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County Agent Views About Facilitating Public Education and Discussion of Genetic Engineering Use in Agriculture

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County Agent Views About Facilitating Public Education and Discussion of Genetic Engineering Use in Agriculture

Abstract

We conducted seven focus groups with Extension agents from three northeast states in Spring 2000 to learn what agents knew about genetic engineering (GE) applications in agriculture, their view of Extension's role in public discussion and education, and the training needed to assume such a role. While participating agents together knew a fair amount about their target audiences' perceptions of GE, they felt unprepared to deal with the challenges of public issues education in light of the current public debate, the publics' low science literacy, and their own science background. Their expressed training needs reflected these challenges.

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Introduction

Genetic engineering (GE) will have enormous impact on our food system (Reiners & Roth, 1989; Wilkinson, 1997; IFT, 2000b). GE uses laboratory techniques to insert a gene(s) from one organism into another, often with no need for sexual compatibility. Currently, GE soybeans, canola, corn and cotton that are herbicide and/or insect resistant; virus-resistant squash and papaya; and fruit or tomatoes with altered ripening are available (IFT, 2000b). Crops with clearer consumer benefits (altered fatty acid content or vitamin content) are in development (Liu, 1999).

Debate about GE's impact on food, human health, and the environment has been fueled by reports of effects on Monarch butterflies, of pollen drift, and of StarLink-contaminated corn products (Demetrakakes, 2000; IFT, 2000a; Wolfenbarger & Phifer, 2000; Taylor & Tick, 2001). Despite new legal agreements, planting rules and uncertainty about markets (Hamilton, 2001), many farmers grow GE crops.

By 2001, 7 years after introduction, over 60% of soybeans and about 25% of corn planted in the U.S. were GE (Osvath, 2001). Because soybeans and corn are converted to ingredients used in

manufactured foods, nearly 70% of our food contains GE ingredients (Eichenwald, Kolata, & Petersen, 2001). The Food and Drug Administration (FDA) ruled that GE foods (e.g., virus resistant papaya) and foods with GE ingredients (e.g., hydrolyzed soy protein) need not be labeled unless chemical content changes significantly (IFT, 2000b). The majority of polls in the last decade, however, have found that Americans want GE foods labeled (PIPA, 2001; Shanahan, Scheufele & Lee, 2001; PEW, 2001; Lazenby, 2001).

Given the impact GE will have on the food supply and the diversity of stakeholder opinions, Extension agents could play critical roles in fostering the grass roots discussion necessary for equitable public policy about GE applications. The Cooperative State Research Education and Extension Service (CSREES) supports the role of Extension agents because it funds research examining the social and economic effects of Ag biotechnology that requires Extension involvement (CSREES, 2003).

In 1999, no information existed about the ability of Extension agents to provide information about GE to farmers or consumers. Through a Kellogg Foundation Keystone 21 mini-grant, we used focus groups to examine Extension agent perspectives in three Mid-Atlantic States. Focus groups are recommended to explore the range of perspectives about an issue among people with diverse perspectives.

Objectives

The objectives of our focus groups were to learn what agents:

- Knew about GE, its agricultural applications and their consequences,
- Believed Extension's role should be in public education and discussion about GE, and
- Needed as training to assume a role in this discussion.

Methods

Subjects

Under project leader guidance, a multi-state Extension team recruited subjects in Winter 2000. Each state team representative sent a standardized recruitment message to all county Extension agents and directors via email asking for volunteer participants. The message explained the purpose of the focus groups, scheduling, and travel reimbursement. All agents responding to the recruitment message (N = 57) became potential participants. Focus groups were held over 3 months in Spring 2000 for agents in agriculture and in family & consumer science/4-H within each state to ensure groups with similar expertise and subject matter backgrounds (Krueger, 1988). Those attending (N=46) became the study sample.

Focus Groups

Based on the objectives, the project leader and focus group moderator developed a script of open-ended questions and probes to elicit discussion. For consistency, one moderator conducted all seven focus groups: three with agricultural agents in each state and four with family & consumer science/4-H agents (two in PA and one each in MD and NJ).

Each focus group had two parts. First, agents gave informed consent and completed a quantitative questionnaire, which included both demographic questions and three questions that provided a systematic self-assessment of knowledge of GE, its use in agriculture and level of concern about GE applications. Second, the moderator conducted the discussion, which an assistant tape-recorded while taking back-up notes.

Data Analyses

Means were compiled for the quantitative data and significant differences determined using t-tests. Qualitative data tapes were transcribed and entered into a software program for thematic analysis. Using two print transcripts, one from each agent group, we developed an initial thematic coding list that represented concepts emerging from the data. Themes and sub themes were categorized under the umbrella constructs of knowledge, perceptions and needs. Two coders then independently coded each remaining printed transcript.

Coded data were compared and differences resolved so that thematic coding categories did not overlap. New and combined coding categories were applied to previously coded, print transcripts. The final coding categories were applied to the electronic transcripts in the computer database and analyzed using Boolean key word searches organized under major themes. For each theme, we summarized and compared the findings for two groups of agents (agricultural vs. family & consumer science/4-H).

Results

Agent Demographic Characteristics and Systematic Self Assessment

Equal numbers of agriculture (Ag) and family & consumer science/4-H (FCS/4-H) agents participated (Table 1). The Ag agents represented horticulture, IPM, dairy science, agronomy,

natural resources, livestock, and farm management. Family and consumer science agents represented nutrition, Expanded Food and Nutrition Program (EFNEP), food safety, and family resource management. Two participants represented 4-H. The predominately male Ag agents and predominately female FCS/4-H agents had similar educational attainment. However, in the self-assessment, Ag agents rated their knowledge of GE and of its applications significantly higher than did FCS/4-H agents. Both groups were "not sure" if they had concerns about GE applications.

Table 1.
Demographic Characteristics and Self-Assessments of Participants

Variable	Agriculture Agents (N = 23)	Family & Consumer Science/4-H Agents (N = 23)
Type of agent	Production Ag = 20 Ag Natural Resources = 2 Farm Management = 1	F & CS = 21 4-H = 2
Sex		
Female	6	21
Male	17	2
Mean age	41.0 ♦ 8.5	46.6 ♦ 8.7
Education		
Bachelors	3	4
Masters	18	17
Doctorate	2	2
Systematic self-assessment		
*How much do you feel you know about the technique of GE?	3.2 ♦ 1.1 ^a	2.5 ♦ 0.9 ^a
*How much do you feel you know about its applications in certain areas of agriculture?	3.5 ♦ 0.9 ^b	2.6 ♦ 0.7 ^b
**I am not concerned with the application of GE within agriculture as it is currently being marketed and regulated	3.1 ♦ 1.3	2.7 ♦ 1.0
*Scale: 1 = nothing at all, 2 = not much, 3 = some, 4 = more than most, 5 = a great deal **Scale: 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree ^a p <= 0.05; ^b p <= 0.000		

Focus Group Discussion Results

Objective 1: Agent Knowledge of GE, Its Applications, and Its Consequences

Each agent group's responses fell into three sub themes, including "opinions about GE." Sometimes the two groups of agents (Ag and FCS/4-H) expressed the theme in the same way, and sometimes they differed.

What Agents Knew About GE and Its Applications

- Both groups knew that GE crops could reduce pesticide use, produce resistant pests, help meet expanding food needs, and endanger Monarch butterflies.
- Ag agents knew the perspectives of conventional farmers, who generally favored GE but were concerned about consumer acceptance, European reactions, cost of GE seeds, and pollen drift liability. Some reported hearing concern about regulatory sufficiency.
- FCS/4-H agents knew of concerns about biotechnology company motives and ethics, negative environmental impacts, and impacts on organic farmers. These agents knew consumers' concerns about allergies, long-term health effects, sufficiency of government regulation, and lack of labeling and consumer choice.

Consequences of GE

- Both groups discussed the consequences of current GE applications for various food system stakeholders, for less-developed countries, and for colleges of agriculture.
- Ag agents described the impacts on farmers, the farm supply industry, biotechnology companies, and the food industry. Only Ag agents mentioned positive environmental consequences, saw consumer reaction as normal resistance to change, and felt that consumers would ultimately pay more for food if GE were not accepted.
- FCS/4-H agents focused more on farmers' dilemma about adoption of GE, possible limitations to GE plants, and impacts of GE on community food systems. They expressed concern about the impact of no labeling of GE foods on consumer fears about long-term health effects and allergies. Although they felt that GE might increase the variety and nutrient content of foods, they saw the potential for higher prices and decreased food access.

Agent Opinions of GE

- Both groups expressed opinions about GE technology, its need, and consumer reactions. Regardless of discipline, some agents felt that concerns about GE and sufficiency of government regulations were legitimate and that more unbiased studies were needed.
- Many Ag agents expressed comfort with GE, felt it was both less risky than traditional breeding and needed as more pesticides were banned, and argued that the potential good for agriculture and medicine should be sufficient for acceptance. While some felt that poorly planned marketing campaigns had contributed to poor consumer acceptance, many believed that the negatives were exaggerated and discussions had become emotional and political. Most felt consumers did not consider GE a hot issue.
- FCS/4-H agents were divided about the need for GE foods to solve world hunger but felt it was needed to alter nutritional content, produce functional foods, and deliver vaccines via food. Many expressed discomfort with the science, seeing this technique as unnatural. They disagreed about the motives of scientists, private industry, lobbyists, and politicians involved in developing GE. They were skeptical of consumer acceptance unless more evidence of safety and GE applications with direct consumer benefit were produced. Finally, they disagreed about whether GE was a hot consumer topic.

Objective 2: Extension's Role in Public Education and Discussion

Agents' views fell into two sub themes, the challenges and their desired role.

Challenges

Agents enumerated challenges in the form of questions about implementing public education/discussion about GE. These challenges (Table 2) reflected the current situation in the US and characteristics of their target audience and of agents themselves.

Table 2.

Challenges to Public Education/Discussion About GE Use in Agriculture

Challenge	Agents' Questions Expressing the Challenge
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Current U.S Situation	
Identifying the issue	Is this a political, social, economic, trade or consumer issue? How do you sort the misinformation from real information? Does the issue differ among food sectors or by application?
Countering the media	How do we counter the media, which handles things inappropriately, gives negative views of agriculture, does not help consumers make educated decisions and causes problems?
Determining who to believe	Who do we believe when most information presented is at one extreme or the other and not balanced? Even specialists are perceived as presenting opinions rather than facts. How does making profits affect the tone of information provided?
Assessing and explaining available studies	How can we assure the public of safety when we may not have studies of sufficient length to see problems? How sufficient are the studies on which regulations are based?
Addressing consumer concerns	How can we work with consumers to encourage demonstration of long-term safety, release of proprietary information from private companies, increase trust in government and reduce disenfranchisement of consumers from food system decision making?
Balancing values vs. facts	The issue of GE use is not purely scientific but involves personal and community values. What is the role of values vs. scientific facts in our interactions with the public
Target Audience Characteristics	
Dealing with a multiplicity of stakeholders	How do we, representing 'rational' science, communicate gaps in knowledge, uncertainty, and changing information to different cultural, ethnic and interest groups? How do you attract the attention of those who need to know? How do you avoid dealing with those holding radically different opinions?
Addressing the gap in science literacy	How do we deal with an audience in which no one (consumers, politicians, legislative aides, elected officials, parents, etc.) understands science terminology or principles?
Extension Agent Characteristics	
Understanding and keeping up with science	How do we talk about this subject when our own science backgrounds are so weak? "It is hard to understand a science you cannot see." Many agents felt they did not have the scientific background to deal with this issue, having taken only a few science courses a long time ago.

Learning the terminology	How can we deal with the terminology, which is confusing and challenging to learn? How is cloning different from GE? Some felt the need to have terminology down pat before they could answer questions.
Retaining credibility	Are we marketing or educating? The support materials of chemical companies are seen as biased information. How do we present balanced information?

Faced with these challenges, some agents expressed frustration, citing a lack of direction from Extension administration that was critical to any educational efforts.

Role in Public Education/Discussion

When asked what role Extension agents should play, if any, in public education/discussion about GE, a consensus emerged about Extension's educational philosophy and preferred methods for reaching the public. However, discomfort with public issues education emerged (Table 3).

Table 3.
Extension's Role in Public Education/Discussion

Theme	Agents' Views
Extension Educational Philosophy	
Provide basic information	"We focus on the nuts and bolts of science." "[We] help people understand the terminology and the rough outline of the technology so they have a framework."
Provide technology transfer only	"Our role is to explain the science, not to go down the road of value issues. We are there to discuss and explain the science." "This is the current research, this is what we know, this is what we don't know. It is up to the consumer to make a choice as to what to do." "We don't want to close people's minds with emotion."
Protect credible image	"We really should just present facts and not opinions." "I feel our stand should be unbiased." "It is important to allow all sides of the argument to be presented without us promoting a particular point of view."
Serve as facilitator	"Our job is to bring information to folks, help them explain it a little bit and set it up for dialogue." "You are not perceived as being for or against. You are just facilitating the meeting and the people [attending] can address the pro, con, issues and concerns." "We want [consumers] to be in a position to make their own decisions without pushing pro or con. Our job is to present the information, not necessarily change their mind."
Role in Public Issues Education	
Disagree about getting involved	Some agents felt they were "trained to transfer technology and we do that extremely well, but I am not so sure we are equipped to do public policy* education." Others felt "one of the goals of

	Extension was that we do more public policy education" and that both science and public policy skills were needed. (*Public policy = public issues)
Avoid confrontation	Most felt "debate is confrontational" and "is not an effective method of education."
Serve as participant or resource, not leader of public forums	Extension could be a "resource of knowledgeable people on both sides of the issue" and also a participant to present credible information about agriculture. Forming a panel is tricky because want to avoid extreme pro and con but "have to be sure both pro and con have a research base to support their opinions. We don't want to offend anybody."
Preferred Methods for Reaching the Public	
Inject this topic into routine programs with already established audiences	Reach more people "if you go in the back door" and "sneak" it in as part of another program. This avoids attracting "the fringe groups" or "bringing out the crazies" (those with strong or opposing opinions). Dropping bits of information at the end of other programs can build interest in a more formal presentation. "[This] takes something that is being driven by a hot issue and diffuses it into a long term educational program." Many felt a program needs an "audience that already exists" and did not want to build interest from scratch.
Offer canned presentation or program with strong backup from main campus	Many agents felt that they needed "a canned presentation that everyone agrees with or that everyone can live with" that will provide information and foster discussion. They also wanted "the backup of experts if they want to go further for information." "The college needs to pay more attention to putting out materials, as opposed to expecting [agents] to do it in their county."
Work at national or regional level is more important than local efforts	"This is an issue that's of a national stature" and "all we can do is react locally." "The ideal situation would be to have all the land grants pull their resources and buy an hour on national TV and put on a program." Could also "recommend this as [regional] conference topic."

Despite this consensus, some Ag agents wanted to be advocates while FCS/4-H agents wanted to present all sides of the issue.

Objective 3: Agents' Perceived Training Needs

Assuming Extension was to facilitate public education/discussion of GE applications in agriculture, agents indicated they would need knowledge upgrade, backup support and group skills training (Table 4).

Table 4.
Training Needs

Knowledge Upgrade	Agent Suggestions
Basic science course	Provide genetic engineering (GE) at 6 th grade level for all agents as preparation for use with the general public. Provide GE 101 or higher with solid grilling on techniques used in laboratory, reasons

	for using a particular technique and how this technique differs from traditional plant breeding. This course could be for those who wish to be educational leaders and optional for others.
Research findings	Provide range of research to back up a finding, not just research designed to support a position.
Background on issues	Review science on all sides of the issue including successes and failures of traditional breeding and genetic engineering applications, known risks and benefits and possible risks and benefits, and myths and myth busters. Provide background on contention in Europe and economic impacts.
Practical and visual applications of GE	Provide examples of GE food products in the market place now and those predicted for the future.
Information on consumer perceptions and attitudes	Provide audience profiles that present characteristics, attitudes and perceptions so agents can be prepared to answer their questions.
Outside expertise	Provide a panel of regulatory representatives and scientists to answer agent questions.
Backup Support	
Resource notebook and Web pages	Provide materials that cover frequently asked questions and fact sheets that update the agent but which also would work with the public. Provide frequent updating as area changes fast.
Consistency of message	Insure consistency of the message and materials among family living, agriculture and 4-H. "All extension personnel should be on the same page."
Expertise at the land-grant university	Provide agents the basic information and have specialists and faculty provide backup of more in-depth information if requested.
Group Skills Training	
Conflict management	Train agents in methods to deal with arguments and strong emotions. Programs about GE are likely to attract people with differing opinions and evoke emotion, anger and possible heckling.
Moderator skills	Teach agents how to get clarification, to politely turn people off, to generate discussion, and to listen.
Media interaction	Train agents about how to get balanced media coverage and how to answer questions from the media skillfully.

Most agents felt this training would require multiple days. Disagreement emerged about the utility of satellite vs. face-to-face and regional vs. statewide training.

Conclusions and Recommendations

We assessed agent knowledge (objective 1) using both self-assessment questions and focus group discussion. In the focus group discussions, a few agents were more informed about GE applications in agriculture than the mean self-assessment response suggested. Reflecting their self-assessments of knowledge of the "technique of GE," Ag agents knew more about the science than FCS/4-H agents, but few Ag agents exhibited in-depth knowledge in the focus groups.

Although, in the self-assessment question, agents indicated being "not sure" if they were concerned about GE applications in agriculture, the focus groups revealed specific concerns about this technology, especially among FCS/4-H agents. Generally, Ag agents appeared more positive about GE use, but FCS/4-H agents were acutely aware of consumers' concerns, expressing their need for information to decrease these concerns.

Our qualitative assessment of agent knowledge helped us understand the viewpoints expressed in the focus groups about Extension's role (objective 2). The challenges these agents enumerated to informing a public with low science literacy about GE reflected:

- Concern about dealing with unbalanced information,
- Limited research on impacts,
- Questions of regulatory sufficiency, distrust of government, and
- Balancing values vs. facts.

Regardless of discipline, agents felt personally unprepared in scientific background and group skills to take a pro-active part in fostering public discussion. Not surprisingly, they wanted to introduce information through the "back door" to familiar audiences in familiar program settings. While many wanted to deliver factual information, Ag agents wrestled with "selling" the technology and its applications vs. providing balanced information.

Public issues education (PIE), in which an agent would facilitate discussions to raise public awareness and group decision-making, was seen as risky, because an agent's credibility could be tested, an agent's information and opinions might not be accepted, and values could be as important as facts. The agents' requested training needs (objective 3) reflected the basis of their discomfort. These agents clearly felt they were not ready to engage in public education about GE.

Our findings indicate a need for training to increase agents' science background and their confidence in using it, ability to provide credible, balanced information to multiple stakeholders with differing views, and ability to facilitate PIE. We used these findings to plan a statewide training session on GE. We invite other Extension specialists to use our findings as the basis for investigating the needs of agents in their state. Agents are key to facilitating public discussion of the implications for the food system.

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