The Public and Agricultural Biotechnology: Key Questions

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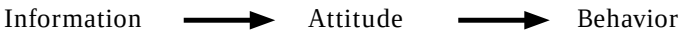
When I speak to managers of environmental agencies or chemical companies, they are often looking for a risk communication magic wand. The hope is that I will provide a few risk communication abracadabras that will make their audiences see risk as the managers do. In short, managers are hoping for a risk communication incantation so audiences, which are overreacting to a risk (in the eyes of the experts), will magically calm down. And, they assume I can also provide another incantation to wake up audiences that are overly complacent about other risks. I have been studying communication about toxic chemicals for many years and have yet to find any magic wands. While much of the research on toxins has applicability to agricultural biotechnology, I can safely say that you are even less likely to get magic wands today. Instead, I plan to discuss five questions that I feel have relevance to the communication issues facing agricultural biotechnology: 1. What the role of information? 2. How does support differ for specific products? 3. Who supports agricultural biotechnology? 4. How can trust be increased? and 5. Can our institutions handle the rapidity of technological change? My examples come from research dealing with chemicals and radiation, but I think you will find them applicable to agricultural biotechnology.

WHAT IS THE ROLE OF INFORMATION

I'll begin by challenging your notion about the power of information. I think many of us have in our heads a model that says if you provide people with information you will change their attitudes and, in turn, their behavior. This model (see Figure 1) is a bit simplistic. Yet, this is the model that drives the biotech industry to "educate" the public in hopes that the public will then support field trials of biotech plants, will buy biotech products, and will favor the biotech industry.

FIGURE 1:

Overly Simplistic Model of Human Response



Let's look at some research on the role of information. The data indicate that people are far more complex than the linear model that suggests an injection of information will transform how people respond to agricultural biotechnology. If people were as simple as the model in Figure 1, no one would smoke, we would all use our seat belts, and I certainly wouldn't jump horses on the weekends. We have all experienced this at some level. If you have tried to "educate" your spouse or your children, you have found that information doesn't necessarily transform the family's behavior. Information is not sufficient to make people rational. A social scientist (Rayner, 1992) has pointed out that the concept of "rational" is subjective: where you sit in society determines where you stand on what you consider rational.

Because I am an academic, I am going to provide you the results of several empirical studies about the relationship between information and behavior. The nuclear industry, concerned about the public's "irrational" concerns about nuclear power, has funded a variety of studies to determine if well-informed people support nuclear issues. Most studies focused on what the people knew about radiation. Questions asked were of the following type: What is the process that generates energy in nuclear power plants? What is the fuel that is used in nuclear fission plants? The researchers then looked at the relationship between knowledge of radiation and pro-nuclear attitudes.

About half of the studies indicated that the people who knew the answers to such questions supported nuclear power (Johnson, 1993). The other studies either found no difference in knowledge between pro- and anti-nuclear supporters or found that the people who knew more were more anti-nuclear. Johnson (1993) also reviewed studies dealing with other issues such as irradiated food and hazardous waste. He found, once again, that some studies indicated that knowledgeable people supported the technology and, in other studies, the relationship between knowledge and support was just the opposite: the more knowledge, the more opposition to the particular technology.

The research on the relationship between support of agricultural biotechnology and knowledge seems to show the same signs of inconsistency. An early survey by the Office of Technology Assessment (OTA) (1987) found approximately the same percentage of support for agricultural biotechnology among those who were college graduates and those with less than a high school education. However, a more recent survey of New Jersey residents (Hallman and Metcalfe, 1993) found that support for genetic engineering was approximately 80 percent among the college educated or those with some college, while less than 60 percent support was found among those with a high school

diploma or less than a high school education. And both the OTA survey and the more recent New Jersey one found significantly more support among those who said they had heard a lot about genetic engineering than those who heard little. Conversely, an analysis of attitudes of citizens of different European countries towards biotechnology, found that countries with the highest level of education and information, Denmark, Germany, and the Netherlands, had the least support for biotechnology (Almas and Nygard, 1995). In short, the link between knowledge, attitude, and behavior is unclear, at best.

Am I suggesting that you can forget about providing information? No. But I am suggesting that experts of all types tend to overestimate the transformative power of information.

What Constitutes Useful information?

Let's look at what is considered useful information. I wonder if the studies found tenuous links between knowledge of radiation, attitudes, and behavior, in part, because the radiation experts' notions of important information are a bit skewed. If you need to make informed decisions about nuclear power, how important is your knowledge of the energy process and the fuel? Similarly, the Centers for Disease Control was very upset that a survey they conducted early in the AIDS epidemic suggested that people didn't know AIDS is caused by a virus. But Baruch Fischhoff, one of the country's most eminent scholars concerning risk communication, pointed out that changing people's behavior is not going to depend on whether they know transmission is caused by a virus rather than bacteria.

One of the questions for the biotechnology industry is: What should stakeholders know about agricultural biotechnology to make informed decisions? This is the question you need to consider carefully. In fact, you should conduct research on what people want to know about agricultural biotechnology. I have read many studies about people's perception of biotechnology in general, and agricultural biotechnology in particular. None of them asked people what they wanted to know about agricultural biotechnology. While questions were asked about their attitudes towards products, no one was asked if there was any information that they needed. And yet, there are a variety of materials written for the public about agricultural biotechnology. Did anyone ever test those materials to see if readers cared about, let alone understood, the information?

Should Industry Rethink Labeling?

For the most part, the agricultural biotechnology industry has vehemently opposed labeling of its products. But results of surveys of the public suggest the opposite. Even supporters of agricultural biotechnology feel strongly about the desirability of labeling (e.g., Hallman and Metcalfe, 1993). Arguably, the question of labeling needs to be considered as a way to address concerns about biotechnology. If you want me to know more about the technology, the prod-

ucts might come with a label, like that on my yogurt container that tells me about acidophilus. In fact, there is a large body of research that suggests people see risks as riskier if the risks are unfamiliar (e.g. Slovic, 1987). This explains why people are usually more fearful of chemical plants than automobiles — despite the mortality statistics that indicate chemical plants cause far fewer deaths per year than automobiles. The evidence suggests that familiarity with new technology does not breed contempt, but rather greater familiarity and comfort.

People learn when they have a reason to seek information. For example, we are motivated to learn because we need to make a decision or we are emotionally involved in some way. You can hold all the conferences you want, but you will not get most people to attend because they do not yet care enough about the issue to devote the time. So how will you reach consumers? Yes, marketing is important. But you might want to look at labeling to help create both familiarity and information-seeking behavior. Questions to consider about the role of information: Are you over relying on information as the way to change behavior? What information do people want? Can labeling help?

How Does Support Differ for Specific Products?

The research on agricultural biotechnology indicates that people view different products differently. They don't view biotechnology animal products, for example, the same way they do vegetables developed through biotechnology (Lacy et al, 1991) Research is beginning to look at the specifics. See Table 1.

Table 1. Support for Agricultural Biotechnology Products

Percentage of respondents that strongly or mildly approves of the product

New grass that doesn't need to be mowed so often	78 percent
Fruits and vegetables that are less expensive	73 percent
Better tasting fruits and vegetables	67 percent
Fruits and vegetables that last longer on the supermarket shelf	57 percent
Hormones that enable cows to produce beef with less cholesterol	57 percent
Hormones that allow cows to give more beef	39 percent
Hormones that allow cows to give more milk	40 percent

(Data from Hallman and Metcalfe, 1993)

Opinion varies by the type of product, and the perceived benefits of that product may impact the formation of that opinion. Respondents felt no shortage of beef (at least not sufficient to overcome their objections to genetic manipulation of animals) but did care about whether they could eat hamburgers with less cholesterol. Less expensive vegetables are supported more than vegetables with longer shelf life. Those responses make sense when you think about what matters to consumers.

Other products raise questions about how the risks and benefits might be distributed through the population. Grass that needs less mowing appealed to most people (at least in May when the survey was conducted). From another perspective, New Jersey residents spend a great deal of money on lawn mowing services that employ workers that might otherwise be unemployed. Also, the services are run by people who count on the spring and summer to provide the bulk of their income for the year. The extent of support for various products raises a critical question: Who benefits from new use agriculture and who bears the risk? (Lacy et al, 1991).

WHO SUPPORTS AGRICULTURAL BIOTECHNOLOGY?

I have been exploring the differences between people who support the concept of agricultural biotechnology products and those who don't. The New Jersey data in Table 1 suggests that some people were supporters of products that didn't exist at the time of the survey. What is the difference between those early supporters and those who say "no thank you" to a product that does not yet exist?

Multivariate analysis of the data using discriminate analysis suggests that the issue of morality is one of the strongest discriminators between those who oppose a product and those who support it. In addition, for men, one of the key variables that distinguished those who supported agricultural biotechnology products was their conviction that they had already eaten biotechnology products when that was not yet possible in 1992. These data reinforce the notion of familiarity reducing fear. The men obviously did not know much about the agricultural biotechnology market, but they thought they did. They may have been uninformed, but they were reassured by their own perceptions of reality. Thus, another question to explore: What makes people supporters of agricultural biotechnology? This recurring issue of familiarity raises once again the question of labeling.

HOW CAN TRUST BE INCREASED?

The perception of trust in the agricultural biotechnology industry is important: What makes people feel trusting. One of the founders of the field of risk perception has studied this issue — using nuclear power as the basis (Slovic, 1993). He asked people to respond to statements about a hypothetical nuclear power plant in their community. He gave two versions of the same statement — one phrased in a way to decrease trust and another dealing positively with the same issue. Figure 2 illustrates how these two questions were framed. The statement: "the county medical examiner reports that the health of people living near the plant is better than average" had a minimal impact on trust. But the trust-decreasing statement had a very powerful impact.

Figure 2. Judged Impact of a Trust-Increasing Event and a Similar Trust-Decreasing Event[a]

	Impact on trust						
	Very small 1	2	3	4	5	6	Very powerful 7
Trust-increasing event							
The county medical examiner reports that the health of people living near the plant is *better* than average	21.5	14.0	10.8	18.3	17.2	16.1	2.2
Trust-decreasing event							
The county medical examiner reports that the health of people living near the plant is *worse* than average	3.0	8.0	2.0	16.0	21.0	26.0	24.0

[a]Cell entries indicate the percentage of respondents in each impact rating category.

In Table 2, Slovic presents data that show what we always have known: Trust is very easy to lose and very hard to build. Trust-decreasing events have a significant negative impact on participants' trust, and the trust-increasing events minimally increased trust.

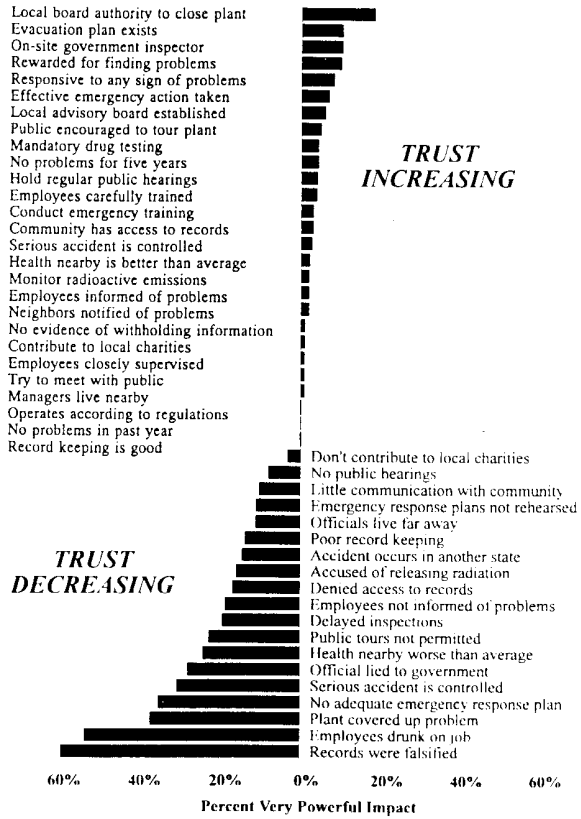


Table 2. Differential impact of trust-increasing and trust-decreasing event. Note: Only percentages of Category 7 ratings (very powerful impact) are shown here.

Equally significant is the one statement that increased trust more than minimally: A local board has the power to shut down the plant if it is not performing up to expectations. In essence, the statement conferred power to the community to make the hypothetical plant live up to public expectations.

How should you involve people in making decisions so you increase trust? Peter Day and Laura Meagher developed a community advisory panel in southern New Jersey before the field trial of genetically-engineered eggplants. The involvement of stakeholders in decision-making was successful in increasing trust by incorporating their suggestions.

The key questions are: What power will consumers have? What power will the government have? And to be even more provocative, might you be better off if you said: Go ahead. Regulate us. We know we can do it. Would this type of willingness to yield power inspire greater trust? Essentially, this was the route taken voluntarily by the manufacturers of the Flavr-Savr™ tomato to increase consumer confidence. Research should be done to determine if more such actions will increase trust in the agricultural biotechnology industry.

Rapidity of Technological Change

Last night I was both exhilarated and terrified by information about the rapidity of the development of agricultural biotechnology products. The speaker expressed frustration with the slow rate of government responses to these advances. Yet, consider that we have essentially the same government infrastructure we had 25 years ago, and we have universities operating for the most part as they did years ago. Our decision-making capabilities as a society have not evolved significantly, as the difficulty of developing environmental policy illustrates. In short, our societal institutions are not even beginning to keep pace with our technology. We need to pay more attention to bridging the gaps between technological innovation and institutional capacity. I recommend to you one small step towards bridging the gap: a 1996 report by the National Academy of Sciences — *Understanding Risk: Informing Decisions in a Democratic Society*. You might examine this report for suggestions on how to bridge the social and technological issues confronting agricultural biotechnology and responses to some of the questions I have raised. Dealing with the social issues of agricultural biotechnology deserves at least as much attention as technological issues.

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