

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

3 **Abstract**

4 *The purpose was to determine opinion leaders' (as information sources) influence on*
5 *college of agriculture students' awareness, knowledge, and perceptions of the National Animal*
6 *Identification System (NAIS). Rogers' (2003) definition of opinion leaders (persons who provide*
7 *information about innovations to individuals) and Katz and Lazarsfeld's (1955) two-step flow of*
8 *communication model provided the framework for this study. An online survey was used to*
9 *collect data. Students (N = 92) were somewhat aware of the NAIS, and were knowledgeable*
10 *about general NAIS concepts. Students' NAIS perceptions and awareness were positively*
11 *associated. University professors, Internet, and family members were the preferred information*
12 *sources. Opinion leaders influenced students' awareness and perceptions of the NAIS. The*
13 *influence from Cooperative Extension, private organizations, and university professors was*
14 *moderately correlated with students' awareness of the NAIS.*

15 *The role of university professors as information sources highlighted the significance of*
16 *the two-step flow of communication in influencing students' perceptions of the NAIS. Hypothesis*
17 *testing confirmed the existence of an indirect flow of information from mass media to opinion*
18 *leaders, and then to a less informed public. University professors were more influential on*
19 *students' perceptions of the NAIS than were mass mediums (television, radio, newspaper,*
20 *Internet, and popular magazines).*

Theoretical Framework

Rogers' (2003) definition of opinion leaders and Katz and Lazarsfeld's (1955) two-step flow of communication model provided the impetus for the theoretical 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.

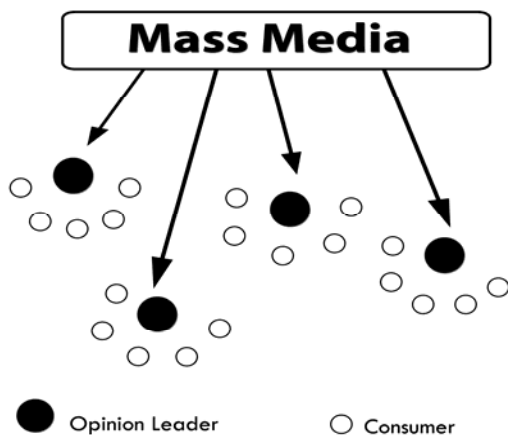


Figure 1. Two-step Flow Model: Mass Media to Consumer (Katz & Lazarsfeld, 1955).

1 Lazarsfeld et al. determined “that print and electronic media influence masses of people
2 through an indirect ‘two-step flow of communication’” (Griffin, 2000, p. 348). In the first step,
3 information transfers to a small group, usually opinion leaders, or others who stay current with
4 news and information. In the second step, opinion leaders interpret the message and pass it to
5 others through speeches, interpersonal communication, and discussion. Essentially, information
6 transfers to a mass audience through various media (television, Internet, radio, satellite);
7 receivers attempt to validate the information through people they respect and trust (Griffin).

8 *Perceptions and Mass Media*

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

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

19 Heuer and Miller (2006) found that mass media can influence public opinion and set a
20 public agenda—or determine the way the public should think about a topic. Meyers and Rhoades
21 (2006) suggested a direct relationship existed between information that appears in media and
22 what viewers perceive as important societal issues.

23

1 *Media Coverage of Livestock Issues*

2 Long (2006) analyzed media coverage of the National Animal Identification System
3 (NAIS) from July, 2005 to August, 2006. News stories were examined for major themes from the
4 top and bottom three cattle producing states. Disease control, financial impact, foreign trade, and
5 political concerns were four major reoccurring themes in the articles (Long). References made to
6 avian flu and mad cow disease highlighted how the NAIS could be used to track and prevent
7 diseases (Long, 2006). Other topics in the disease control theme included bioterrorism and
8 whether small herds could be responsible for spread of disease. Financial impact concerns
9 centered on who would pay for the initial program costs, and who would absorb those costs—
10 taxpayers or producers. The NAIS’s effect on foreign and domestic trade was the fourth most
11 dominant theme found by Long (2006). Media sources cited the NAIS as vital to reestablishing
12 foreign markets, winning trading partners’ trust, and ensuring consumer confidence.

13 *Attitudes toward Livestock Industry Issues*

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

22

1 *The National Animal Identification System*

2 The NAIS Communications Campaign initiated a stakeholder focus group in June 2006
3 to identify stakeholders' awareness, attitudes, and perceptions of the NAIS (Mobley, 2006). The
4 campaign concluded that messages generated from Animal and Plant Health Inspection Service
5 (APHIS) were inconsistent and incomplete, that printed NAIS materials were ineffective, and the
6 NAIS Web site was not being used as an information source. The campaign also found where
7 producers were concerned about privacy and viewed the NAIS as increased paperwork, red tape,
8 and bureaucracy (Mobley).

9 **Purpose and Objectives**

10 The purpose was to determine opinion leaders' (as information sources) influence on
11 college of agriculture students' awareness, knowledge, and perceptions of the National Animal
12 Identification System. The objectives were to

- 13 1) Determine students' awareness, knowledge, and perceptions of the NAIS;
- 14 2) Determine students' information sources for livestock industry issues;
- 15 3) Determine if a relationship existed among students' perceptions, awareness, and
16 knowledge of the NAIS; and
- 17 4) Test hypotheses that opinion leaders influenced (a) students' awareness, (b) knowledge,
18 and (c) perceptions of the NAIS.

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

22 The accessible population ($N = 1,293$) was undergraduate students enrolled in courses
23 related to animal agriculture and production in the College of Agriculture and Life Sciences at

1 Texas A&M University during the spring 2007 semester. The sample ($n = 296$) was determined
2 using Dillman's (2007) sampling procedures. Males and females, ranging in age from 18 to 25,
3 and all classes of students—freshman, sophomore, junior, and senior—were included in the
4 target audience. Stratified random sampling was used to ensure a representative sample of the
5 population. The strata were animal science majors and non-animal science majors, and
6 upperclassmen and lowerclassmen.

7 The instrument was a self-administered survey. Three scales were used: *strongly agree* to
8 *strongly disagree*, *very important* to *not important*, and *I am very knowledgeable* (about the
9 NAIS) to *I have no knowledge*. In addition to the scalar responses, the instrument had eight
10 true/false questions.

11 All questions in this instrument required an answer, which helped to determine
12 characteristics of the survey population (Dillman, 2007). Experts from animal science,
13 agricultural education, and agricultural communications validated content validity of the
14 instrument. A pilot study of students with similar majors and classes established face validity of
15 the instrument. Internal consistency of each conceptual scale was tested with Cronbach's
16 coefficient alpha (α). No significant differences in the variables of interest existed between pilot
17 and sample responses, or between early and late respondents.

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

1 *Important*). Cronbach's alpha coefficient for the five-point scale was .86 and .73 for the three-
2 point scale.

3 The two-step flow of communication from media to opinion leaders to students was
4 measured with a series of close-ended items. Students' use of media sources was measured with
5 nine close-ended questions on a four-point Likert-type scale. Cronbach's alpha coefficient was
6 .88 for the media source scale. Demographic information such as gender, involvement with
7 livestock, and participation in the NAIS program was gathered in the final section.

8 The researcher followed Dillman's "*The tailored design method: Mail and internet*
9 *surveys*" (2007) to collect data through an online survey. Each participant received personalized
10 pre-notice e-mail messages that informed him/her about his/her selection to participate in the
11 study. A second personalized e-mail was sent three days after the pre-notice and contained a link
12 to the actual study. Dillman concluded that personalized e-mails increased survey response rates
13 (2007). Participants' names, unique passwords, and e-mail addresses remained confidential. Four
14 e-mail reminders were sent to non-respondents. Each e-mail contained the hyperlink to the online
15 survey and encouraged the recipient to visit the information page.

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

20 **Results**

21 Respondents ($N = 92$) numbered 46 (50%) females and 46 (50%) males (Table 1). Thirty-
22 four (37%) were underclassmen (freshman or sophomore) and 58 (63%) students were

1 upperclassmen (junior or senior). Sixty-eight (73.9%) students were non-animal science majors
 2 and 24 (26.1%) students were animal science majors.

3 Table 1

4 *Demographic Frequencies of Respondents (N = 92)*

Variables		<i>f</i>	%
Gender	Female	46	50.0
	Male	46	50.0
Major	Animal Science	24	26.1
	Non-Animal Science	68	73.9
Class Status	Upperclassmen (U3 – U4)	58	63.0
	Lowerclassmen (U1 – U2)	34	37.0

5

6 To determine students’ awareness of the NAIS, respondents answered five statements.

7 Students were aware of the NAIS (Table 2); 45 (48.9%) were unaware its effects on U.S.

8 national security and 43 (46.7%) were unaware of its effects on the U.S. economy.

9 Table 2

10 *Frequencies of Respondents’ Awareness of the NAIS (N = 92)*

<i>Statement</i>	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

11

12 To determine students’ knowledge of the livestock industry and the NAIS, respondents

13 answered eight true/false statements. Respondents’ knowledge ranged from 7.6 to 88% correct.

1 A majority (88%) correctly answered the statement, “The NAIS is a program that was created by
 2 the United States Department of Agriculture” (Table 3).

3 Table 3

4 *Frequencies of Respondents’ Knowledge of the NAIS (N = 92)*

<i>Statement</i>	<i>Incorrect^a</i>		<i>Correct^a</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</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. ^aTotal frequencies may not equal 100% because of missing data. Respondents’ individual knowledge levels ranged from zero to eight correct responses.

5

6 Students’ perceptions of the NAIS were measured with 14 statements. Respondents
 7 agreed that the NAIS did not affect them ($M = 2.93$), will help track sick animals back to the
 8 source of contamination or infection ($M = 2.75$), is an important program ($M = 2.65$), and is
 9 important to national security ($M = 2.56$) (Table 4).

10

1 Table 4

2 *Descriptive Statistics for Perceptions of the NAIS (n = 89)*

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

Note. ^aFive-point, Likert-type scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly Agree*, 0 = *Unsure*. ^bThree-point, Likert-type scale: 1 = *Not Important*, 2 = *Important*, 3 = *Very Important*.

3

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

10

1 Table 5

2 *Descriptive Statistics for Influence of Information Sources for the NAIS (N = 92)*

Source	<i>f</i>	<i>M^a</i>	<i>SD</i>
University professors	46	7.40	3.11
Internet	38	5.72	2.94
Family member/friend	33	5.69	2.77
Trade publications (<i>Beef, Dairy Herdsman, Drovers</i>)	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 (<i>Time, Newsweek, People</i>)	16	3.72	2.85

Note. ^aScale: 1 = No Influence...10 = Most Influential.

3

4 Opinion leaders, as information sources, influenced students' awareness of the NAIS.

5 Hypothesis one was tested using Pearson's Product Moment Correlations. The composite score

6 for student awareness was correlated with each opinion leader (Table 6). Student awareness of

7 the NAIS was substantially (Davis, 1971) positively associated with the Cooperative Extension

8 service ($r = .55$) and private organizations ($r = .50$), and moderately associated with university

9 professors ($r = .33$) and the Internet ($r = .31$). Therefore, the null hypothesis that opinion leaders

10 did not affect students' awareness of the NAIS was rejected, and the alternative hypothesis was

11 accepted as true. Statistical evidence suggested that opinion leaders' influenced students'

12 awareness of the NAIS (Table 6).

13

1 Table 6

2 *Relationships between Selected Opinion Leaders' Influence on Students' Awareness, Knowledge,*

3 *and Perception of the NAIS (N = 92)*

Variables	Awareness			Knowledge		Perception	
	<i>n</i>	<i>r</i>	Sig.	<i>r</i>	Sig.	<i>r</i>	Sig.
Cooperative Extension Service	23	.55*	.01	.13	.57	.22	.31
Private Organizations (Texas Beef Council)	23	.50*	.02	.11	.62	.36	.09
Popular Magazines (<i>Time, Newsweek, People</i>)	16	.44	.09	.03	.91	.38	.15
Television	22	-.41	.06	.04	.86	-.10	.67
Trade Publications (<i>Beef, Dairy Herdsman</i>)	23	.36	.10	.30	.17	.28	.19
University Professors	52	.33*	.02	.04	.76	.29*	.04
Internet	45	.31*	.04	.26	.09	.19	.21
Family members/friend	38	.27	.10	.15	.37	.23	.17
Newspapers	33	.25	.16	.09	.62	.27	.14
Radio	20	.15	.52	.01	.96	-.02	.94

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

4

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

9 Opinion leaders, as information sources, influenced students' perceptions of the NAIS.
10 Student perceptions were determined by a construct of ten statements. Students' perceptions of
11 the NAIS had a positive, yet low association with university professors ($r = .29$) (Table 6).
12 Therefore, the null hypothesis that opinion leaders did not affect students' perception of the
13 NAIS was rejected and the alternative hypothesis was accepted as true. Statistical evidence
14 suggested that opinion leaders' influenced students' perceptions of the NAIS.

15 Findings, Conclusions, and Recommendations

16 Overall, more students were aware that there was a risk of foreign animal disease
17 outbreak, than were students who were aware of how the NAIS would affect food safety in the

1 U.S. These findings are consistent with Whaley, Tucker, Sharp, and Knipe's (2003) findings that
2 consumers believed their food was less safe in 2003 than it was in 1993. Food safety concerns
3 from the Whaley et al. study included genetically modified foods, bacterial and pesticide
4 contamination, use of growth hormones in livestock, mad cow disease, and bio-terrorism. While
5 these specific food safety issues were not measured in this study, it is noted that proponents of
6 the NAIS cited how the program could be used to track and prevent diseases (Long, 2006).

7 Students were equally aware of how the NAIS affected U.S. food safety and national
8 security, but fewer students were aware of how it will affect the U.S. economy. Perhaps their
9 disagreement with being well informed about the NAIS sheds light on the fact that a majority of
10 them incorrectly answered three of the eight knowledge questions. Vitiello and Thaler (2001)
11 found that consumers were more concerned with food safety in 2003 than in 1993. Educators of
12 the students in this study should realize that a reliable system would enable public health
13 officials to pinpoint animal products containing harmful pathogens. Such a system would prevent
14 human consumption of those products, and would hold the segment of the food chain responsible
15 and liable for any costs associated with the contamination (Vitiello & Thaler).

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

1 Reduction of pathogens in the processing industry, control of residues, backward/forward
2 tracing in the event of a food-borne disease outbreak, and control of zoonotic pathogens are
3 among the many benefits of an animal identification system (Vitello & Thaler, 2001). This
4 literature was supported by our students' agreement that the NAIS will help track sick animals
5 back to the source of infection, and that the NAIS would prevent the spread of livestock diseases.
6 However, students disagreed that the NAIS would have an economic benefit to the producer,
7 revealing an inconsistency with the findings of Vitello and Thaler, and Long's (2006) study of
8 news media frames of the NAIS. Vitello and Thaler cited the economic burden of disease
9 outbreaks could be reduced for the packer and producer with an identification system. Long also
10 found evidence of financial impact through news media frames, more specifically references to
11 producers receiving higher prices for cattle tagged with electronic identification ear tags. Sources
12 in Long's study cited the NAIS as vital to reestablishing foreign markets, winning trading
13 partners' trust, and ensuring consumer confidence.

14 Respondents reported that traceability of food through the food supply chain was
15 important, which contradicted the findings by Nordstrom et al. (2000) that food safety was of
16 utmost importance and concern. Respondents reported that the NAIS was important to maintain a
17 safe U.S. food supply and was important to the U.S. economy, confirming Terry and Lawver's
18 (1995) conclusions that students generally held positive perceptions about the impact of
19 agriculture on the economy and environment.

20 Students' indicated which information sources they used to learn about the NAIS, the
21 influence of the source, and how often they accessed each source. Evidence of university
22 professors' rank as a very influential source for information about the NAIS supported the
23 findings of Wingenbach et al. (2003) that students gained awareness of biotechnology through

1 science classes, labs, and university professors' beliefs. This finding emphasizes the impact
2 university professors had on students concerning livestock industry issues. Respondents
3 indicated that university professors, Internet, and family members or friends were the most
4 favorable, while Cooperative Extension, radio, and popular magazines were the least favorable
5 sources of NAIS information. These findings are somewhat inconsistent with those of Tucker et
6 al. (2006) that respondents favored traditional media such as newspapers and television news.
7 Perhaps exploratory research should be conducted to determine if college students are using
8 information sources for livestock industry issues that were not included in the survey. Also, an
9 investigation of how students access and process NAIS information could help agricultural
10 educators and communicators better educate students about the impacts of the NAIS.

11 Perceptions of the NAIS were positively associated with awareness of the NAIS for all
12 respondents. Lower and upperclassmen animal science majors' NAIS perceptions were very
13 strongly associated with their NAIS awareness. These findings supported Wingenbach et al.
14 (2003), who concluded that students' awareness of biotechnology practices influenced their
15 perceptions of it. The finding that knowledge and perceptions of the NAIS were not associated
16 suggests that further research is needed because previous literature (Humphrey, 1992, as found in
17 Wright, Stewart, & Birkenholz, 1994) found weak positive relationships between knowledge and
18 perceptions scores related to agriculture. Likewise, knowledge and awareness of the NAIS were
19 not associated, yet Vestal and Briers (2000) found that journalists' awareness of biotechnology
20 effects on food, health, and the environment had a weak positive association with knowledge.

21 Students' awareness of the NAIS was positively associated with Cooperative Extension,
22 private organizations, and university professors, resulting in a rejection of the null hypothesis
23 that opinion leaders did not affect student awareness of the NAIS. Opinion leaders, as

1 information sources, affected students' awareness of the NAIS. This finding supported previous
2 literature (Tucker et al., 2006; Wingenbach, et al., 2003). In their study of student awareness and
3 perceptions of biotechnology issues, Wingenbach et al. (2003) found that students gained
4 awareness of biotechnology through science classes, labs, and university professors' beliefs.
5 University agricultural educators must be cognizant about the impact their beliefs have on
6 students' awareness and perceptions of agricultural issues.

7 Information seen or read through mass media channels creates the reality of science for
8 most people (Nelkin, 1995), and the news media plays a major role in disseminating information
9 and bringing scientific issues to the public's attention (Malone, Boyd, & Bero, 2000). In this
10 current study, mass media were not positively associated with students' awareness of the NAIS.
11 Perhaps this is because the NAIS is not a critical issue for mass media, therefore information
12 about the NAIS is not broadcast in popular media channels.

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

22 Student knowledge was not correlated with any of the listed opinion leaders. House et al.
23 (2004) found that female respondents with a college education had significantly higher objective

1 and subjective knowledge levels of genetically modified foods than did those without a college
2 education. Additional research is needed to determine the origin of college students' topic-
3 specific knowledge about national agricultural issues. Maybe future research could determine if
4 high school agricultural education programs influence students' knowledge of the NAIS.

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

15 Knowledge, experience, or global attitudes reported in mass media can shape and form
16 people's perceptions (Wingenbach et al., 2003). Previous research (Sanbonmatsu & Fazio, 1990)
17 concluded that when people have low knowledge or experience with a topic, it is possible for
18 them to base their perceptions of that topic on already-present global attitudes. Meyers and
19 Rhoades (2006) suggested a direct relationship exists between information that appears in the
20 media and what the viewers perceive as important. Heuer and Miller (2006) indicated that mass
21 media has the ability to influence public opinion and set the public agenda – or determine the
22 way the public should think about a topic.

1 Student perceptions in the acceptance of biotechnology practices were influenced by
2 respondents' demographics such as family ownership of agricultural production land and
3 whether students had lived or worked on a farm or ranch (Wingenbach et al., 2003). Future
4 research should investigate if similar relationships exist between students' perceptions of the
5 NAIS and their demographics. Exploratory research should be conducted to determine if
6 relationships exist between students' perceptions of the NAIS and opinion leaders'
7 demographics; also, research is needed to identify opinion leaders who were not included in this
8 study, but who may impact students' awareness, knowledge, and/or perceptions of the NAIS.

9 **References**

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