

Opinion Leaders' Influence on College Students' Perceptions of the National Animal Identification System

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ABSTRACT

The purpose of this study was to determine opinion leaders' (as information sources) influence on college of agriculture students' awareness, knowledge, and perceptions of the National Animal Identification System (NAIS). An online survey was used to collect data. Students (N=92) were somewhat aware of the NAIS, and were knowledgeable about general NAIS concepts. Students' NAIS perceptions and awareness were positively associated. University professors, Internet, and family members were preferred information sources. Opinion leaders influenced students' awareness and perceptions of the NAIS. The influence from Cooperative Extension, private organizations, and university professors was moderately correlated with students' awareness of the NAIS. The role of university professors as information sources highlighted the significance of the two-step flow of communication in influencing students' perceptions of the NAIS. Hypotheses tests confirmed the existence of an indirect flow of information from mass media to opinion leaders, and then to a less informed public. University professors were more influential on students' perceptions of the NAIS than were mass media (television, radio, newspaper, Internet, and popular magazines). University agricultural educators must be cognizant about the impact their beliefs have on students' awareness and perceptions of agricultural issues.

KEY WORDS: communications, perceptions, information sources, livestock

INTRODUCTION

Rogers' (2003) definition of opinion leaders and Katz and Lazarsfeld's (1955) two-step flow of communication model provided the framework in this study. Rogers defined opinion leaders as those who provide information and advice about innovations to individuals. Because the opinion leader earns and maintains status through technical competence, conformity to norms, and social accessibility, he/she is considered an expert and is trusted for accurate and truthful information. Opinion leaders are also seen as having an influence on others and access mass media more than the average person.

Katz and Lazarsfeld's (1955) two-step flow model (Figure 1) depicts how messages flow from media to opinion leaders and from opinion leaders to a less active or informed public audience. The two-step flow model focused on decision-making in the 1940 Presidential election campaign. Evidence existed that media effects were minimal, but social influences affected voters' opinions (Lowery & DeFleur, 1995). Social influence was derived from opinion leaders, those who were heavily involved with or

exposed to political campaigns (Lowery & DeFleur). Therefore, people who had less knowledge or interest turned to opinion leaders for information because they trusted opinion leaders more than they trusted political propaganda.

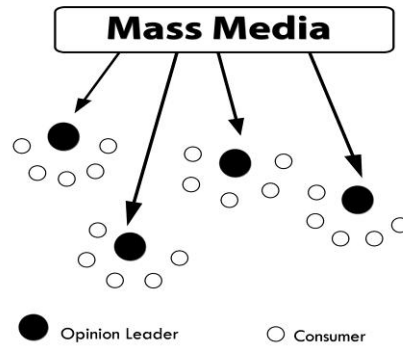


Figure 1. Two-step Flow Model: Mass Media to Consumer (Katz and Lazarsfeld, 1955)

Perceptions and Mass Media. Terry and Lawver (1995) studied university students' perceptions of agriculture issues. Their results suggested that urbanization has contributed to consumer's low awareness of agriculture and their inaccurate perceptions of agricultural industry issues. Terry and Lawver suggested that as people become removed from production agriculture, they are less concerned about their food and fiber, therefore failing to understand the benefits of agriculture to society.

Knowledge, experience, or global attitudes reported in mass media can shape and form people's perceptions (Wingenbach, Rutherford, & Dunsford, 2003). Wingenbach et al. found that students gained awareness of biotechnology through science classes, labs, and university professors' beliefs. The authors determined that already-present global attitudes did not influence students' perceptions, but awareness of biotechnology practices influenced their perceptions.

Heuer and Miller (2006) found that mass media can influence public opinion and set a public agenda—or determine the way the public should think about a topic. Meyers and Rhoades (2006) suggested a direct relationship existed between information that appears in media and what viewers perceive as important societal issues.

Attitudes Toward Livestock Industry Issues. Nordstrom et al. (2000) assessed high school students' attitudes toward animal welfare, resource use, and food safety. All students ranked food safety as the area of most importance and concern; resource use and animal welfare were the second most important issues. Microbial contamination was ranked as a major food safety concern for both urban and rural students, while providing shelter was a primary concern for all students in regards to animal welfare issues. Nordstrom et al. concluded that agricultural education programs can provide a foundation for students on animal and environmental issues, while enhancing their knowledge and fostering dialogue related to these areas.

National Animal Identification System (NAIS). The NAIS Communications Campaign initiated a stakeholder focus group in June 2006 to identify stakeholders' awareness, attitudes, and perceptions of the NAIS (Mobley, 2006). The campaign concluded that

messages generated from Animal and Plant Health Inspection Service (APHIS) were inconsistent and incomplete, that printed NAIS materials were ineffective, and the NAIS Web site was not being used as an information source. The campaign also found where producers were concerned about privacy and viewed the NAIS as increased paperwork, red tape, and bureaucracy.

MATERIALS AND METHODS

The purpose of this study was to determine opinion leaders' influence (as information sources) on college of agriculture students' awareness, knowledge, and perceptions of the NAIS. The objectives were to: 1) Determine students' awareness, knowledge, and perceptions of the NAIS; 2) Determine students' information sources for livestock industry issues; 3) Determine if a relationship existed among students' perceptions, awareness, and knowledge of the NAIS; and 4) Test hypotheses that opinion leaders influenced (a) students' awareness, (b) knowledge, and (c) perceptions of the NAIS.

A correlational, ex-post facto design (Tuckman, 1999) was used to determine relationships between variables and to understand the effects of opinion leaders' influence on students' awareness, knowledge, and perceptions of the NAIS.

The accessible population (N=1,293) was undergraduate students enrolled in courses related to animal agriculture and production in the College of Agriculture and Life Sciences at Texas A&M University during the spring 2007 semester. The sample (n=296) was determined using Dillman's (2007) sampling procedures. Males and females, ranging in age from 18 to 25, and all classes of students—freshman, sophomore, junior, and senior—were included in the target audience. Stratified random sampling was used to ensure a representative sample of the population. The strata were animal science majors and non-animal science majors, and upperclassmen and lowerclassmen.

The instrument was a self-administered survey. Three scales were used: strongly agree to strongly disagree, very important to not important, and I am very knowledgeable (about the NAIS) to I have no knowledge. In addition to the scalar responses, the instrument had eight true/false questions. All questions in this instrument required an answer, which helped to determine characteristics of the survey population (Dillman, 2007). Experts from animal science, agricultural education, and agricultural communications validated content validity of the instrument. A pilot study of students with similar majors and classes established face validity of the instrument. Internal consistency of each conceptual scale was tested with Cronbach's coefficient alpha (α). No significant differences in the variables of interest existed between pilot and sample responses, or between early and late respondents.

Students' awareness of the NAIS was measured with five questions (Scale=No, Somewhat, Yes); Cronbach's alpha coefficient was .77 for the awareness construct. Students' knowledge was measured with eight close-ended questions (true or false). Students' perceptions were measured with 14 close-ended statements on two separate Likert-type scales. The first scale had 10 questions on a five-point Likert-type scale (Strongly Disagree to Strongly Agree); the second scale had four questions with a three-point, Likert-type scale (Not Important to Very Important). Cronbach's alpha coefficient for the five-point scale was .86 and .73 for the three-point scale.

The two-step flow of communication from media to opinion leaders to students was measured with a series of close-ended items. Students' use of media sources was

measured with nine close-ended questions on a four-point Likert-type scale. Cronbach's alpha coefficient was .88 for the media source scale. Demographic information such as gender, involvement with livestock, and participation in the NAIS program was gathered in the final section.

The researchers followed Dillman's "*The tailored design method: Mail and internet surveys*" (2007) to collect data through an online survey. Each participant received personalized pre-notice e-mail messages that informed him/her about his/her selection to participate in the study. A second personalized e-mail was sent three days after the pre-notice and contained a link to the actual study. Dillman concluded that personalized e-mails increased survey response rates (2007). Participants' names, unique passwords, and e-mail addresses remained confidential. Four e-mail reminders were sent to non-respondents. Each e-mail contained the hyperlink to the online survey and encouraged the recipient to visit the information page.

Descriptive statistics were used to describe the data. Bivariate analyses were conducted to test the direction of the hypotheses, using an alpha level of $p < .05$ to determine statistical significance. A confidence interval of .05 was used on all tests because of the available research on college students' perceptions.

RESULTS

Respondents (N=92) numbered 46 (50%) females and 46 (50%) males (Table 1). Thirty-four (37%) were underclassmen (freshman or sophomore) and 58 (63%) students were upperclassmen (junior or senior). Sixty-eight (73.9%) students were non-animal science majors and 24 (26.1%) students were animal science majors.

Table 1. Demographic frequencies of respondents (N=92).

Variables		<i>f</i>	%
Gender	Female	46	50.0
	Male	46	50.0
Major	Non-Animal Science	68	73.9
	Animal Science	24	26.1
Class Status	Upperclassmen (Junior-Senior)	58	63.0
	Lowerclassmen (Freshman-Sophomore)	34	37.0

Students' awareness of the NAIS was measured with five statements. Students were aware of the NAIS (Table 2); 45 (48.9%) were unaware its effects on U.S. national security and 43 (46.7%) were unaware of its effects on the U.S. economy.

Table 2. Frequencies of respondents' awareness of the NAIS (N=92).

Statement	No		Somewhat		Yes	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Are you aware of how the NAIS will affect United States' national security?	45	48.9	23	25.0	24	26.1
Are you aware of how the NAIS will affect the United States' economy?	43	46.7	29	31.5	20	21.7
Do you think there is a risk of a foreign animal disease outbreak in the United States?	17	18.5	43	46.7	32	34.8
Do you think the risk [of foreign animal disease] would be severe enough to warrant the use of the NAIS?	22	23.9	39	42.4	31	33.7
Are you aware of how the NAIS will affect food safety in the United States?	33	35.9	35	38.0	24	26.1

Students' knowledge of the livestock industry and the NAIS was measured with eight true/false statements. Respondents' knowledge ranged from 7.6 to 88% correct. A majority (88%) correctly answered the statement, "The NAIS is a program that was created by the United States Department of Agriculture" (Table 3).

Table 3. Frequencies of respondents' knowledge of the NAIS (N=92).

Statement	Incorrect		Correct	
	<i>f</i>	%	<i>f</i>	%
The NAIS is a program that was created by the United States Department of Agriculture. (True)	9	9.8	81	88.0
The NAIS will include all animal livestock species: cattle, horses, swine, sheep, goats, bison, poultry, cervids (elk and deer), and camelids (llamas, alpacas). (True)	18	19.6	73	79.3
The NAIS was created to track diseased livestock. (True)	22	23.9	69	75.0
Participation in the NAIS is voluntary at the Federal level. (True)	22	23.9	69	75.0
The NAIS will include livestock and pets (dogs and cats). (False)	36	39.1	55	59.8
The NAIS will allow the government to pinpoint a farm's location and record the number of livestock on the property through the use of a global positioning system (GPS). (False)	59	64.1	32	34.8
The NAIS will track and identify the movement of all livestock in the United States. (False)	71	77.2	20	21.7
The NAIS provides the government a way to continuously monitor livestock records. (False)	83	90.2	7	7.6

Note. Frequencies may not equal 100% because of missing data. Respondents' individual knowledge levels ranged from zero to eight correct responses.

Students' perceptions of the NAIS were measured with 14 statements. Respondents agreed that the NAIS did not affect them ($M=2.93$, $SD=1.15$), will help track sick animals back to the source of contamination or infection ($M=2.75$, $SD=1.46$),

is an important program (M=2.65, SD=1.34), and is important to national security (M=2.56, SD=1.41) (Table 4).

Table 4. Descriptive statistics for perceptions of the NAIS.

Statement	M	SD
The NAIS does not affect me. †	2.93	1.15
The NAIS will help track sick animals back to the source of contamination or infection. †	2.75	1.46
The NAIS is an important program. †	2.65	1.34
The NAIS is important to national security. †	2.56	1.41
The NAIS will help prevent the spread of disease in livestock. †	2.53	1.45
The NAIS is an invasion of my privacy. †	2.49	1.45
My belief system influences my perceptions of the NAIS. †	2.04	1.29
I am not concerned about the voluntary NAIS becoming mandatory. †	1.99	1.35
The NAIS will have an economic benefit to the producer. †	1.88	1.54
I am well informed about the NAIS. †	1.83	1.09
As a consumer, how important is the...		
NAIS to maintain a safe U.S. food supply? ‡	2.41	0.83
Traceability of food through the food supply chain? ‡	2.37	0.72
NAIS to the U.S. economy? ‡	1.97	1.02
NAIS to national homeland security? ‡	1.86	1.02

† Five-point scale: 0.0-0.5=Unsure, 0.51-1.5=Strongly Disagree, 1.51-2.5=Disagree, 2.51-3.5=Agree, 3.51-4.0=Strongly Agree.

‡ Three-point scale: 1.0-1.5=Not Important, 1.51-2.5=Important, 2.51-3.0=Very Important.

Students' indicated the information sources used to learn about the NAIS and the level of influence (1=No Influence, 10=Most Influential) that source had on their opinion of it (Table 5). Forty-six students rated university professors as very influential information sources (M=7.40); 38 rated the Internet as an influential source (M=5.72); and 33 rated family members or friends as influential sources (M=5.69). The Cooperative Extension service was rated as somewhat influential (M=4.44) by 20 students.

Table 5. Descriptive statistics for influence of information sources for the NAIS.

Source	f	M†	SD
University professors	46	7.40	3.11
Internet	38	5.72	2.94
Family member/friend	33	5.69	2.77
Trade publications (Beef, Dairy Herdsman, Drovers)	23	5.43	2.97
Television	22	5.26	3.26
Newspapers	31	5.06	2.87
Private organizations (Texas Beef Council, Farm Bureau)	22	4.92	3.23
Radio	17	4.52	3.14
Cooperative Extension Service	20	4.44	3.29
Popular magazines (Time, Newsweek, People)	16	3.72	2.85

† Ten-point Scale: 1=No Influence... 10=Most Influential.

The hypothesis that opinion leaders, as information sources, influenced students' awareness of the NAIS was tested using Pearson's Product Moment Correlations. The

composite score for student awareness was correlated with each opinion leader (Table 6). Student awareness of the NAIS was substantially (Davis, 1971) positively associated with the Cooperative Extension service ($r=.55$, $p < .05$) and private organizations ($r=.50$, $p < .05$), and moderately associated with university professors ($r=.33$, $p < .05$) and the Internet ($r=.31$, $p < .05$). Therefore, the null hypothesis that opinion leaders did not affect students' awareness of the NAIS was rejected, and the alternative hypothesis was accepted as true. Statistical evidence suggested that opinion leaders influenced students' awareness of the NAIS (Table 6).

Opinion leaders did not influence students' knowledge of the NAIS. The knowledge construct consisted of eight true or false statements. Student knowledge was not correlated with any of the opinion leaders' influence. Because of insufficient evidence, the null hypothesis that opinion leaders did not affect student knowledge of the NAIS failed to be rejected (Table 6).

Table 6. Relationships between selected opinion leaders' influence on students' awareness, knowledge, and perception of the NAIS.

Variables	Awareness		Knowledge		Perception	
	<i>r</i>	Sig.	<i>r</i>	Sig.	<i>r</i>	Sig.
Cooperative Extension Service	.55*	.01	.13	.57	.22	.31
Private Organizations (Texas Beef Council)	.50*	.02	.11	.62	.36	.09
Popular Magazines (Time, Newsweek, People)	.44	.09	.03	.91	.38	.15
Television	-.41	.06	.04	.86	-.10	.67
Trade Publications (Beef, Dairy Herdsman)	.36	.10	.30	.17	.28	.19
University Professors	.33*	.02	.04	.76	.29*	.04
Internet	.31*	.04	.26	.09	.19	.21
Family members/friend	.27	.10	.15	.37	.23	.17
Newspapers	.25	.16	.09	.62	.27	.14
Radio	.15	.52	.01	.96	-.02	.94

* $p < 0.05$ (2-tailed).

Opinion leaders influenced students' perceptions of the NAIS. Students' perceptions of the NAIS had a positive, yet low association with university professors ($r=.29$, $p < .05$) (Table 6). Therefore, the null hypothesis that opinion leaders did not affect students' perception of the NAIS was rejected and the alternative hypothesis was accepted as true. Statistical evidence suggested that opinion leaders' influenced students' perceptions of the NAIS.

DISCUSSION

Overall, more students were aware that there was a risk of foreign animal disease outbreak, than were students who were aware of how the NAIS would affect food safety in the U.S. These findings are consistent with Whaley, Tucker, Sharp, and Knipe's (2003) findings that consumers believed their food was less safe in 2003 than it was in 1993. Food safety concerns from the Whaley et al. study included genetically modified foods, bacterial and pesticide contamination, use of growth hormones in livestock, mad cow disease, and bio-terrorism.

Students were equally aware of how the NAIS affected U.S. food safety and national security, but fewer students were aware of how it will affect the U.S. economy. Perhaps their disagreement with being well informed about the NAIS sheds light on the

fact that a majority of them incorrectly answered three of the eight knowledge questions. Educators of the students in this study should realize that a reliable system would enable public health officials to pinpoint animal products containing harmful pathogens. Such a system would prevent human consumption of those products, and would hold the segment of the food chain responsible and liable for any costs associated with the contamination (Vitiello & Thaler, 2001).

Overall, students were more informed about the general rather than the specific aspects of the NAIS. They believed common myths such as the use of a global positioning system to pinpoint farm locations, the ability to track and identify movement of all livestock in the U.S., and the continuous monitoring of livestock records. These three myths are reoccurring themes addressed on the APHIS Web site; however the NAIS Communications Campaigns' focus groups found that the NAIS Web site was not being used as an information source (Mobley, 2006). Further research on NAIS knowledge should be conducted to determine if other audiences believe these myths.

Reduction of pathogens in the processing industry, control of residues, backward/forward tracing in the event of a food-borne disease outbreak, and control of zoonotic pathogens are among the many benefits of an animal identification system (Vitiello & Thaler, 2001). This literature was supported by our students' agreement that the NAIS will help track sick animals back to the source of infection, and that the NAIS would prevent the spread of livestock diseases. However, students disagreed that the NAIS would have an economic benefit to the producer, revealing an inconsistency with the findings of Vitiello and Thaler, who cited economic burden of disease outbreaks could be reduced for the packer and producer with an identification system.

Respondents reported that traceability of food through the food supply chain was important, which contradicted the findings by Nordstrom et al. (2000) that food safety was of utmost importance and concern. Respondents reported that the NAIS was important to maintain a safe U.S. food supply and was important to the U.S. economy, confirming Terry and Lawver's (1995) conclusions that students generally held positive perceptions about the impact of agriculture on the economy and environment.

Students' indicated which information sources they used to learn about the NAIS, the influence of the source, and how often they accessed each source. Evidence of university professors' rank as a very influential source for information about the NAIS supported the findings of Wingenbach et al. (2003) that students gained awareness of biotechnology through science classes, labs, and university professors' beliefs. This finding emphasizes the impact university professors had on students concerning livestock industry issues. Respondents indicated that university professors, Internet, and family members or friends were the most favorable, while Cooperative Extension, radio, and popular magazines were the least favorable sources of NAIS information. These findings are somewhat inconsistent with those of Tucker et al. (2006) that respondents favored traditional media such as newspapers and television news. Perhaps exploratory research should be conducted to determine if college students are using information sources for livestock industry issues that were not included in the survey. Also, an investigation of how students access and process NAIS information could help agricultural educators and communicators better educate students about the impacts of the NAIS.

Perceptions of the NAIS were positively associated with awareness of the NAIS for all respondents. Lower and upperclassmen animal science majors' NAIS perceptions were very strongly associated with their NAIS awareness. The finding that knowledge and perceptions of the NAIS were not associated suggests that further research is needed

because previous literature (Humphrey, 1992, as found in Wright, Stewart, & Birkenholz, 1994) found weak positive relationships between knowledge and perceptions scores related to agriculture.

Students' awareness of the NAIS was positively associated with Cooperative Extension, private organizations, and university professors, resulting in a rejection of the null hypothesis that opinion leaders did not affect student awareness of the NAIS. Opinion leaders affected students' awareness of the NAIS. This finding supported previous literature (Tucker et al., 2006; Wingenbach, et al., 2003). University agricultural educators must be cognizant about the impact their beliefs have on students' awareness and perceptions of agricultural issues.

Information seen or read through mass media channels creates the reality of science for most people (Nelkin, 1995), and the news media plays a major role in disseminating information and bringing scientific issues to the public's attention (Malone, Boyd, & Bero, 2000). In this study, mass media were not positively associated with students' awareness of the NAIS. Perhaps it was because the NAIS was not a critical issue, thereby limiting its popular media exposure.

The role of opinion leaders as information sources, such as Cooperative Extension, private organizations, and university professors in influencing students' awareness of the NAIS highlighted the significance of the two-step flow of communication. The indirect flow of information from mass media to opinion leaders and then to the less informed public (students in this case) was evident in this study. Mass mediums such as television, radio, newspaper, or popular magazines were not significantly associated with students' awareness of the NAIS. Cooperative Extension, private organizations, and university professors, however, were significantly associated with students' awareness of the NAIS, thereby suggesting that opinion leaders were more influential on students' NAIS awareness than were mass mediums.

Student knowledge was not correlated with any of the listed opinion leaders. House et al. (2004) found that female respondents with a college education had significantly higher objective and subjective knowledge levels of genetically modified foods than did those without a college education. Additional research is needed to determine the origin of college students' topic-specific knowledge about national agricultural issues. Maybe future research could determine if high school agricultural education programs influence students' knowledge of the NAIS.

Tucker et al. (2006) stated that food safety specialists and communicators can be key players in educating consumers about food biotechnology risks and benefits. It is important that information concerning food biotechnology be presented realistically, with unbiased opinions, and disseminated through commonly used mass media channels. Widespread media coverage of topics such as avian bird flu, mad cow disease, foot-and-mouth disease, and bioterrorist attacks on the food supply would undoubtedly increase awareness of food safety issues among all consumers, not just those who actively seeking food safety information. Livestock industry specialists and communicators could be key players in educating college students and consumers alike about NAIS benefits, risks, and implications. Disseminating unbiased NAIS information is important to educate students as they transition into consumer and livestock producer roles.

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