

## **Texas Legislators' Perceived Trust, Bias, and Fairness of Biotechnology Information Sources**

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### **ABSTRACT**

Elected leaders' perceptions of agricultural biotechnology issues can be influenced by their information sources prior to the legislative process. This study examined information source trustworthiness, bias, and fairness in communicating agricultural biotechnology issues, as perceived by Texas' legislators. Thirty-six House and Senate legislators perceived university scientists/researchers as trustworthy, unbiased, and fair in communicating agricultural biotechnology issues; activist groups were viewed as untrustworthy, completely biased, and unfair on the same issues. Texas' legislators were most concerned about the economic implications of agricultural biotechnology. They held negative attitudes toward public participation in making scientific decisions, regardless of people's knowledge of the issues involved. A positive association existed between legislators' attitudes toward democratic processes in science and 1) concerns about agricultural biotechnology issues, and 2) trust in the Internet. Texans who work with or are affected by agricultural biotechnology issues should become active participants in the legislative processes for these issues. Elected leaders and their constituents should continue to examine their information sources in terms of trustworthiness, bias, and fairness in reporting agricultural biotechnology issues, and how those sources may impact future agricultural biotechnology policies.

**KEYWORDS:** Agricultural Biotechnology, Elected State Leaders, Information Sources

### **INTRODUCTION**

The origin of agricultural policy resides with persons entrusted by audiences who may or may not be directly linked to such policies. However, agricultural biotechnology policies will affect all consumers. Policymakers do not have adequate time to study all issues prior to crafting and passing laws affecting agricultural biotechnology practices. "Social values and attitudes, of course, influence government regulation" (Kalaitzandonakes, 2000, p. 76). A lack of time and social values may force policymakers to rely on interest groups' viewpoints and agendas. Whether pro or con, interest groups are information sources that can influence agricultural biotechnology policy. What do we know about policymakers' perceptions of information source trustworthiness, bias, and fairness in communicating agricultural biotechnology issues?

For that matter, what do we know about public perception of elected leaders who write legislation that affects agricultural biotechnology policy?

Esposito and Kolodinsky (2007) found Vermonters “viewed government as a culpable party...more than half the respondents (54.4%) agreed that the US government (specifically the US Department of Agriculture) should bear legal liability for the spreading of GM [Genetically Modified] pollen to organic, non-GM crops” (p. 89). In the same study, Vermonters with higher education levels did not think the Vermont government should be held liable for pollen drift. Such findings demonstrate public viewpoints that could negatively affect future agricultural biotechnology legislation. It is easy to blame others when food safety issues arise, but we must remember that “we” are the government; policymakers will defend their positions as being representative of the people, even if the public majority has inadequate education to fully understand agricultural biotechnology issues. Indeed, most policymakers may lack sufficient agricultural biotechnology understanding, which could hyper-sensitize the information roles played by special interest groups, prior to establishing biotechnology legislation.

Public trust of government officials is essential to establishing proactive policies for agricultural biotechnology. Several studies (Curtis, McCluskey, & Wahl, 2004; Harrison, Boccaletti, & House, 2004; Hu & Chen, 2004) found that as consumers’ confidence in government agencies (ability to control and monitor GMOs) increased, their willingness to buy GM products also increased. Lang, O’Neill, and Hallman (2003) discovered that when asked whom consumers “should” trust for information about food biotechnology, one-third of the experts (scientists and professionals in food biotechnology) believed it should be government or academics as the one main source. However, even consumer confidence in its own government is affected by public opinion of government regulations affecting food biotechnology (Zhong, Marchant, Ding, & Lu, 2002).

Previous studies (Wingenbach, Rutherford, & Dunsford, 2003; Wingenbach & Rutherford, 2005) found agricultural college students and journalists (agricultural vs. mass media) trusted university scientists’ statements about biotechnology, but did not trust the same statements made by activist groups/celebrities, supporting the findings from earlier studies (Hoban, 1999; Vestal & Briers, 2000). Typically, the public has trusted mass media sources such as newspapers, Internet, and magazines for its biotechnology information (Wingenbach & Rutherford, 2007; Fritz, Ward, Byrne, Harms, & Namuth, 2004).

Brossard and Shanahan (2003) ascertained reliable associations between “citizens’ media use and their views of democratic processes in science by measuring institutional trust, scientific knowledge, and fears and concerns related to science and biotechnology” (p. 291). A democratic process in science, according to Brossard and Shanahan, refers to the extent that public opinion is considered in scientific decision making. Brossard and Shanahan found increased education (in New York) lead to mistrust of activist groups and less fear of science in general. New Yorkers who were more educated watched less television, but paid more attention to biotechnology from television and newspapers, mirroring the National Science Foundation’s (NSF, 2000) finding that “most of what Americans know about science and technology comes from watching television or reading a newspaper” (p. 25).

Despite the public’s reliance on mass media as a source for scientific information, biased reporting has been documented. Bias leads to mistrusting an information source. Marks and Kalaitzandonakes (2001) confirmed media bias (in

reporting agrobiotechnology events) “in so far as media coverage emphasized different frames (biosafety and food safety) at different points in time” (p. 206). However, readers should consider Logan’s (2001) view that “food biotechnology news often has been perceived as an agriculture food or business story, instead of a science...story” (p. 194).

Do trust issues exist between the public and its elected leaders? How can these issues be resolved? Barling et al. (1999) believed that government makes policy based on science. Science can be uncertain at times, but the aforementioned studies showed the public trusts scientists when communicating about biotechnology issues. Maybe scientists need to become better communicators of agricultural biotechnology to our elected leaders. Jenkins (1999) supported this opinion, finding that scientists were seen as trustworthy information sources, but they did not do enough to inform the public. Consumers want scientists to be more open and share their knowledge through mass media information sources. Do selected Texas legislators share consumers’ reliance on mass media information sources? Do those elected leaders consider their sources as trustworthy, unbiased, and fair in communicating agricultural biotechnology issues?

The purpose of this study was to examine information source trustworthiness, bias, and fairness in communicating agricultural biotechnology issues, as perceived by Texas’ legislators. This research was accomplished by collecting legislators’ perceptions of information source trustworthiness, bias, and fairness in communicating agricultural biotechnology issues; levels of concern about agricultural biotechnology issues; attitudes toward democratic processes in science; and exploring relationships between their perceptions of information source trustworthiness, bias, and fairness and their concerns about agricultural biotechnology issues, or attitudes toward democratic processes in science.

## MATERIALS AND METHODS

A descriptive correlational design (Field, 2000; Ott & Longnecker, 2001) was used in this study. The population of interest (N=181) included all elected Texas members of House (n=150) and Senate (n=31) districts. The population of House and Senate members was derived from the Texas Legislature Online (<http://www.capitol.state.texas.us/>). A proportional stratified random sample (Borg & Gall, 1989) using methods from Bartlett, Kotrlík, and Higgins (2001) to ensure proportionally representative numbers of Texas House of Representatives and Senators, produced a sample of Texas House (n=68) and Senate (n=20) members.

Modified versions of two instruments, *Journalists’ Perceptions about Biotechnology Issues* (Wingenbach & Rutherford, 2005) and *Media, Agricultural Biotechnology and Authoritarian Views of Democratic Processes in Science* (Brossard & Shanahan, 2003), were used to create the research instrument; wording changes and question sequencing constituted the modifications. Content validity was established by a panel of agricultural journalism experts from Texas A&M University.

The instrument, *Texas Legislature Members’ Perceptions about Biotechnology Issues Reported in the Mass Media*, contained four multi-part questions (for the results in this paper) measuring Texas House and Senate members’ perceptions of information source trustworthiness, bias, and fairness in communicating agricultural biotechnology issues; concerns about agricultural biotechnology issues; and attitudes toward democratic

processes in science. A final section of the instrument collected demographic information.

Trustworthiness, bias, and fairness scales each included nine sources (activist groups, biotechnology industry representatives, farmer/rancher groups, government officials, Internet, newspapers, retail food companies, television, and university scientists/researchers) and had four-point Likert scales (descriptors changed between scales). Reliability analyses for the scale measuring information source trustworthiness (1=Completely Untrustworthy...4=Completely Trustworthy) had a Cronbach's alpha coefficient of .89 (.74 in Wingenbach & Rutherford, 2005); information source bias scale (1=Completely Biased...4=Completely Unbiased) had a Cronbach's alpha coefficient of .76 (.64 in Wingenbach & Rutherford, 2005); and information source fairness scale (1=Completely Unfair...4=Completely Fair) had a coefficient of .79 (.84 in Wingenbach & Rutherford, 2005). The scales used in this study provided reliable data for analyses and interpretation. Three scales (trustworthiness, bias, and fairness) were transformed into single additive indices so an overall trust indicator could be determined for information sources (Brossard & Shanahan, 2003). Information source trust indicators were used in bivariate analyses.

Concerns about agricultural biotechnology issues were measured with eight, four-point items ranging from 1 (Very Unconcerned) to 4 (Very Concerned) and were transformed into a single additive index for bivariate analyses. A Cronbach's alpha coefficient of .84 (.86 in Wingenbach & Rutherford, 2005) was produced for the concerns scale. The scale (four-point) measuring attitudes toward democratic processes in science had four items, from 1 (Strongly Disagree) to 4 (Strongly Agree), with a Cronbach's alpha coefficient of .69 (.71 in Wingenbach & Rutherford, 2005), and was similarly converted to a single additive index for bivariate analyses.

Dillman's *Tailored Design Method* (2000) was modified for this study. Data collection was achieved using paper survey and regular postal delivery methods. Pre-notice letters describing the study were mailed via regular postal delivery to all participants in the stratified random sample. One week later, a personalized cover letter, survey, and self-addressed, stamped envelope was mailed to the sample. Follow-up postcard and personalized letters were sent to non-respondents every two weeks, with a replacement survey sent every third mailing. Some House and Senate members responded by e-mail that they wished to complete the survey electronically, which they were allowed to do (an e-survey was sent and returned to the researcher via e-mail). Reminders continued for three months through regular postal delivery.

Sixteen House and six Senate members chose not participate in the study, reducing the sample to 66. The response rate was 54.55% (N=36), represented by 28 House and 8 Senate members. Babbie (2001) suggested a 50% response rate for adequate statistical analyses.

Non-respondents are similar to late respondents (Goldhor, 1974). According to Lindner, Briers, and Murphy (2001), one method of to determine that "nonresponse is not a threat to external validity" (p. 51) is to compare early to late respondents' scores for significant differences on the variables of interest. Insufficient responses from successive waves of stimuli resulted in late respondents being defined as the latter 50% (n=18). No significant differences were found when comparing early-late respondents' summed scores for importance of biotechnology research, biotechnology effects, or levels of trustworthiness, bias, and fairness of information sources. Non-respondents were equivalent to respondents. The findings may be generalized to the population of interest.

Descriptive analyses were used to describe the data. Bivariate analyses were conducted to determine if significant relationships existed between selected variables. Significance levels were set *a priori* at  $\alpha=0.05$ . Relationships between variables with continuous scores were analyzed using Pearson's product-moment correlations (Borg & Gall, 1989).

## RESULTS

Responses (N=36) were received from 28 House and 8 Senate elected Texas legislators (Table 1). The majority of respondents were male and ranged from 41 to 60 or more years old. Most (n=17) had served four or more terms in the Texas legislature.

**Table 1.** Demographic frequencies of respondents.

Variables		<i>f</i>	%
Status:	House member	28	77.8
	Senate members	8	22.2
Gender:	Male	30	83.3
	Female	5	13.9
Age:	31-40	5	13.9
	41-50	11	30.6
	51-60	10	27.8
	61 or more	10	27.8
Service:	1 <sup>st</sup> term	6	16.7
	2 <sup>nd</sup> term	8	22.2
	3 <sup>rd</sup> term	4	11.1
	4 <sup>th</sup> or more terms	17	47.2

*Note.* Frequencies may not equal 100% because of missing data.

### Perceptions of Information Source Trustworthiness, Bias, and Fairness

Texas' legislators responded to three multi-part questions about their perceptions of information sources' trustworthiness, bias, and fairness in communicating agricultural biotechnology issues (Table 2). Texas' legislators perceived university scientists/researchers as trustworthy (M=3.03, SD=.45), unbiased (M=2.82, SD=.63), and fair (M=3.06, SD=.42) in communicating agricultural biotechnology issues. They felt essentially the same about farmer/rancher groups and government officials as being trustworthy, unbiased, and fair. However, they viewed activist groups as untrustworthy (M=1.94, SD=.74), completely biased (M=1.47, SD=.51), and unfair (M=1.91, SD=.67) in communicating agricultural biotechnology issues.

In terms of mass media information sources, Texas' legislators viewed newspapers, Internet, and television as untrustworthy (M=1.51-2.50) and biased (M=1.51-2.50), but mostly fair (M=2.51-3.50; television was deemed unfair, M=2.40) in communicating agricultural biotechnology issues.

**Table 2.** Texas politicians' perceived information source trustworthiness, bias, and fairness.

Information Source Trust Indicators		M	SD
Trustworthy†	University scientists/researchers	3.03	.45
	Farmer/rancher groups	2.94	.55
	Government officials	2.68	.53
	Biotech industry representatives	2.57	.70
	Retail food companies	2.42	.69
	Newspapers	2.31	.63
	Internet	2.21	.60
	Television	2.20	.63
	Activist groups	1.94	.74
Biased‡	University scientists/researchers	2.82	.63
	Farmer/rancher groups	2.56	.69
	Government officials	2.53	.61
	Newspapers	2.26	.62
	Television	2.24	.61
	Internet	2.20	.58
	Retail food companies	1.94	.55
	Biotech industry representatives	1.78	.54
	Activist groups	1.47	.51
Fairness††	University scientists/researchers	3.06	.42
	Farmer/rancher groups	3.03	.51
	Government officials	2.89	.40
	Biotech industry representatives	2.57	.65
	Retail food companies	2.54	.61
	Internet	2.52	.62
	Newspapers	2.51	.61
	Television	2.40	.65
	Activist groups	1.91	.67

† Four-point scale: 1.00-1.50=completely untrustworthy, 1.51-2.50=untrustworthy, 2.51-3.50=trustworthy, 3.51-4.00=completely trustworthy.

‡ Four-point scale: 1.00-1.50=completely biased, 1.51-2.50=biased, 2.51-3.50=unbiased, 3.51-4.00=completely unbiased.

†† Four-point scale: 1.00-1.50=completely unfair, 1.51-2.50=unfair, 2.51-3.50=fair, 3.51-4.00=completely fair.

#### Concerns about Agricultural Biotechnology Issues

Texas elected leaders also rated their levels of concern about agricultural biotechnology issues. They were concerned (M=2.51-3.50) about six of the eight issues identified by Brossard and Shanahan (2003; see Table 3). Their greatest concerns were about the economic implications (M=3.03, SD=.66), human health risks and safety issues (M=2.97, SD=.81), and consequences that agricultural biotechnology would have in farming and food production (M=2.97, SD=.77). Respondents were unconcerned (M=1.51-2.50) with the low level of public knowledge (M=2.44, SD=.73) and ethical implications (M=2.39, SD=.73) of agricultural biotechnology issues.

**Table 3.** Texas legislators' concerns about agricultural biotechnology issues.

Issues	M	SD
Economic implications	3.03	.66
Human health risks and safety issues	2.97	.81
Consequences for farming and food production	2.97	.77
Scientific uncertainty about biotechnology's consequences	2.86	.77
Potential risks for the environment	2.80	.72
International and global implications	2.61	.73
Low level of public knowledge	2.44	.73
Ethical implications	2.39	.73

Note. Four-point scale: 1.00-1.50=very unconcerned, 1.51-2.50=unconcerned, 2.51-3.50=concerned, 3.51-4.00=very concerned.

#### Attitudes toward Democratic Processes in Science

Texas' legislators reported their levels of agreement with four statements measuring authoritarian attitude toward democratic processes in science (Brossard & Shanahan, 2003; see Table 4). They disagreed (M=1.80-2.42) with all four statements and were most opposed to the idea that it is important to have public participation in making scientific decisions, regardless of people's knowledge of the issues involved (M=2.42, SD=.73). They were least opposed to the thought of the scientific community's actions always reflecting the will of the majority (M=1.80, SD=.47).

**Table 4.** Texas legislators' attitudes toward democratic processes in science.

Statements	M	SD
It is important to have public participation in making scientific decisions, regardless of people's knowledge of the issues involved.	2.42	.73
Scientists should pay attention to the wishes of the public, even if they think citizens are mistaken or do not understand their work.	2.33	.53
Public opinion is more important than scientists' opinions when making decisions about scientific research.	1.89	.52
The actions of the scientific community should always reflect the will of the majority.	1.80	.47

Note. Four-point scale: 1.00-1.50=strongly disagree, 1.51-2.50=disagree, 2.51-3.50=agree, 3.51-4.00=strongly agree.

#### Relationships between Information Source Trust and Concerns and/or Attitudes

Respondents' perceptions of information source trust were transformed into single additive indices so trust indicators could be determined for each source. Also, summed scores for their concerns about agricultural biotechnology issues (M=21.83, SD=3.99), and attitudes toward democratic processes in science (M=8.39, SD=1.32) were converted into single additive indices, and correlated with their information source trust indices (Table 5). Relationships were described using the standards developed by Davis (1971).

A significant moderate relationship existed between respondents' concerns about agricultural biotechnology issues and their attitudes toward democratic processes in science ( $r=.34$ ,  $p < .05$ ). Another significant moderate relationship existed between Texas legislators' attitudes toward democratic processes in science and trust in the Internet ( $r=.41$ ,  $p < .01$ ).

**Table 5.** Pearson correlations between Texas legislators’ concerns about agricultural biotechnology issues, attitudes toward democratic processes in science, and information source trust indicators.

Variables	r <sup>†</sup>	
	1	2
1. Concerns about agricultural biotechnology issues‡	—	
2. Attitudes toward democratic processes in science††	.34*	—
Information source trust indicators‡‡		
Activist groups	.19	.10
Biotechnology industry representatives	.08	.11
Farmers/ranchers	-.18	.31
Government officials	-.05	.32
Internet	-.15	.41*
Newspapers	.07	.22
Food retail companies	.03	-.08
Television	.03	.27
University scientists/researchers	-.14	.21

*Note.* Four-point scales were summed to determine legislators’ perceptions of information source trust, concerns about agricultural biotechnology issues, and attitudes toward democratic processes in science.

† Interval variables; reported as Pearson correlations.

‡ Concerns about biotechnology issues ranged from 10-29.

†† Attitudes toward democratic processes in science ranged from 4-11.

‡‡ Information source trust indicators ranged from 2-12.

\* Significant at the 0.05 probability level.

## DISCUSSION

Elected Texas legislators perceived university scientists/researchers as trustworthy, unbiased, and fair in communicating agricultural biotechnology issues, which agreed with the findings (Wingenbach & Rutherford, 2005) about journalists’ perceptions of agricultural biotechnology information sources. Both, Texas’ legislators and journalists surveyed held similar disdain for activist groups, finding this information source as untrustworthy, completely biased, and unfair on the same issues.

It is not surprising that Texas’ legislators perceived government officials as being trustworthy, unbiased, and fair, but further research may reveal why they think of themselves in such light. Are these factors synonymous with bearing the outcomes of biotechnology legislation (Esposito & Kolodinsky, 2007)? Do Texas legislators consider all sides of an issue (agricultural biotechnology) before creating policy? If so, why did this group not support the idea that it was important to have public participation in making scientific decisions, regardless of people’s knowledge of the issues involved? Scientists, communicators, and government officials alike should be concerned about the “disconnect” between Texas legislators’ perceived value of information sources and stakeholders who have the power of placing elected leaders in their respective state and national policymaking roles.

A larger disconnect existed between Texas legislators’ views about mass media sources and the public’s reliance on using those sources for their biotechnology information. Texas’ legislators viewed newspapers, Internet, and television as untrustworthy, biased, but mostly fair (television was deemed unfair) in communicating agricultural biotechnology issues. Surprisingly, even journalists perceived “television as



untrustworthy and biased in communicating agricultural biotechnology issues” (Wingenbach & Rutherford, 2005, p. 218). Other research (Blaine, Kamaldeen, & Powell, 2002; Macer, 2001; NSF, 2000) found that consumers got their biotechnology information from television and newspapers. If our nation’s public accepts the fact that most only keep abreast of scientific and technological advances through mass media (radio and television news broadcasts or newspapers), why then do elected leaders and journalists not place more trust in our mass media? Additional research is needed to determine the underlying factors for elected leaders’ and journalists’ distrust of mass media.

A new finding in this study showed that Texas’ legislators were most concerned about the economic implication of agricultural biotechnology, revealed new insights into the debate on legislation affecting biotechnology. Previous studies (Wingenbach et al., 2003, Wingenbach & Rutherford 2005; Blaine et al., 2002; Vestal & Briers, 2000) showed respondents were most concerned about the consequences that agricultural biotechnology would have in farming and food production or risks to the environment. Texas’ legislators think about state budgets, industrial growth, and economic impact more so than human health risks, safety issues, or agricultural production consequences when considering agricultural biotechnology issues. With that knowledge, scientists should focus their communication efforts on the economic implications of agricultural biotechnology, but not at the sake of ignoring public health and environmental concerns, when speaking to legislative panels, boards or inquiry, or through personal communications with their elected leaders.

Brossard and Shanahan (2003) found “respondents were not positive that public opinion is important in decision making related to scientific research” (p. 301). Texas legislators in this study confirmed Brossard and Shanahan’s findings. Barling et al. (1999) believed that government officials craft legislation based on science. Although Texas legislators perceived university scientists/researchers as trustworthy, unbiased, and fair in communicating agricultural biotechnology issues, we cannot lose sight of the importance of public opinion in decision making. Texas legislators held negative attitudes toward public participation in making scientific decisions and scientists paying attention to the wishes of the public, despite a positive association between their overall attitudes toward democratic processes in science and concerns about agricultural biotechnology issues. Texans who work with or are affected by agricultural biotechnology issues should become active participants in the legislative processes for these issues through active communications with their elected leaders. To become indifferent or ignorant of the policies affecting scientific processes, especially those policies most related to agricultural biotechnology, is to willingly accept policies crafted by elected leaders who do not respect public opinion.

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