

# Labeling Genetically Modified Foods: How Do US Consumers Want to See It Done?

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If genetically modified food labeling occurs, policymakers will need to consider the form of the program: Should it be mandatory? What should be labeled? What should be on the label? Who should be in charge? We present results of a nationally representative survey of US adults aimed at answering these questions.

**Key words:** genetically engineered food, labeling, design, consumer preferences.

The production and labeling of genetically modified (GM) foods has been controversial—debated at legislative and judicial levels and in the arena of public opinion. Polls have emphasized that a majority of consumers in the United States (US) desire GMFs to be labeled (Pew Initiative on Food and Biotechnology, 2001), and legislation has been entered at both the federal and state levels. For example, HR 3377 and S 2080—the “Genetically Engineered Food Right to Know Acts”—were introduced into the US House of Representatives and Senate, respectively. In addition, at least seven states have debated labeling and marketing requirements for GM foods (Pollack, 2001). Further, the current lack of harmonization of policies across countries also makes GM food labeling an international trade issue.

The debate surrounding GM food labeling has almost exclusively centered on the assumption that consumers’ sole desire for information about GM foods is whether they are, in fact, genetically modified. Although this is an important primary question, the labeling issue is more complex than simply determining whether or not to label. If GM food labeling is to occur, policymakers need to consider the form of the labeling program: Should it be mandatory or voluntary? What foods should be labeled? What pieces of information should be placed on the label? Who should be in charge of monitoring compliance? To answer these questions, policy-makers have to balance the concerns and desires of a broad spectrum of consumers with the costs and complexities associated with supply chain management under alternative labeling programs. Here we present an overview of a recent survey of US adults aimed at

understanding consumer preferences for specific attributes of alternative labeling programs.

## Methods

During the summer of 2002, we administered a mail survey to a nationally representative sample of 5,462 US residents and an additional oversample (710 individuals) of Maine residents. The survey was administered with multiple mailings and with an incentive paid for returned completed surveys. A mail survey approach was used, because it allowed respondents to react to physical representations of potential GM labels and allowed us to manipulate these representations experimentally. An oversample of Maine residents was added to provide representative results for Maine state policymakers. (The Maine Agriculture and Forest Experiment Station provided some of the funding for this research.)

In total, 375 Maine residents and 2,012 US (non-Maine) residents responded to the survey for a response rate of 53% and 37%, respectively. For all analyses, the data are weighted to adjust for oversampling; responses for each state are weighted such that the proportion of respondents from that state is reflective of the state’s proportion of the US adult population (as measured by the 2000 US Census) while maintaining the overall sample size. Specifically, weights are determined by the formula:

$$\text{State weight} = (\text{state adult population} / \text{US adult population}) / (\text{number of state respondents} / \text{total number of respondents})$$

**Table 1. Socioeconomic characteristics of respondents.**

	Survey	US Census
Percent male	46	48
Average age	53	47
Average years of education	14	13
Percent white	89	75
Average household income	\$60,900	\$57,000

Except for race, our survey respondents have characteristics similar to those of the US adult population (Table 1). The stated differences in race may be reflective of a true underlying difference and/or may reflect differences in the way the race questions are asked across the two surveys.

The mail survey instrument consisted of 44 questions in six sections.<sup>1</sup> (Questions analyzed are referenced throughout the text—see Appendix A for actual question wording.) The content and wording of questions is based upon an analysis of issues raised in the labeling or consumer-perception literature (e.g., Boccalatti & Moro, 2000; Hallman & Metcalfe, 1995; Hoban, 1999; Huffman, Rousu, Shogren, & Tegene, 2003a; Rousu, Monchuk, Shogren, & Kosa, 2003; Roe, Teisl, Rong, & Levy, 2001; Teisl, 2003), state and federal policy needs, and previous focus group research (e.g., Teisl et al., 2002). Further, they are based upon conceptualizations of consumer reactions to labeling information as presented in Teisl, Bockstael, and Levy (2001) and Teisl and Roe (1998).

There are several statistical tests used that are differentiated by the type of data being tested. For responses to ratings questions (Tables 2, 3, 4, and 7) we use analysis of variance (in the form of pair-wise t-tests of means) to determine if the mean ratings are different across response categories. For responses to categorical choice questions (Tables 5 and 6), we use contingency tables to determine if the response distributions are different across response categories. All tests use a significance level of 10%.

1. Note there are several questions (Questions 16, 17, and 22) that ask respondents to react to specific labels; the information presented in these labels was experimentally manipulated and varied across respondents. The analyses of these data are beyond the scope of this paper and, as a result, we will not fully describe these data; interested readers can contact the first author.

**Table 2. Respondents' ratings of concerns about food production and processing technologies.<sup>a</sup>**

Pesticides	4.17 a
Artificial growth hormones	4.00 b
Antibiotics	3.77 c
GM ingredients	3.73 c
Irradiation	3.58 d
Preservatives	3.21 e
Artificial colors/flavors	3.07 f
Pasteurization	2.77 g

<sup>a</sup> Where 1 = not at all concerned, 3 = somewhat concerned, and 5 = very concerned. Results sharing the same letter are not significantly different at the 10% level.

## Results

We began by asking a series of questions to determine respondents' awareness and knowledge of current GM food production in the United States. We find 76% of respondents had heard of GM foods (Question 6), and a majority of these individuals had heard about GM corn and tomatoes. The high awareness of corn may be due to extensive news coverage in 2000 of the contamination of taco shells by GM corn not approved for human consumption. The high awareness of tomatoes may be because the Flav'r Savr™ tomato was the first commercially available GM food in the United States (released in 1994).

We next asked respondents to provide an estimate of the percent of food sold in the United States that is GM (Question 7). The Grocery Manufacturers of America estimates that at least 70% of the foods on grocery store shelves contain GM ingredients (Goldsbrough, 2000). However, about half of the respondents thought that less than 30% of the food supply has been genetically modified, and less than 10% thought the answer was 70% or more. Respondents seemed to have an imperfect appreciation for the amount of GM foods they had been eating.

We also asked respondents to provide a concern rating for eight different food production and processing techniques (Question 5). Respondents' number one food production concern was *not* the use of GM ingredients (Table 2); this general result parallels those from an annual survey administered by the International Food Information Council.<sup>2</sup> In those surveys, respondents had relatively high concerns on a range of food safety issues

2. Results available at <http://www.ific.org/research/loader.cfm?url=/commonsspot/security/getfile.cfm&PageID=1491>.

**Table 3. Average importance respondents place on potential benefits of genetically modified food.<sup>a</sup>**

Decreased use of pesticides	4.12 a
Increased food production in lesser developed countries	3.92 b
Lower food prices	3.84 c
Increased vitamins/minerals	3.82 c
Decreased use of antibiotics	3.82 c
Decreased total fat/saturated fat	3.76 d
Increased disease resistance in crops	3.69 e
Increased anti-oxidant levels	3.63 f
Increased protein in foods	3.58 f, g
Longer shelf life	3.53 g
Removal of allergens	3.46 h
Decreased need for irrigation	3.45 h
Increased flavor	3.43 h
Increased frost resistance	3.25 i
Foods modified to contain vaccines	3.09 j
Increased size of fruits/vegetables	2.79 k

<sup>a</sup> Where 1 = not at all important, 3 = somewhat important, and 5 = very important. Results sharing the same letter are not significantly different at the 10% level.

(e.g., pathogens, chemicals, pesticides). Perversely, the four technologies of most concern do not trigger labeling, whereas techniques of lesser concern do require some sort of labeling.<sup>3</sup> The apparent discrepancy between individuals' concerns about food production technologies and the labeling of foods using these technologies raises two questions. First, if government implements GM food labeling, why does it not impose (or at least advocate) a similar requirement for technologies of equal or higher concern? Second, given that labeled technologies are of lowest concern, one may question if labeling has the ability to reduce consumer concerns about food technologies.

We next provided respondents a list of 32 potential benefits (Question 8) and concerns (Question 9) of using GM foods and asked them to rate each one on importance. Of the eight benefits rated as most important by our respondents, most accrue directly to consumers, and most of these relate to improvements in the food's health attributes (Table 3). Farmer benefits and nonhealth improvements in food attributes were less important to respondents. Currently approved GM foods primarily provide producer benefits with few benefits

3. Not all irradiated food needs to be labeled, only those foods nutritionally altered by the irradiation.

**Table 4. Average importance respondents place on potential concerns of genetically modified food.<sup>a</sup>**

Unknown long-term health effects	4.42 a
Increased risk of antibiotic resistant bacteria	4.38 a
Increased use of pesticides	4.21 b
Unknown toxins produced	4.19 b
Unknown long-term environmental effects	4.18 b, c
Genetic contamination of the environment	4.13 c, d
Increased use of herbicides	4.11 d
Risks to wildlife & insects	4.08 d
Damage to topsoil	3.93 e
Unknown allergens introduced	3.92 e
Spread of disease resistance to weeds	3.87 e, f
Spread of pest resistance to weeds	3.86 f
Spread of herbicide tolerance to weeds	3.85 f, g
Control of agriculture by biotech firms	3.80 g, h
Risks to species diversity	3.74 h
Ethical issues	3.57 i

<sup>a</sup> Where 1 = not at all important, 3 = somewhat important, and 5 = very important. Results sharing the same letter are not significantly different at the 10% level.

accruing directly to the consumer.<sup>4</sup> However, one benefit of importance to both farmers and consumers is a reduction in pesticide use. Increased plantings of GM crops have led to an overall decrease in the amount of pesticides used and in a switch to less toxic pesticides (Fernandez-Cordejo & McBride, 2002). Genetically modified food producers may have similar success in marketing pesticide reduction as a benefit to consumers; however, the current lack of labeling may hamper their ability to do this.

The eight concerns rated as most important by our respondents are related to risks directly impacting the consumer through perceived deteriorations in food safety or are related to potential negative environmental impacts (Table 4). An important component of all these concerns seems to be the uncertainty of long-term impacts. The high level of concern surrounding unknown long-term impacts is a consistent theme explaining consumers' negative reactions to new food technologies.<sup>5</sup> For example, concerns about long-term health impacts seem to explain consumers' initial opposition to pasteurization (Huffman et al., 2003a) and

4. This is also generally true for nonfood GM crops such as cotton. However, cigarettes made from tobacco genetically modified to reduce nicotine are currently available in some states.

microwave ovens (Devlin, 1998) and seems to be a factor in consumer acceptance of GM foods (Hoban, 1997). In general, consumers trust food scientists' abilities to determine the short-term safety of new food technologies but understand the limitations scientists face in determining long-term impacts (Levy & Derby, 2000). Interestingly, the level of technical knowledge about a new food technology does not seem to impact consumers' concerns; it is the lack of experience with the technology (Levy, 2001).

If long-run uncertainties are the primary driver of consumer rejection of new food technologies, then a lack of labeling may actually prevent consumers' ability to develop direct or indirect experience with it; that is, they are not able to understand the extent to which they (directly), or other members of society (indirectly), consume GM foods without any apparent ill effects. For example, in focus group research (Teisl et al., 2002), when we told participants how much of the food supply is derived from GM crops, some found the information comforting; these participants seem to combine the prevalence of GM foods with the notion they had not heard or known of anyone getting sick as positive news.<sup>6</sup>

This may present an ironic twist to those who support labeling as a way of eliminating GM foods; labeling may after an initial short-run decline in sales actually lead to a broader long-run acceptance of the technology (if, in fact, producers are willing to ride out any short-term losses). This also presents a conundrum to producers; they may be trading off a potential short-run decline in sales against future sales growth. This is particularly true if consumers are not able to associate a technology with the provision of positive attributes. Research has indicated that some individuals will accept an increase in perceived risks if relevant benefits are bundled with the risk (Fischhoff & Fischhoff, 2001; Moon & Balasubramanian, 2001; Teisl, Roe, Vayda, & Ross, 2003).

5. *This hypothesis is consistent with Slovic (1987) who indicates a major factor impacting a consumer's evaluation of a new technology is the degree to which risks are "unknown"—that is, risks that are not observable or evident, have effects that are delayed, or are not definitively known to science (Marks, 2001).*
6. *Others in the groups reacted negatively; they found the idea that they had been eating GM foods in ignorance as disturbing—apparently, a lack of labeling led these individuals to feel deceived.*

**Table 5. Respondents' desire for labeling genetically modified foods.**

	Percent stating: <sup>a</sup>
<b>Want mandatory testing with only genetically modified foods labeled</b>	46 a
<b>Want mandatory testing with all foods labeled</b>	42 b
<b>Want voluntary testing with only foods not genetically modified labeled</b>	7 c
<b>Want mandatory testing with only foods not genetically modified labeled</b>	4 d

<sup>a</sup> Results sharing the same letter are not significantly different at the 10% level. Results do not sum to 100% due to rounding.

Before asking respondents whether they want a GM food-labeling program, we first wanted to determine how much experience respondents had with GM labeling. Currently, producers voluntarily test and label their foods only to denote that they do *not* contain GM ingredients. Few respondents (12%) had seen such a label (Question 10); however, almost all respondents (85%) wanted GM foods to be labeled (Question 11). Of those who wanted GM foods labeled, we asked a question to determine how they wanted the program structured (Question 12); almost all respondents who wanted labeling wanted this labeling to be mandatory (Table 5), although respondents were split on whether they wanted all foods or just GM foods to display a label. Clearly, respondents were dissatisfied with the current approach to labeling.

To determine who respondents wanted to administer GM labeling, we presented them with a list of organizations and asked them to choose which one organization they would prefer (Question 13). In terms of general organizational groups, most individuals chose either a government agency or an independent organization (Table 6); this result is similar to Huffman, Rousu, Shogren and Tegene (2003b). Of those choosing a government agency, most individuals wanted either the US Food and Drug Administration or the US Department of Agriculture to administer labeling. Respondents' familiarity with these two agencies, and their positive evaluation of their traditional handling of food labeling, may explain respondents' strong preferences for these agencies. Independent organizations, as a group, were chosen by almost 10% of respondents. However, of the four independent organizations, few chose the two that are currently the largest independent certifiers of GM-free foods (the Identity Preservation Program and Genetic ID).

**Table 6. Percent of respondents preferring specific groups to oversee labeling program.<sup>a</sup>**

<b>Federal Government</b>	76.2 a
<b>Food and Drug Administration</b>	40.0 a
<b>Department of Agriculture</b>	33.2 b
<b>Environmental Protection Agency</b>	3.0 c, d
<b>Independent organizations</b>	9.0 b
<b>Consumer's Union</b>	5.9 e
<b>Union of Concerned Scientists</b>	2.3 d, f
<b>Identity Preservation Program</b>	0.4 g
<b>Genetic ID, Inc.</b>	0.4 g
<b>Health-related organizations</b>	8.8 b
<b>National Institutes of Health</b>	5.8 e
<b>American Medical Association</b>	1.7 f
<b>American Heart Association</b>	0.8 g
<b>American Cancer Society</b>	0.6 g
<b>Environmental organizations</b>	6.0 c
<b>Organic Consumers Association</b>	3.4 c
<b>Greenpeace</b>	1.9 f
<b>Natural Resources Defense Council</b>	0.7 g
<b>Other</b>	1.0 d

<sup>a</sup> Results in each column sharing the same letter are not significantly different at the 10% level.

Given their health-related concerns, it is not surprising that many respondents preferred health organizations. However, of the health-related groups, the American Medical Association has stated they find no scientific justification for the general labeling of genetically modified foods (American Medical Association, 2000), and the other three have apparently not taken any official position on the issue. In focus groups (Teisl et al., 2002) we found that some people did not want health organizations to administer a labeling program, because many of these organizations target only specific diseases or conditions (e.g., heart disease), whereas GM foods could impact the whole body. Thus, it is not surprising that the two health organizations focusing on specific diseases were chosen by few respondents.

It may be initially surprising that relatively few respondents wanted environmental groups to administer GM labeling, because at least two of these groups (the Organic Consumers Association and Greenpeace) have strongly supported this type of labeling. Respondents may have made a clear distinction between an organization's ability to promote advocacy and their ability to administer a labeling program.

**Table 7. Importance ratings of potential information pieces for a genetically modified food label.<sup>a</sup>**

<b>Labels should list:</b>	
<b>Any warnings associated with the genetic modification</b>	4.6 a
<b>A phone number or website so you could obtain more information</b>	4.2 b
<b>Which ingredients in a product are genetically modified</b>	4.2 b
<b>Who is certifying the information</b>	4.2 b
<b>Any benefits associated with the genetic modification</b>	3.9 c
<b>Why the ingredients are genetically modified</b>	3.5 d
<b>How the ingredients are genetically modified</b>	3.4 d

<sup>a</sup> Where 1 = not at all important, 3 = somewhat important, and 5 = very important. Results sharing the same letter are not significantly different at the 10% level.

The bottom line is that consumer preferences for who should administer a labeling program for GM foods seem directly at odds with the current reality. Most consumers desired a federal agency to administer this program—apparently because of the relatively high level of trust people place in these agencies—yet these agencies have been reluctant to take on this task. At the same time, the groups most active in promoting GM labeling, or those currently involved with GM labeling, garner little public support. Given that the ability of a labeling program to communicate to consumers depends, at least in part, on the degree to which consumers trust the organization in charge of the program (Slovic, 1993; Blaine & Powell, 2001), the government's reluctance to administer such a program may be inadvertently hindering consumer acceptance of GM foods.

To help determine the information respondents want to see on a GM label, we asked them to rate the importance of seven potential pieces of information that could be placed on such a label (Question 15). Given respondents' concerns about potential health risks, it is not surprising that they placed a high degree of importance on knowing about any warnings associated with the genetic modification (Table 7). Respondents were likely to desire contact (a phone number or website) and certifier information, because it would allow for a simpler, more credible label<sup>7</sup> while allowing individuals a venue to pursue more information. Respondents would also like information about a GM food's benefits.

7. Both pieces of information have been shown to be critical in establishing label credibility (Teisl, 2003).

Respondents' desires that GM food labels provide benefit and risk information implies that a simple yes/no approach to labeling may be of limited usefulness. The use of biotechnology in food production can have multi-dimensional effects on product quality; some consumers may want to know about some or all of these changes. A simple GM label may actually be harmful to individuals who are concerned about GM content but willing to accept it if the genetic modification provides benefits; the harm comes from a simple GM label causing these individuals to avoid a food they would otherwise consume. Although the context is different, this general result is consistent with findings by Rousu et al. (2003), where they suggest that GM labeling of low-nicotine cigarettes may confuse some consumers, leading to inappropriate purchase decisions and reductions in welfare.

## Conclusions

Policies allowing consumers to make purchase decisions match personal preferences are inherently desirable, whether the attributes concern end-use characteristics or process attributes—as long as these policies are not too costly. The results indicate that most respondents desire a labeling program for GM foods. However, this finding is based upon responses to a question that did not present the costs or benefits of instituting a labeling program. A decision to impose labels should recognize both its benefits *and* costs. Thus, the research here does not conclude that a labeling program should be instituted; rather, the findings can provide guidance on how a labeling program should look if it is determined that such a program is warranted. In terms of the GM debate thus far, one thing is relatively clear: A simple GM food label will be of limited usefulness to consumers because it would only allow consumers to differentiate GM food products from non-GM food products. Given that genetic engineering can produce a wide variety of outcomes (both positive and negative), simple GM food labels are not likely to allow most consumers to differentiate products in the manner they most desire and could actually hurt those consumers who would be willing to accept GM content when there are GM-linked benefits.<sup>8</sup>

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8. *An anonymous reviewer points out that if a similar study was done in Europe and found similar results, it would provide evidence that Europe's GM-labeling policy is suboptimal. Boccaletti and Moro's (2000) findings seem to support this idea; they found that some Italian consumers would be willing to consume GM foods if the benefits of the genetic modification were presented.*

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## Section One

Thank you for agreeing to complete this survey. In this section, we are interested in learning about your general perceptions of the foods you purchase.

1. How concerned are you about the way foods are produced and processed in the United States? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NOT AT ALL CONCERNED		SOMEWHAT CONCERNED		VERY CONCERNED

2. How concerned are you about the way foods are produced and processed in other countries? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NOT AT ALL CONCERNED		SOMEWHAT CONCERNED		VERY CONCERNED

3. How often do you purchase organic foods? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NEVER		SOMETIMES		ALWAYS

4. How often do you read the nutrition labels on the foods you purchase? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NEVER		SOMETIMES		ALWAYS



## Section Two

In this section, we are interested in concerns you may have with the way foods are produced or processed.

5. Listed on this page are different items related to the way foods are produced or processed. Review the list and rate how concerned you are with each item. (PLEASE CIRCLE ONE NUMBER FOR EACH ITEM)

	NOT AT ALL CONCERNED		SOMEWHAT CONCERNED		VERY CONCERNED
	-----		-----		-----
Use of antibiotics .....	1	2	3	4	5
Use of pesticides .....	1	2	3	4	5
Use of artificial Growth hormones .....	1	2	3	4	5
Use of genetically Modified ingredients .....	1	2	3	4	5
Use of irradiation .....	1	2	3	4	5
Use of artificial Colors or flavors .....	1	2	3	4	5
Use of pasteurization .....	1	2	3	4	5
Use of preservatives .....	1	2	3	4	5

### Section Three

In this section, we are interested in your opinions regarding genetically modified foods. Genetically modifying foods refers to a laboratory procedure where the genetics of a plant or animal is changed by either taking a gene from another organism and inserting it into the plant or animal or by removing a gene currently found in the plant or animal. The goal of the process is to alter one or more of the basic characteristics of the plant or animal. For example, one could genetically manipulate a tomato plant to change its flavor, texture, or ability to resist insects.

6. Have you ever heard of food being genetically engineered or genetically modified? (PLEASE CIRCLE ONE NUMBER)

1 NO → **SKIP TO QUESTION 7**

2 YES → What foods have you heard are being genetically modified? (**CHECK ALL** THAT APPLY)

- CANOLA OIL
- CORN (INCLUDING POPCORN AND SWEET CORN)
- SOYBEANS
- POTATOES
- SQUASH (YELLOW CROOKNECK)
- TOMATOES
- SALMON
- OTHER: (PLEASE SPECIFY) \_\_\_\_\_

7. **In your opinion**, what percent of the food sold **in the U.S.** is genetically modified or contains genetically modified ingredients?  
(PLEASE CIRCLE ONE NUMBER)

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%  
NONE                      SOME                      HALF                      MOST                      ALL

8. Below are some potential benefits of genetically modifying foods claimed by proponents. Review and rate how important each of these alleged benefits are to you. (CIRCLE ONE NUMBER FOR EACH ITEM)

	NOT AT ALL IMPORTANT		SOMEWHAT IMPORTANT		VERY IMPORTANT
	-----	-----	-----	-----	-----
INCREASED DISEASE RESISTANCE IN CROPS	1	2	3	4	5
DECREASED NEED FOR ANTI-BIOTICS IN MEAT	1	2	3	4	5
INCREASED FROST RESISTANCE IN CROPS	1	2	3	4	5
DECREASED NEED FOR IRRIGATION OF CROPS	1	2	3	4	5
INCREASED VITAMINS AND MINERALS IN FOODS	1	2	3	4	5
INCREASED FOOD PRODUCTION IN POORER COUNTRIES	1	2	3	4	5
LONGER SHELF LIFE FOR FRESH FRUITS AND VEGETABLES	1	2	3	4	5
DECREASED TOTAL FAT AND/OR SATURATED FAT	1	2	3	4	5
DECREASED NEED FOR PESTICIDES ON CROPS	1	2	3	4	5
INCREASED ANTI-OXIDANT LEVELS IN FOODS	1	2	3	4	5
INCREASED PROTEIN IN FOODS	1	2	3	4	5
INCREASED SIZE OF FRUITS AND VEGETABLES	1	2	3	4	5
INCREASED FLAVOR OF FRESH FRUITS AND VEGETABLES	1	2	3	4	5
REMOVAL OF ALLERGENS FROM FOODS	1	2	3	4	5
FOODS MODIFIED TO CONTAIN VACCINES AGAINST DISEASES	1	2	3	4	5
LOWER FOOD PRICES	1	2	3	4	5
OTHER – SPECIFY AND RATE:	1	2	3	4	5

9. Listed on this page are some potential concerns of genetically modifying foods claimed by opponents. Review the list and rate how important these alleged concerns are to you. (CIRCLE ONE NUMBER FOR EACH ITEM)

	NOT AT ALL IMPORTANT		SOMEWHAT IMPORTANT		VERY IMPORTANT
	-----		-----		
UNKNOWN OR UNANTICIPATED ALLERGENS INTRODUCED	1	2	3	4	5
UNKNOWN OR UNANTICIPATED TOXINS PRODUCED	1	2	3	4	5
UNKNOWN LONG TERM HEALTH EFFECTS	1	2	3	4	5
INCREASED RISK OF ANTIBIOTIC RESISTANT BACTERIA	1	2	3	4	5
CONTROL OF AGRICULTURE BY BIOTECHNOLOGY COMPANIES	1	2	3	4	5
UNKNOWN LONG TERM ENVIRONMENTAL EFFECTS	1	2	3	4	5
GENETIC CONTAMINATION OF THE ENVIRONMENT	1	2	3	4	5
INCREASED USE OF PESTICIDES	1	2	3	4	5
INCREASED USE OF HERBICIDES	1	2	3	4	5
SPREAD OF PEST RESISTANCE TO UNDESIRABLE WEEDS	1	2	3	4	5
SPREAD OF DISEASE RESISTANCE TO WEEDS	1	2	3	4	5
SPREAD OF HERBICIDE TOLERANCE TO WEEDS	1	2	3	4	5
ETHICAL ISSUES WITH GENETIC MODIFICATION OF NATURE	1	2	3	4	5
RISKS TO SPECIES DIVERSITY	1	2	3	4	5
DAMAGE TO TOPSOIL	1	2	3	4	5
RISKS TO WILDLIFE & INSECTS	1	2	3	4	5
OTHER – SPECIFY AND RATE:	1	2	3	4	5

#### Section Four

Currently, the U.S. government does not require genetically modified foods to be labeled unless the food's composition is significantly changed. Some people feel that all genetically modified foods should be labeled. In this section, we are interested in your reactions to different labeling programs for food products.

10. Have you ever seen a label indicating that a product is "GMO-free" or "does not contain genetically modified ingredients"? (PLEASE CIRCLE ONE NUMBER)

- 1 NO
- 2 YES
- 3 DON'T KNOW

11. Would you like to see labels on foods indicating whether or not the product contains genetically modified ingredients? (PLEASE CIRCLE ONE NUMBER)

- 1 NO → SKIP TO SECTION FIVE
- 2 YES

12. There are several ways to implement a food-labeling program for genetically modified foods.

A **mandatory** approach would require all food producers to test whether their product contains genetically modified ingredients. Once tested, the program could require either:

- **all foods** to display whether or not they contain genetically modified ingredients
- **only foods containing** genetically modified ingredients to display a label
- **only foods not containing** genetically modified ingredients to display a label

A **voluntary** approach would allow food producers to voluntarily test whether their product contains genetically modified ingredients. Once tested, the program would allow:

- **only foods not containing** genetically modified ingredients to display a label

How do you think a testing and labeling program should be implemented in the U.S.?  
(PLEASE CIRCLE ONE NUMBER)

- 1 TESTING IS MANDATORY AND ALL FOODS MUST DISPLAY A LABEL
- 2 TESTING IS MANDATORY AND ONLY FOODS CONTAINING GENETICALLY MODIFIED INGREDIENTS DISPLAY A LABEL
- 3 TESTING IS MANDATORY AND ONLY FOODS **NOT** CONTAINING GENETICALLY MODIFIED INGREDIENTS DISPLAY A LABEL
- 4 TESTING IS VOLUNTARY AND ONLY FOODS **NOT** CONTAINING GENETICALLY MODIFIED INGREDIENTS DISPLAY A LABEL
- 5 TESTING AND LABELING ARE UNNECESSARY → **SKIP** TO SECTION FIVE

13. Which organization would you prefer to oversee a labeling program for genetically modified foods? (PLEASE CIRCLE ONE NUMBER)

- 1 US DEPT. OF AGRICULTURE
- 2 US FOOD AND DRUG ADMINISTRATION
- 3 US ENVIRONMENTAL PROTECTION AGENCY
- 4 GREENPEACE
- 5 NATURAL RESOURCES DEFENSE COUNCIL
- 6 THE ORGANIC CONSUMERS ASSOCIATION
- 7 IDENTITY PRESERVATION PROGRAM
- 8 CERT ID – GENETIC ID, INC.
- 9 UNION OF CONCERNED SCIENTISTS
- 10 CONSUMER’S UNION
- 11 NATIONAL INSTITUTES OF HEALTH
- 12 AMERICAN MEDICAL ASSOCIATION
- 13 AMERICAN HEART ASSOCIATION
- 14 AMERICAN CANCER SOCIETY
- 15 OTHER ORGANIZATION - PLEASE SPECIFY: \_\_\_\_\_  
\_\_\_\_\_

14. What is the main reason you chose this organization? (PLEASE CIRCLE ONE NUMBER)

- 1 I'M FAMILIAR WITH ORGANIZATION
- 2 IT IS A GOVERNMENT AGENCY
- 3 IT IS AN INDEPENDENT CERTIFYING ORGANIZATION
- 4 IT IS AN INDUSTRY GROUP
- 5 OTHER: (PLEASE SPECIFY) \_\_\_\_\_

15. There are different pieces of information that could be displayed on a label for genetically modified foods. Review the following list and rate how important each piece of information is to you. (PLEASE CIRCLE ONE NUMBER FOR EACH ITEM)

NOT AT ALL IMPORTANT	SOMEWHAT IMPORTANT	VERY IMPORTANT
----- -----		

LABELS SHOULD STATE <b>WHICH</b> INGREDIENTS IN A PRODUCT ARE GENETICALLY MODIFIED	1	2	3	4	5
LABELS SHOULD STATE <b>WHY</b> THE INGREDIENTS ARE GENETICALLY MODIFIED	1	2	3	4	5
LABELS SHOULD STATE <b>HOW</b> THE INGREDIENTS ARE GENETICALLY MODIFIED	1	2	3	4	5
LABELS SHOULD STATE <b>WHO</b> IS CERTIFYING THE INFORMATION	1	2	3	4	5
LABELS SHOULD LIST ANY WARNINGS ASSOCIATED WITH THE MODIFICATION	1	2	3	4	5
LABELS SHOULD LIST ANY BENEFITS ASSOCIATED WITH THE MODIFICATION	1	2	3	4	5
LABELS SHOULD LIST A PHONE NUMBER OR WEBSITE SO YOU COULD OBTAIN MORE INFORMATION	1	2	3	4	5





c. **In your opinion**, how likely are you to develop long-term health problems because of eating this food? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

d. **In your opinion**, how likely are you to improve your long-term health because of eating this food? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

e. **In your opinion**, what are the environmental effects of this product? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
BENEFICIAL TO ENVIRONMENT		UNSURE		HARMFUL TO ENVIRONMENT

f. If you were to see this label displayed on a food product that you normally buy, what is the likelihood that you would buy this product if the price and other qualities of the product were the **same** as your regular brand? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

17. Please review the following hypothetical food label and answer the questions listed on these two pages.

**This product contains genetically modified ingredients**

a. **In your opinion**, how believable is the information on this label? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NOT				VERY
BELIEVABLE				BELIEVABLE

b. How much information does this label provide so you can make an educated product choice? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
NOT ENOUGH		JUST ENOUGH		TOO MUCH
INFORMATION		INFORMATION		INFORMATION

c. **In your opinion**, how likely are you to develop long-term health problems because of eating this food? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

d. **In your opinion**, how likely are you to improve your long-term health because of eating this food? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

e. **In your opinion**, what are the environmental effects of this product? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
BENEFICIAL TO ENVIRONMENT		UNSURE		HARMFUL TO ENVIRONMENT

f. If you were to see this label displayed on a food product that you normally buy, what is the likelihood that you would buy this product if the price and other qualities of the product were the **same** as your regular brand? (PLEASE CIRCLE ONE NUMBER)

1	2	3	4	5
HIGHLY UNLIKELY		UNSURE		HIGHLY LIKELY

### Section Five

In this section we would like to know your reaction to different hypothetical labeling programs for products containing genetically modified ingredients.

18. How often do you do the food shopping for your household? (PLEASE CIRCLE ONE NUMBER)

- 1 ALL OF THE TIME,
- 2 MOST OF THE TIME
- 3 ABOUT HALF OF THE TIME
- 4 OCCASIONALLY
- 5 NEVER → **SKIP** TO SECTION SIX

19. How much do you typically spend, per month, on foods you eat at home? Please do not include foods you buy at a restaurant (IF NOT SURE, PLEASE MAKE YOUR BEST ESTIMATE).

\$\_\_\_\_\_ SPENT PER MONTH

20. Do you ever buy bread? (PLEASE CIRCLE ONE NUMBER)

- 1 YES
- 2 NO → **SKIP** TO SECTION SIX

21. About how many loaves of bread do you currently buy in a typical month? (IF NOT SURE, PLEASE MAKE YOUR BEST ESTIMATE).

\_\_\_\_\_ LOAVES

22. Assume that you went to your usual food store to buy a loaf of bread. In addition to a brand you have bought in the past, you find two other brands of bread. Each loaf of bread looks and smells the same. The only difference between the loaves of bread is what appears below. Note that farmers currently produce both genetically modified wheat and wheat that is not genetically modified. The company that makes your brand of bread mixes both types of wheat together. Please assume that 90% of the wheat in your brand of bread is genetically modified.

**BRAND A**

costs 10 cents more than  
your usual brand

<p><b>100% OF THE WHEAT IN THIS PRODUCT IS GENETICALLY MODIFIED</b></p> <p>Long-term health effects are currently unknown.</p> <p><i>Certified by Identity Preservation Program</i></p>
---

**BRAND B**

costs 5 cents more than  
your usual brand

<p><b>CONTAINS NO GENETICALLY MODIFIED INGREDIENTS</b></p> <p><i>Certified by Identity Preservation Program</i></p>
---

Which loaf of bread would you purchase? (CIRCLE ONE NUMBER)

- 1 I WOULD CHOOSE BRAND A
- 2 I WOULD CHOOSE BRAND B
- 3 I WOULD CHOOSE MY USUAL BRAND
- 4 I WOULD CHOOSE NOT TO BUY BREAD → **SKIP** TO SECTION SIX

23. About how many loaves, of the brand you chose above, would you buy in a typical month?  
(IF UNSURE, PLEASE MAKE YOUR BEST ESTIMATE)

\_\_\_\_\_ LOAVES

### Section Six

In this section, we would like to know a little bit about you for statistical purposes. We would like to remind you that all of your answers to the survey are treated as strictly confidential. However, we need this information to be able to compare your responses with other Americans. We thank you again for taking the time to complete this survey.

24. What is your gender? (PLEASE CIRCLE ONE NUMBER)

- 1 MALE
- 2 FEMALE

25. What is your race/ethnicity? (PLEASE CIRCLE ONE NUMBER)

- 1 WHITE
- 2 BLACK
- 3 HISPANIC OR OF SPANISH ORIGIN
- 4 ASIAN OR PACIFIC ISLANDER
- 5 AMERICAN INDIAN OR ALASKAN NATIVE
- 6 OTHER, PLEASE SPECIFY \_\_\_\_\_

26. How old are you? \_\_\_\_\_ YEARS OLD

27. What is the highest level of education you have completed? (PLEASE CIRCLE ONE NUMBER)

- 1 0-11 YEARS
- 2 12 YEARS (HIGH SCHOOL GRADUATE OR GED)
- 3 1-3 YEARS COLLEGE (SOME COLLEGE)
- 4 COLLEGE GRADUATE (BACHELOR DEGREE OR EQUIVALENT)
- 5 POSTGRADUATE, MASTER'S DEGREE, DOCTORATE, LAW DEGREE, OTHER PROFESSIONAL DEGREE

28. Are there any children under the age of 18 living in your household? (PLEASE CIRCLE ONE NUMBER)

- 1 NO
- 2 YES → How many children in your household fall under the following age groups? (FILL IN THE BLANK)

NEWBORN – 5 YEARS OLD \_\_\_\_\_ CHILDREN  
6 YEARS OLD – 10 YEARS OLD \_\_\_\_\_ CHILDREN  
11 YEARS OLD – 18 YEARS OLD \_\_\_\_\_ CHILDREN

29. Do you grow your own vegetables? (PLEASE CIRCLE ONE NUMBER)

- 1 NO
- 2 YES, FOR CONSUMPTION BY MY HOUSEHOLD
- 3 YES, FOR SALE AT THE LOCAL STORE/FARMER'S MARKET, ETC.

30. Do you belong to a food cooperative? (PLEASE CIRCLE ONE NUMBER)

- 1 NO
- 2 YES

31. Do you regularly shop at a farmer's market or health food store? (PLEASE CIRCLE ONE NUMBER)

- 1 NO
- 2 YES



32. Do you work in any of the fields listed below? (CIRCLE ONE NUMBER)

- 1 LARGE SCALE CONVENTIONAL FARMING
- 2 SMALL SCALE CONVENTIONAL FARMING
- 3 LARGE SCALE ORGANIC FARMING
- 4 SMALL SCALE ORGANIC FARMING
- 5 DAIRY FARMING OR LIVESTOCK FARM
- 6 FOOD PROCESSING
- 7 GROCERY STORE
- 8 COOK, CATERER OR RESTAURANT OWNER
- 9 OTHER AGRICULTURAL OR FOOD PROCESSING WORK
- 10 I DO NOT WORK IN ANY OF THESE FIELDS

33. Do you adhere to any of the following dietary restrictions? (PLEASE CIRCLE ONE NUMBER)

- 1 DIABETIC DIET
- 2 LOW FAT DIET
- 3 HIGH FIBER DIET
- 4 FOOD ALLERGIES/SENSITIVITIES
- 5 VEGETARIAN DIET
- 6 LOW SODIUM DIET
- 7 KOSHER DIET
- 8 OTHER – PLEASE SPECIFY: \_\_\_\_\_
- 9 I DO NOT ADHERE TO ANY DIETARY RESTRICTIONS

34. What was your total household income before taxes for last year?  
(PLEASE CIRCLE ONE NUMBER)

- |                       |                         |
|-----------------------|-------------------------|
| 1 LESS THAN \$10,000  | 7 \$60,000 - \$70,000   |
| 2 \$10,000 - \$20,000 | 8 \$70,000 - \$80,000   |
| 3 \$20,000 - \$30,000 | 9 \$80,000 - \$90,000   |
| 4 \$30,000 - \$40,000 | 10 \$90,000 - \$100,000 |
| 5 \$40,000 - \$50,000 | 11 MORE THAN \$100,000  |
| 6 \$50,000 - \$60,000 | 12 MORE THAN \$250,000  |