.73; p \leq .05$ ). The linear combination of the variables in the model predicted 4% of the variance in trust in production agriculture as determined by the  $R^2$ . Respondents having direct engagement ( $\beta = 7.45; p \leq .05$ ) and acquaintances ( $\beta = 3.66; p \leq .05$ ) in agriculture had more trust in production agriculture compared to those with no

engagement. Additionally, those who used social media ( $\beta = -6.70$ ;  $p \leq .05$ ) or friends and family ( $\beta = -4.01$ ;  $p \leq .05$ ) as top sources of information had lower levels of trust compared to those whose top source was television. Finally, those with an annual household income between \$20,000 - \$39,999 ( $\beta = 4.41$ ;  $p \leq .05$ ) had higher levels of trust in production agriculture compared to respondents with an annual household income of \$80,000 or more.

For trust in food processing, the linear model was significant ( $F(10, 835) = 7.80$ ;  $p \leq .05$ ). The linear combination of the variables in the model predicted 9% ( $R^2 = .09$ ) of the variance in trust in food processing. Respondents with a direct engagement in agriculture had a higher level of trust in food processing compared to those with no engagement ( $\beta = 8.83$ ;  $p \leq .05$ ). Respondents whose top source of information was using social media ( $\beta = -6.05$ ;  $p \leq .05$ ) or print media ( $\beta = -5.42$ ;  $p \leq .05$ ) had lower levels of trust in food processing compared to those whose top information source was television. Additionally, those with an income of less than \$19,000 ( $\beta = 6.63$ ;  $p \leq .05$ ) or income between \$20,000 - \$39,999 ( $\beta = 4.38$ ;  $p \leq .05$ ) had higher levels of trust in food processing compared to those with an annual income of at least \$80,000, and women had lower levels of trust in food processing compared to men ( $\beta = -9.17$ ;  $p \leq .05$ ).

The linear model predicted food retail was significant ( $F(10, 835) = 4.74$ ;  $p \leq .05$ ). The linear combination of the variables in the model predicted 7% ( $R^2 = .07$ ) of the variance in trust in food retail. Once again, respondents with direct engagement in production agriculture ( $\beta = 6.81$ ;  $p \leq .05$ ) had higher levels of trust in food retail compared to those with no engagement. Also, respondents whose top information source was social media ( $\beta = -5.50$ ;  $p \leq .05$ ) had lower levels of trust in food retail compared to those who received information from television the most. Gender was once again a predictor, and females had lower levels of trust in food retail compared to men ( $\beta = -8.03$ ;  $p \leq .05$ ).

The fourth and final linear model predicting trust in food safety regulation was significant ( $F(10, 835) = 5.84$ ;  $p \leq .05$ ) and predicted 5% of the variance in trust in food safety regulation ( $R^2 = .05$ ). Similar to the other three models, respondents who had a direct engagement in agriculture ( $\beta = 4.72$ ;  $p \leq .05$ ) had a greater trust in food safety regulation compared to those with no engagement, and women had lower levels of trust in food safety regulation compared to men ( $\beta = -6.59$ ;  $p \leq .05$ ). All of the information sources were predictors in this model, and respondents whose top source was social media ( $\beta = -9.85$ ;  $p \leq .05$ ), print media ( $\beta = -6.73$ ;  $p \leq .05$ ), or friends and family ( $\beta = -6.55$ ;  $p \leq .05$ ) had lower levels of trust in food safety regulation compared to respondents who reported television was their most used information source.

Table 7.

*Linear regression models examining demographic characteristics, media use, and personal agricultural connections on consumers' trust in production agriculture, food processing, food retail, and food safety regulation*

	Production Agriculture		Food Processing		Food Retail		Food Safety Regulation	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Constant	67.82	0.00*	55.87	0.00*	60.10	0.00*	68.92	0.00
Personal Engagement								
Direct Engagement	7.45	0.00*	8.83	0.00*	6.81	0.00*	4.72	0.04*
Acquaintances	3.66	0.02*	-0.59	0.73	-1.12	0.51	1.67	0.38
Top Information Source								
Social Media	-6.05	0.00*	-6.70	0.00*	-5.50	0.01*	-9.85	0.00*
Print Media	-5.42	0.02*	-3.01	0.24	-3.43	0.16	-6.73	0.02*
Friends and Family	-1.60	0.34	-4.01	0.03*	-1.96	0.27	-6.55	0.00*
Income								
Less than \$19,999	3.19	0.14	6.63	0.01*	4.25	0.07	1.65	0.53
\$20,000-\$39,999	4.41	0.02*	4.38	0.04*	4.05	0.05	1.66	0.49
\$40,000-\$59,000	1.01	0.63	0.77	0.74	0.33	0.88	-3.31	0.20
\$60,000-\$79,999	2.77	0.22	2.74	0.28	2.29	0.35	2.45	0.38
Men	1.40	0.31	-9.17	0.00*	-8.03	0.00*	-6.59	0.00*
F	3.73	0.00*	7.80	0.00*	5.84	0.00*	4.74	0.00*

### Conclusions and Recommendations

The purpose of this research was to explore the influence of personal characteristics on U.S. residents' trust in the food supply chain. The findings supported that trust across the food supply chain was correlated to one another, but the level of trust somewhat differed. Furthermore, personal characteristics influenced trust differently across production agriculture, food processing, food retail, and food safety regulation.

Similar to prior findings, this research determined the majority of respondents had no direct engagement in agriculture (The World Bank, 2018). Respondents also reported most often receiving their news from television and friends and family, which mirrored prior research related to where people learn about food safety (Leal et al., 2017). This finding may indicate people are not necessarily seeking information about food and instead are passively learning about food through their typical communication sources. Respondents also reported a moderate level of trust across all four sectors of the food supply chain. However, trust in agricultural production was rated the highest with a mean of 70.71 and trust in food processing was rated the lowest at 52.25. This difference in trust may reveal where some of the skepticism around food is rooted. The trust in production agriculture may be due to increased consumer participation in farmers' markets, where consumers get to interact directly with producers (AMRC, 2019). Putting a face to the food may provide consumers with a heightened sense of trust toward agricultural production. Additionally, the lower level of trust in food processing may stem from recent food recalls prior to this data collection (CDC, 2019).

Responses to individual items in each construct indicated respondents had lower levels of trust when it came to how healthy their food was, particularly when considering processed food. This finding may reflect consumers' overall thought that organic food is safer or of higher

quality compared to conventional, processed food (Magkos et al., 2007). There is a need to engage consumers in conversations about what “processed” food actually means and discuss the health implications and science behind the safety to help decrease perceptions of risk and increase trust in food processing. Additionally, communicators should use food safety regulators as a source of information when communicating about the food supply chain since respondents reported moderate trust in the agencies’ ability to regulate food safety.

This research also found that trust in production agriculture, food processing, food retail, and food safety regulations were positively correlated to one another. If communicators can increase trust in one sector of the food supply chain, the other areas would be expected to increase in trust as well. So agricultural communicators would not need to communicate about all aspects of the food supply chain and could focus communication on specific areas to increase overall trust. Since trust for production agriculture was rated the highest, communication could center on increasing this trust even more to also increase trust in food processing, food retail, and food safety regulation. Further research is needed to best incorporate the many layers involved in the supply chain into marketing.

While the conceptual model tested in this study was statistically significant for predicting trust in the different food supply chain areas, the model could at most account for 9% of the variance in the predictor variable. Therefore, there are other variables influencing trust that should be explored in future studies. However, the findings from objective four can still provide valuable insight into how personal characteristics influence trust. As Huang and Wilkinson (2013) proposed, direct experiences in agriculture had a positive influence on trust across all four agricultural areas. Interestingly, having acquaintances in agriculture was only a significant predictor for trust in production agriculture. It might be easier for people to feel more personally connected to production agriculture through their personal connections than to feel connected to retail, regulation, or processing. Social media use was also consistently identified in the models as a negative predictor of trust in agriculture. As Fisher (2017) predicted, these people may be deciding what is fact or fiction when it comes to their food opposed to relying on scientific information. This self-selection of information likely decreased their overall levels of trust in agriculture (Mihailidis & Viotty, 2017).

Demographic variables were also predictive of trust. Similar to prior research (Miller et al., 2007; Strijbos et al., 2016), women were less trusting than men when it came to their food. Counter to Myers et al.’s (2016) finding, people in lower income brackets expressed greater levels of trust toward production agriculture and food processing compared to those earning at least \$80,000 annually. Myers et al. (2016) was examining trust in science and trust in scientific regulatory agencies, so the context of food may explain the diverging results. Lower income families likely have less options compared to high-income families when it comes to their food choices and may prioritize price over quality. Because of this priority, they may have no choice but to trust the products they are consuming are safe and of high quality.

When communicating about the safety and quality of food produced throughout the food supply chain, agricultural communicators should consider these findings. Targeting higher-income audiences or women will be necessary to increase trust across these agricultural sectors. Additionally, communication via social media, including blogs and podcasts, will be necessary to share scientifically accurate information on the online environment. Increased presence on social media would also increase consumers’ feelings they have “acquaintances” in agriculture, which would be important to increasing trust in production agriculture. As demonstrated by the correlations, increasing trust in production agriculture would likely increase trust in the other

agricultural areas as well, which would increase consumer demand for agricultural products (Yee et al., 2005).

As with all research, this work is not without its limitations. Although quota sampling was used, the sample demographics did not necessarily reflect the U.S.' demographics for income, age, or education. Replicating this study with a simple random sample of U.S. residents would help increase the generalizability of the findings. Additionally, adding questions to the instrument, like level of education, use of specific news sources (e.g. Fox News, CNN, NPR, etc.), or type of diet (e.g. organic, keto, vegan, etc.) could provide researchers with a greater understanding for how personal characteristics predict trust in agriculture and could account for some of the unexplained variance in the regression models. Conducting follow-up interviews would also be beneficial to understand how consumers form their trust beliefs related to production agriculture, food processing, food retail, and food safety regulation. Future research should also develop, and test messages based on the findings from this study to determine how message framing can influence trust and purchasing intent.

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