

U.S. Consumer Attitudes Toward Food Biotechnology

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Abstract

This study examines consumer attitudes in the U.S. toward genetically modified food over time. Five surveys conducted by the International Food Information Council (1999 - 2001) are used to determine what factors significantly influence consumers' willingness to try food products genetically modified to reduce pesticide usage or improve taste.

Introduction

Much research has examined consumer attitudes in the United States toward genetically modified (GM) food. However, there is a dearth of information concerning the attitudes of consumers in differentiated groups and information that can be compared over time. The objective of this research is to examine U.S. consumer attitudes over time towards foods genetically modified to reduce pesticide usage or to improve taste.

The data in this study was collected by The International Food Information Council (IFIC). IFIC has conducted regular telephone surveys of the US population asking questions about biotechnology since 1997. This study uses surveys conducted approximately every 8-9 months from 1999 through 2001. Surveys conducted prior to and including January 2001 were conducted by Wirthlin Group Quorum Survey. IFIC began using Cogent Research after January 2001. This is significant because certain data that might be useful to the study (income and race) were not collected prior to the September 2001 survey.

This article is divided into three sections. The first is a summary of the data collected by IFIC. The second section is an econometric analysis of this data, followed by an interpretation of the analysis.

Summary of Data

To gain an understanding of the base knowledge level of respondents, respondents were asked to indicate whether or not they had heard about biotechnology and if they correctly identify that there are currently foods in the supermarket that have been produced using biotechnology. According to the survey, more than half of Americans had heard “some or a little” about biotechnology (Figure 1). Over the five surveys, an average of 42.2% of consumers believed there were foods modified by biotechnology in the supermarkets as compared to 34.4% that believed there were not (Figure 2). Nearly one quarter of respondents indicated they were not sure if these foods were currently in the supermarket.

Respondents were also asked if they would purchase products that were produced using biotechnology for a variety of reasons. These results suggest consumers are more willing to buy products that have been modified in some way to be protected from insect damage and require fewer pesticide applications (Figure 3) than products modified to taste better or fresher (Figure 4). This is likely the result of perceiving pesticide to be a health risk. Information on the demographic profile of the survey respondents by survey is provided in Table 1.

Results

Ordered probit models were used to determine what factors influenced whether or not a respondent was willing to try a product that had been genetically modified to reduce pesticide

usage or to improve taste and freshness. Factors used as independent variables included the respondents age, education level, marital status, whether children were in the home, gender, location of residence, self-rated knowledge of biotechnology and whether they believed genetically modified foods were currently in the grocery store (another measure of knowledge).

Table 2 presents the results from the ordered probit model for consumer willingness to try foods modified to reduce pesticide usage and Table 3 presents the results from the model for consumer willingness to try foods modified to taste better or fresher. Respondents were grouped into five age categories: age 34 and below, age 35-44, age 45-54, age 55-64, and above 65 years of age. Respondents in the oldest age category were 5.0% less likely to strongly agree that they would try a product genetically modified to reduce pesticide usage than respondents in the youngest category. Those in the oldest category were 1.6% and 2.7% more likely to disagree, or strongly disagree respectively, than the youngest respondents. Those respondents in the other age groups were not statistically different from those in the youngest group. There were no significant age effects in the model for foods modified to taste better or fresher. These results may indicate that the oldest consumers, who are more likely to have health problems, may be more concerned about the impact of pesticides on health, making them more likely to accept these products, but not the products modified for taste.

Compared to respondents with an advanced college degree, respondents with less education were significantly less likely to strongly agree they would try foods modified to reduce pesticide usage. Respondents in the lowest level of education (less than high school) were the least likely to indicate they would strongly agree (12% less likely than those with the advanced college degree). Respondents with a high school degree and some college were 4.9% and 4.7% less likely to strongly agree, respectively. For products that were modified to taste better or

fresher, education was again significant. Respondents in the lowest level of education were 11% less likely to strongly agree that they would buy any product produce through biotechnology to taste better or fresher. Respondents with a high school degree, some college and a 4-year college degree were 9.4%, 9.2% and 6% less likely to strongly agree, respectively.

Marital status did not impact consumer willingness to try either type of product, but consumers with children under the age of 18 in the home were 4.3% less likely than consumers without children in the home to strongly agree they would try a product genetically modified to taste better or fresher.

Compared to male respondents, female respondents were 8.8% less likely to strongly agree that they would try a product genetically modified to taste better or fresher and 3% less likely to strongly agree that they would try a product genetically modified food to reduce pesticide usage.

There were regional differences in willingness to try genetically modified products. Respondents living in the Northeast region were 4.4% less likely to strongly agree that they would try a product genetically modified to reduce pesticide usage than respondents living in the Western region. Respondents living in the Northeast and North Central region were 7% and 3.6% less likely to strongly agree, respectively, that they would try a product genetically modified to taste better or fresher than respondents living in the Western region. There were no significant differences between consumers living in the South and West regions.

In order to test the effect of knowledge and exposure on willingness to try products that were genetically modified to reduce pesticide usage, respondents were asked two questions: whether they had heard a lot, some, little or nothing at all about biotechnology and if they believed genetically modified foods were currently in the grocery stores. Respondents who

indicated they had heard a lot about biotechnology were 10% and 9.2% more likely to strongly agree that they would try products genetically modified to reduce pesticide usage and to taste better or fresher, respectively. Knowledge of whether or not products are currently in the grocery store or not was not related to willingness to try the products.

Finally, the time variable was significant in both equations, indicating that willingness to try products genetically modified to reduce pesticide usage or to improve taste has decreased over the time period in this analysis. However, the decrease has not been very large, with respondents 1.4% and 2.0% more likely to strongly disagree that they would try products genetically modified to reduce pesticides or taste better, respectively, for each 8 month time period between surveys.

Conclusions

Results to this study show both positive and negative signs for the future of food biotechnology in the U.S. On the positive side, education and exposure to information about genetic modification increased respondent willingness to try genetically modified products. On the negative side, acceptance does appear to be decreasing over time, though at a relatively slow rate. Results of the analysis of the IFIC data are consistent with results from other studies of U.S. acceptance of food biotechnology. For instance, Moon and Balasubramanian also found both knowledge and awareness were positively associated with acceptance and Langer (2001) and Hoban (1998) identified US women as less accepting of biotechnology than men.

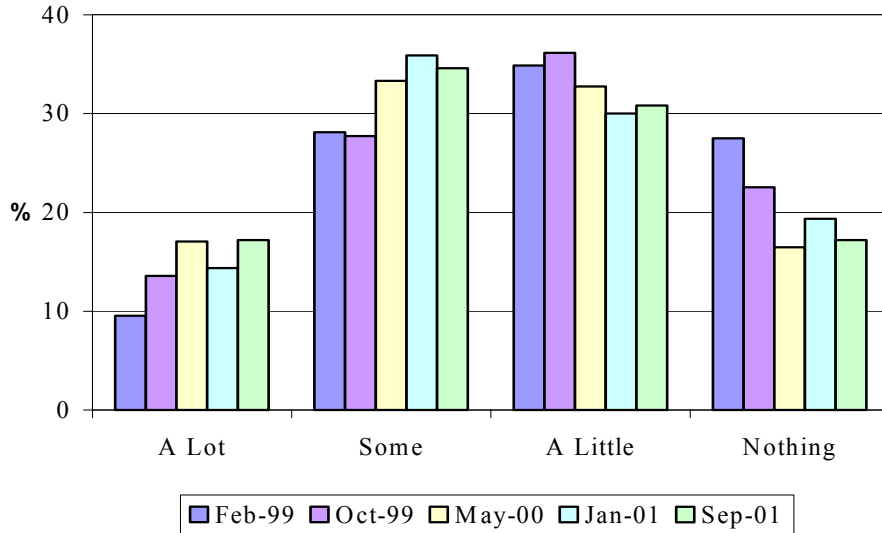
An interesting finding is the regional differences in acceptance. In this study, consumers in the Northeast and North Central census regions were less accepting of genetically modified food products than consumers in the West and South census regions. Many studies have found

differences between the United States and the European Union, and even within the European Union (i.e. Gaskell, 2000; INRA, 1993; Marlier, 1992; Zechendorf, 1998; Lusk et al, submitted), but few have identified significant differences in regions within the United States.

References:

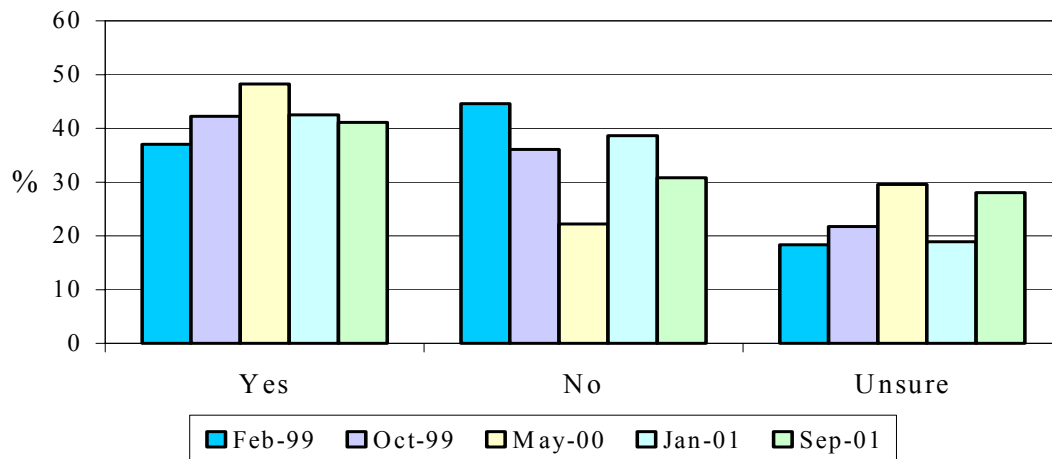
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Figure 1: How much respondents have heard or read about biotechnology*.



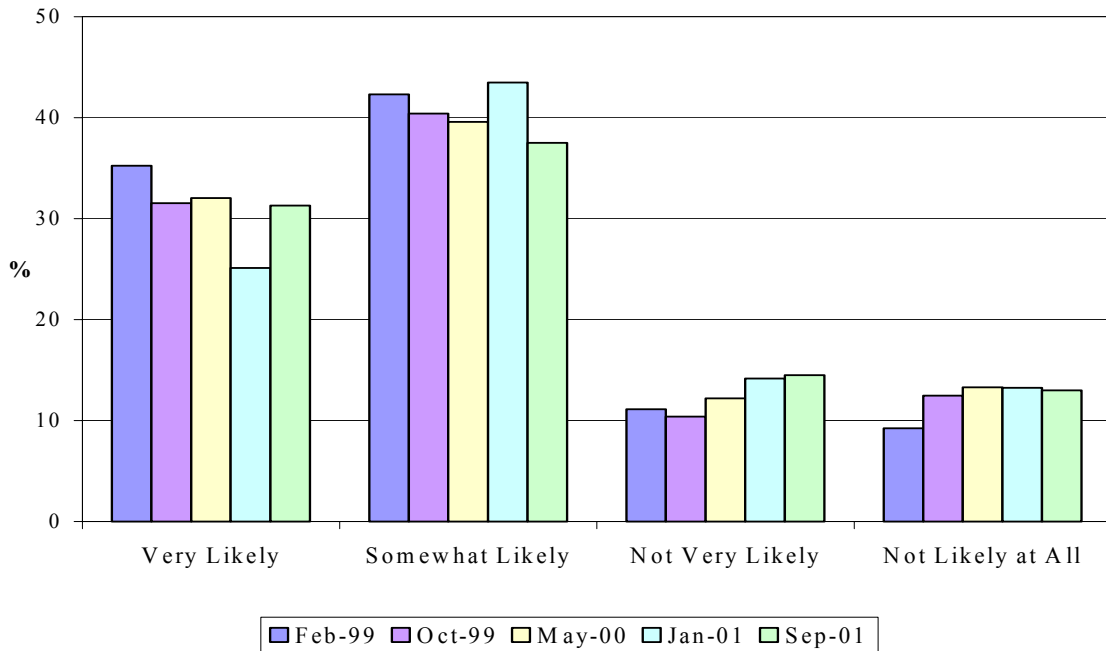
* Phrasing of question in survey: “As you may know, some food products and medicines are being developed with the help of new scientific techniques. The general area is called "biotechnology" and includes tools such as genetic engineering. Biotechnology is also being used to improve crop plants. How much have you heard or read about biotechnology?”

Figure 2. Awareness of biotechnology currently in supermarkets*.



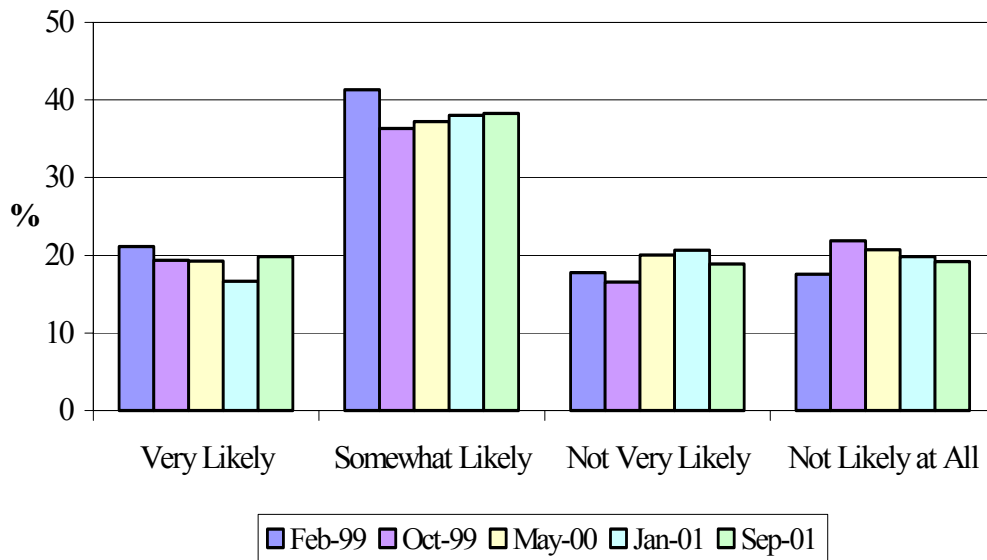
* Phrasing of question in survey: “As far as you know, are there any foods produced through biotechnology in the supermarket now?”

Figure 3. Respondents likelihood to purchase foods modified to reduce pesticide use*



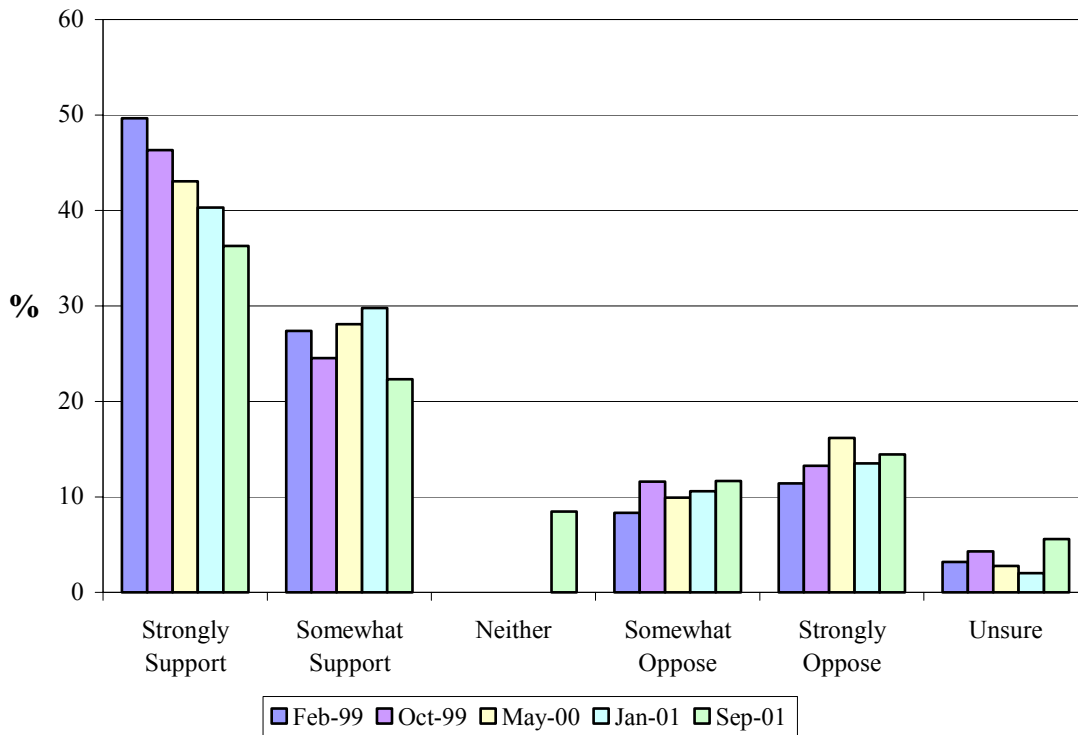
* Phrasing of question in survey: “All things being equal, how likely would you be to buy a variety of produce, like tomatoes or potatoes, if it had been modified by biotechnology to be **protected from insect damage and required fewer pesticide applications**? Would you be very likely, somewhat likely, not too likely, or not at all likely to buy these items?”

Figure 4. Respondents likelihood to purchase foods modified to taste better or fresher*.



* Phrasing of survey question: “All things being equal, how likely would you be to buy a variety of produce, like tomatoes or potatoes, if it had been modified by biotechnology to **taste better or fresher**? Would you be very likely, somewhat likely, not too likely, or not at all likely to buy these items?”

Figure 5. Support or opposition of current FDA policy*.



* Phrasing of question in survey: “The U.S. Food and Drug Administration (FDA) requires special labeling when a food is produced under certain conditions: when biotechnology's use introduces an allergen or when it substantially changes the food's nutritional content, like vitamins or fat, or its composition. Otherwise special labeling is not required. Would you say that you support or oppose this policy of FDA?”

Table 1: Summary of demographics of respondents to surveys.

	February (%) 1999	October (%) 1999	May (%) 2000	January (%) 2001	September (%) 2001
<i>Age</i>					
34 and below	25.72	26.74	31.55	29.70	22.79
35-44	20.55	21.36	19.15	17.8	15.92
45-54	21.25	16.27	16.86	17.6	17.41
55-64	14.60	13.27	14.39	12.7	15.32
65 and above	17.88	22.36	18.05	22.2	28.56
<i>Education</i>					
Less than High School	22.45	22.44	22.45	22.4	19.84
Graduated High School	28.7	31.00	33.56	34.00	34.00
Some College	29.3	25.63	24.52	24.00	22.14
Graduated College	11.70	11.76	11.72	11.7	14.96
Advanced College Degree	7.85	9.17	7.75	7.9	8.97
<i>Marital Status</i>					
Single	18.98	18.28	21.45	23.9	24.33
Married	55.90	55.75	52.63	51.7	51.65
Other	25.12	25.97	25.92	24.4	24.02
Has children under the age of 18 in house	76.76	78.02	72.32	73.5	72.32
<i>Gender</i>					
% Female	52.0	52.0	51.98	52.0	51.84
<i>Location</i>					
North East	20.9	20.4	20.8	19.9	20.3
North Central	24.0	23.6	22.4	23.6	25.4
South	33.9	34.3	35.9	35.6	38.6
West	21.2	21.7	20.9	20.9	15.6

Table 2. Empirical results from ordered probit model for reducing pesticide usage

Variable Name	Probit Coefficient (Standard errors in parentheses)	Marginal Effects in percentage (%)			
		Strongly Agree	Agree	Disagree	Strongly Disagree
Age Category					
34 AND BELOW	0.083 (0.053)	-3.0	0.4	0.1	1.6
35-44	0.058 (0.053)	-2.1	0.3	0.7	1.1
45-54	0.042 (0.059)	-1.5	0.2	0.5	0.8
55-64	0.139** (0.057)	-5.0	0.7	1.6	2.7
Education Level					
LESS THAN HIGH SCHOOL	0.324* (0.079)	-11.7	1.7	3.8	6.3
HIGH SCHOOL DEGREE	0.134** (0.056)	-4.9	0.7	1.6	2.6
SOME COLLEGE	0.129** (0.055)	-4.7	0.7	1.5	2.5
4 YEAR COLLEGE DEGREE	0.109 (0.057)	-3.9	0.6	1.3	2.1
Demographics					
GENDER	0.077** (0.035)	-2.8	0.4	0.9	1.5
SINGLE	0.017 (0.050)	-0.6	0.1	0.2	0.3
MARITAL	-0.046 (0.045)	1.7	-0.2	-0.5	-0.9
HAVE CHILDREN UNDER AGE 18	0.022 (0.041)	-0.8	0.1	0.3	0.4
Region					
NORTH EAST	0.122** (0.052)	-4.4	0.6	1.4	2.4
NORTH CENTRAL	0.065 (0.051)	-2.3	0.3	0.8	1.3
SOUTH	0.045 (0.045)	-1.6	0.2	0.5	0.9
Knowledge					

HEARD LOT ABOUT GMFOOD	- 0.275* (0.061)	10.0	-1.4	-3.2	-5.3
HEARD SOME ABOUT GMFOOD	- 0.081 (0.053)	2.9	-0.4	-1.0	-1.6
HEARD LITTLE ABOUT GMFOOD	- 0.040 (0.048)	1.5	-0.2	-0.5	-0.8
GMFOOD IN STORE	0.028 (0.048)	-1.0	0.2	0.3	0.6
NO GMFOOD IN STORE	0.034 (0.046)	-1.2	0.2	0.4	0.7
DATE	0.074* (0.012)	-2.7	0.4	0.9	1.4

p value: * =0.01 or less;
 ** =0.01-0.05;

Table 3. Empirical results from ordered probit model for tasting better or fresher

Variable Name	Probit Coefficient (Standard errors in parentheses)	Marginal Effects in percentage (%)			
		Strongly Agree	Agree	Disagree	Strongly Disagree
Age Category					
34 AND BELOW	-0.022 (0.051)	0.6	0.2	-0.3	-0.6
35-44	0.015 (0.052)	-0.4	-0.1	0.2	0.4
45-54	0.006 (0.058)	-0.2	-0.1	0.1	0.2
55-64	0.019 (0.057)	-0.5	-0.2	0.2	0.5
Education Level					
LESS THAN HIGH SCHOOL	0.375* (0.075)	-10.8	-3.4	4.2	10.1
HIGH SCHOOL DEGREE	0.326* (0.055)	-9.4	-2.9	3.6	8.8
SOME COLLEGE	0.319* (0.053)	-9.2	-2.9	3.5	8.6
4 YEAR COLLEGE DEGREE	0.208* (0.056)	-6.0	-1.9	2.3	5.6
Demographics					
GENDER	0.303* (0.034)	-8.8	-2.7	3.4	8.1
SINGLE	0.087 (0.048)	-2.5	-0.8	1.0	2.3
MARITAL	-0.055 (0.046)	1.6	0.5	-0.6	-1.5
HAVE CHILDREN UNDER AGE 18	0.150* (0.040)	-4.3	-1.4	1.7	4.0
Region					
NORTH EAST	0.241* (0.051)	-7.0	-2.2	2.7	6.5
NORTH CENTRAL	0.125** (0.050)	-3.6	-1.1	1.4	3.4
SOUTH	0.071 (0.045)	-2.1	-0.6	0.8	1.9

Knowledge					
HEARD LOT ABOUT GMFOOD	- 0.318* (0.060)	9.2	2.9	-3.5	-8.5
HEARD SOME ABOUT GMFOOD	- 0.070 (0.052)	2.0	0.6	-0.8	-1.9
HEARD LITTLE ABOUT GMFOOD	- 0.015 (0.047)	0.0	0.0	0.0	0.0
GMFOOD IN STORE	-0.017 (0.048)	-0.5	-0.2	0.2	0.5
NO GMFOOD IN STORE	0.056 (0.045)	-1.6	-0.5	0.6	1.5
DATE	0.074* (0.012)	-2.1	-0.7	0.8	2.0

p value: * =0.01 or less;

** =0.01-0.05;