

Consumer choice

Linking consumer intentions to actual purchase of GM labeled food products

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With a mandatory labeling scheme for GM food in Europe since 2004 measuring actual consumer choice in practice has become possible. Anticipating Europeans negative attitude toward GM food, the labeling was enforced to allow consumers to make an informed choice. We studied consumers actual purchase behavior of GM food products and compared this with their attitude and behavioral intention for buying GM food. We found that despite a majority of consumers voicing a negative attitude toward GM food over 50% of our European respondents stated that they did not actively avoid the purchase of GM food and 6% actually purchased one of the few available GM labeled food products in the period between September 2006 and October 2007. Our results imply that a voiced negative attitude of consumers in responses to questionnaires about their intentions is not a reliable guide for what they actually do in supermarkets. We conclude that the assumption of a negative attitude with regard to GM food is at least in part construed.

Introduction

In May 2013 more than 2 million people, in over 50 countries worldwide, marched against Monsanto. The protest was ignited because of the adoption of what is now called the “Monsanto Protection Act.” According to its critics the act allows for the planting of unapproved genetically modified (GM) crops in the United States, overruling previous court orders designed to protect the environment, people’s health and wellbeing.¹⁻³ With the protest march people expressed their concern about the safety of their food supply and they express anger about the cronyism between companies and government. Marching, the protestors wanted to raise awareness about the possible harmful effects of eating GM food.

These people indicated that they do not wish to be exposed to a possible risk connected to eating GM food. It was suggested that their outrage could be mitigated by providing the option to share the control on eating GM food.⁴ Labeling GM food

products is such an option which makes the possible risk of eating GM food a voluntary choice. Much research has been done on what type of labeling would be the best option to use and what are its effects. No labels, non-GM labels and GM labels all have been considered from consumer, manufacturer and policy point of view.⁵⁻⁸

In Europe the labeling of food products is mandatory since April 2004. Facing Europe’s negative attitude toward GM food the European Commission installed two directives that ensured labeling of products that contain more than 0.9% GM ingredients. This would not only give the consumers more complete information, it would also allow them to make informed choices on whether to buy the product or not.⁹ With the labeling in place in Europe we were able to explore the extent to which consumers actually use the GM label information for their choice of purchase.

GM Food on the Market

The introduction of GM food to the market was, to put it mildly, not as successful as its producers anticipated.⁵ With the introduction of GM soy for consumer products into Europe in 1996, it could be found in almost 60% of all consumer food products at that time.¹⁰ For consumers this was impossible to check at the time as labeling was not required. Anticipating the upcoming labeling requirement, producers and supermarkets voluntarily started labeling their GM containing products. Both premium brand and lower priced articles were labeled. In some cases, the fact that a product contained GM ingredients or biotechnology was used for the manufacturing was used as a selling argument. One of the major supermarket chains in the Netherlands voluntarily labeled over 160 products and saw no decline in purchase behavior (personal communication). However, with increasing NGO actions against GM food it was decided to develop a mandatory system for the European Union that could be controlled by an independent body.

The enforced labeling empowers consumers to make their own choices in buying GM food or not according to their beliefs, leaving the success of GM labeled products to the market. Naturally, the fact that GM products have to be labeled needs to be communicated to consumers. And subsequently, consumers need to be able to read and understand the label to

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Table 1. The number of GM labeled products per country

Country	Number of GM labeled products
Czech Republic	27
Germany	1
Estonia	13
Greece	0
The Netherlands	18
Poland	1
Slovenia	0
Spain	6
Sweden	1
United Kingdom	3

make such an informed choice. Tenbült et al.⁶ found that the labeling of GM food products made consumers analytically process the information on the label whereas the non-labeled products were more automatically processed. The success of this information processing depends on people's capacity to process the information presented. When consumers' capacity to process label information is low they tend to rely on more non-verifiable criteria instead on what is said on the label.

Since the introduction of GM containing products on the European market, followed by a passionate debate about its desirability, a lot of research has been done on Europeans attitudes and behavioral intentions.¹¹⁻¹⁵ The studies showed that Europeans have a negative explicit attitude toward genetically modified food whereas their implicit attitude is more positive.¹⁶ It is suggested that these positive attitudes might enhance the behavioral intention of people toward the purchase of GM food. Other studies showed that if there is a clear consumer benefit to purchasing GM food—for instance a reduced price—consumers are more inclined to do so.^{12,14}

Most consumers' studies on GM food have been lacking an actual link with purchasing GM food. Most experiments prompted for consumers' responses in hypothetical situations collecting intentions rather than behavioral data. This matters as other consumer studies have shown that behavioral intentions not always predict consumers behavior while shopping. With the mandatory labeling in place we were able to design a study which provides data on actual consumer choices related to GM food. This paper presents the results of an empirical study investigating consumer attitudes toward GM food and linking them to their purchase behavior.

Consumer behavior and attitudes were tested in a quasi-experimental study. Shop visits were carried out to identify the GM labelled products. Based on the barcodes of the GM products a consumer survey institute (GfK) selected a representative group of buyers (a "buyer" is a consumer who bought at least one GM labelled product in the studied period of 12 months) and non-buyers from their different country panels. Both groups were questioned about GM food and their intentions for buying it, which we could then relate to their actual behavior. This study was carried out in ten European countries as part of a European

Commission funded project called "CONSUMERCHOICE: do European consumers buy GM food?"¹⁷

In the following section we present the results on consumer behavior and attitude to purchasing GM food followed by a discussion on the results and an evaluation of this method for measuring consumer behavior in relation to consumer's attitude. How we conducted our shop visits, measured consumer behavior, and administered our questionnaire is described at the end of this paper.

Results

Shop visits

As shown in **Table 1**, a small number of GM labeled products were found in European supermarkets. Most products—27 in total—were found in Czech Republic followed by The Netherlands with 18 different products, Estonia with 13 and Spain with 6. No GM labeled products were found in Slovenia and Greece between 2006 and 2008. In Germany, Poland and Sweden only one GM labeled product was found.

In most cases the GM labeled product was soy oil or a soy oil based product in the lower (cheaper) or private label section. No premium brands were found with a "contain GM" label. The GM labeled products were found on the shelves between similar products. Supermarkets had no separate GM product section.

Survey

For all countries with GM-labeled products on sale, 75% of the respondents claimed to know GM-products have to be labeled by law. Although not everyone read the detailed ingredients list before they buy a particular food item, 54.1% of the respondents said they do. In contradiction to this nearly 60% said not to know how to tell apart a GM-containing product from a conventional one. There was no significant difference between buyers and non-buyers in the answers to these three questions (**Tables 2 and 3**).

Of all respondents 75.3% regarded gene technology in food production undesirable. 5.5% of our consumers could not decide and 19.2% had no opinion. There was a significant difference between buyers and non-buyers ($\chi^2 = 7.92$, $p < 0.05$); buyers of GM labeled products (34.1%) were less pronounced in their negative belief of GM food than non-buyers (38.2%). Significantly more buyers did not know what to answer to this question. There was a significant difference between buyers and non-buyers in how much they cared whether they bought food with GM-ingredients ($\chi^2 = 14.433$, $p < 0.05$). Although for both groups it mattered whether their food contained GM ingredients it expectedly mattered more to non-buyers (50.2%) than to buyers (42.3%). Buyers and non-buyers also differed significantly in how careful they were in not buying GM-labeled products ($\chi^2 = 9.709$, $p < 0.05$); most respondents answered not to be careful to avoid buying GM labeled products (55.6% average of total), expectedly buyers of GM-labeled food were even less careful (59.4%) than non-buyers (54.1%).

There was also a significant difference in opinion between buyers and non-buyers in regard to the safety of GM labeled product for people's health ($\chi^2 = 13.919$, $p < 0.05$). More buyers (41.7%) were undecided—nor agree, nor disagree—about the

health benefits of GM labeled products than non-buyers (35.9%). Non-buyers of GM labeled products held slightly stronger opinions, seemingly (dis) agreeing more strongly.

Comparing the respondents' actual behavior with their perceived behavior, we found no significant difference between buyers and non-buyers. Half of the respondents (49.8%) say they do not buy GM-labeled food. Interestingly, 48% of the GM-buyers thought wrongly they had not bought GM-labeled food and almost 23% of non-buyers wrongly thought they had bought GM-labeled food. A remarkable high number of respondents claimed not to know what kind of product they had bought (30%) (Fig. 1). Furthermore, 26.1% of the buyers claimed to be careful to avoid buying GM labeled products, while they had actually done so.

Discussion

In this study we looked at the extent to which consumers use their freedom of choice in order to avoid GM labeled food products. We made an inventory of the GM labeled products that were available on the European market. Based on this inventory we were able to compare consumers' attitudes to purchasing GM labeled food with their actual shopping behavior. Our results show that there was only a limited number of GM labeled foods for sale in European supermarkets in the period of study, two years after the introduction of mandatory labeling. This is a decrease compared with GM products available in 1996, which we suggest is not related to lack of purchase but to decisions by food companies fearing for negative PR.

In six out of the ten countries not more than three GM labeled products could be found. Most found GM labeled products were soy or soy based products produced in the lower price range or under private labels. No longer are there any premium brands that have GM labels. Since only in a few European countries consumers can choose between GM and conventional food products—due to the limited number of GM labeled products—the choosing between a GM labeled product and a conventional counterpart is often not possible. We don't know whether this limited choice is a result of consumers not

Table 2. Consumer (buyers and non-buyers of GM labelled products) responses to knowledge on labelling and opinion and behavioral intention towards GM products. The consumers were identified as buyers (bought at least one GM labelled product in the period September 2006–October 2007, N=1220) and non-buyers (consumers did not buy a GM labelled product between September 2006–October 2007, N=39780). Column Sig. gives the level of significance between buyers and non-buyers per question. Answers are given in percentage per question.

	Chi-Square	df	Sig.		% yes	% no	% don't know
Q1	According to law does food with GM ingredients have to be labeled?						
	2.882	2	0.237	Buyer	76.7	3.7	19.6
				Non-buyer	79.6	3.2	17.2
				Total	78.8	3.3	17.9
Q2	Before deciding to buy a particular food item I always read (or have previously read) the detailed contents listing on the package.						
	2.405	2	0.3	Buyer	52.0	45.3	2.7
				Non-buyer	54.9	42.9	2.1
				Total	54.1	43.6	2.3
Q3	I know how to tell whether a product contains GM ingredients.						
	0.884	2	0.643	Buyer	28.6	59.3	12.2
				Non-buyer	30.4	57.9	11.8
				Total	29.9	58.3	11.9
Q4	I don't care if the food I buy contains GM ingredients.						
	14.433	2	0.001*	Buyer	39.6	42.3	18.2
				Non-buyer	34.7	50.2	15.1
				Total	36.1	48.0	16.0
Q5	I buy food labeled as containing GM ingredients.						
	4.222	2	0.121	Buyer	21.5	48.0	30.5
				Non-buyer	22.9	50.5	26.6
				Total	22.5	49.8	27.7
Q6	I would buy organic food even if it also contained GM ingredients.						
	1.829	2	0.401	Buyer	20.6	52.6	26.8
				Non-buyer	20.9	54.7	24.3
				Total	20.8	54.2	25
Q7	I am careful never to buy food labeled as containing GM ingredients.						
	9.709	2	0.008*	Buyer	26.1	59.4	14.5
				Non-buyer	32.1	54.1	13.8
				Total	30.5	55.6	14
Q9	I buy food with GM ingredients because, compared with other food, it is healthier, cheaper, tastier or produced in a more environmentally friendly manner.						
	0.975	2	0.614	Buyer	15.6	56.6	27.8
				Non-buyer	16.8	56.9	26.3
				Total	16.5	56.8	26.7

*significant

buying GM labeled products or a result of producers replacing GM ingredients for conventional ones for other reasons. But our data strongly indicate the latter as only 30% of consumers (buyers and non-buyers!) state to be careful to avoid GM ingredients!

Most of the consumer respondents claimed to have knowledge about GM labeling, however, a similar large proportion of people

Table 3. Consumer (buyers and non-buyers of GM labelled products) responses to knowledge on labelling and opinion and behavioral intention towards GM products. The consumers were identified as buyers (bought at least one GM labelled product in the period September 2006–October 2007, N=1220) and non-buyers (consumers did not buy a GM labelled product between September 2006–October 2007, N=39780). Column Sig. gives the level of significance between buyers and non-buyers per question. Answers are given in percentage per question.

Q8	Compared with other foods, I regard those containing GM ingredients as being safer for health.									
	Chi-Square	df	Sig.		% completely disagree	% disagree	% neither agree nor disagree	% agree	% completely agree	% don't know
13.919	5	0.016*	Buyer	11.7	21.3	41.7	6.7	3.7	15	
			Non-buyer	15.2	23.1	35.9	8.1	4.2	13.5	
			Total	14.2	22.6	37.5	7.7	4.1	13.9	
Q10	In general I believe that the use of gene technology in food production is good/bad.									
	Chi-Square	df	Sig.		% very bad	% bad	% not bad/not good	% good	% very good	% don't know
7.92	3	0.048*	Buyer	34.1	38.3	5.4	0	0	22.3	
			Non-buyer	38.2	38.1	5.6	0	0	18.1	
			Total	37.1	38.2	5.5	0	0	19.2	

*significant

do not know where to look for on the package to see the distinction between a product containing GM and a conventional product. This could be explained with the finding that more than half of the consumers do not care to avoid GM containing products, so they may not feel a need to look for the information. The results to this question however might be misleading, as it was a negative proposition for which a yes or no answer was asked and such questions tend to be answered ambiguously. Furthermore, these results do not correspond with the response of almost 75% of the consumers who say they find food with GM ingredients somewhat to really undesirable. It could be so that the information on the package is misunderstood or misinterpreted as suggested by Turnbult et al.⁶ or that European consumers perhaps trust supermarkets to only provide safe and desired food.¹⁸ This could also explain that 26% of “buyers”, so who actually bought at least once a GM containing food product, claimed that they were careful not to buy such a product (Q7). However, the answers to the question on how careful people are to not buy GM food also strongly implies that more than half (56%) of the consumers are indifferent to buy food containing GM ingredients, with only 30% claiming that they try to avoid this, suggesting that there is a market opportunity for GM food producers.

The fact that GM labeled products are available and actually bought, shows that there is a market for such products. Our results indicate that this market might even be bigger, as 20% of non-buyers already think they buy GM-foods, and around 30% do not even know whether they buy GM food or not. Interestingly, our data (Table 2, Q5) show no significant differences between buyers and non-buyers. Are the buyers not aware of what they are buying in spite of claiming both to read the labels and to understand what they mean? Or do the questions asked in the poll simply have no bearing on the way people behave in the bustle of doing the daily or weekly shopping for food?

Our observations indicate that what people say differs from what they do. When asked whether they had bought GM-food, half of our respondents said they had not. Yet the barcode analyses

of their purchases showed that half of them were wrong and they had bought such products. The answers on question 7 also shows that actual behavioral data do not match with what people say they (intend to) do, as also 30% of buyers claimed to be careful not to buy GM food, rendering most surveys on consumer behavior which only collect data on intentions at least questionable.

Our results fit with polls which collected concerns unprompted, where only a low percentage listed their concerns about GM food suggesting a low and declining level of concern in the GM issue.^{15,20} It was only when they were prompted, and GMOs were brought specifically to their attention, that consumers show an antipathy. We also observe this effect: consumers in the countries we investigated continue to display a negative attitude toward gene technology and genetically modified ingredients in particular. When prompted whether they would buy GM containing foods, with such benefits as lower prices, healthier or tastier, or grown under “environmental-friendly” regimes, most people remained rather negative. It would be interesting to further explore what the reasons are for such considerations and the mismatch with actual purchase behavior.

Since expressed opinions differ so little between buyers and non-buyers of GM-products, it is quite possible that there is essentially no difference between the two groups but that the non-buyers just had no particular interest in the rather small ranges of GM products available in each of the five countries. If a consumer did not wish to buy soya cooking oil or margarine, it mattered little whether that oil or margarine was derived from a GM source. Another explanation of these findings might be that most people are actually not really interested in, nor very alert to the presence of GM-ingredients or -products, corresponding to the low level of concern in unprompted polls.

In general there was an expectation that mandatory labeling would not really change consumers’ behavior. The fact that products with voluntary labels were continued to be purchased suggested that mandatory labels would not change consumer’s purchase patterns, therefore the mandatory labeling was

expected to provide consumers choice. This was among others also supported by a study performed in North American Supermarkets by Heslop⁸ who found that the labeling of GM products had an overall minimal effect on consumer responses. It did not really seem to matter to them although the consumer response toward GM labeled products did vary significantly with the level of consumer activism, the perceived benefits of genetic modification and consumers' level of interest in novel foods with consumer benefits.

But another effect was taking place. The concern of the food industry was that badly informed consumers were triggered by the NGO actions for mandatory labels and would develop a negative attitude toward food with GM ingredients. Such attitude was expected to not only make them likely to avoid buying GM labeled products, but to also badly affect those brands which had GM labeled products on the shelf. In a survey assigned by the European Commission it was indeed shown that 62% of the Europeans worry about the possibility of their food to contain genetically modified ingredients.²⁰ As a result the major food brands changed the composition of their products on the European market to avoid the mandatory label, which was also observed and discussed by Moorman.²¹ The availability of GM products became limited or even non-existing, taking the opportunity away for consumers to make informed choices on GM food ingredients.

We conclude that despite an abundance of negative attitudes toward food with GM ingredients more than half of the consumers do not actively seek to avoid buying them, or indeed use their ability to avoid buying these products. We suggest that the reasons of food producers to no longer offer GM containing products on the European market may lay elsewhere. We conclude that the assumption of a negative attitude with regard to GM food is at least in part construed.

Methods

The research was performed among consumers in ten European countries as part of a European Commission funded project CONSUMERCHOICE (see Table 1). In order to assess whether consumers use their freedom of choice in selecting food with or without GM ingredients, and if their choices while shopping align with their beliefs about the products they buy, the project partners first established what GM labeled products were on the market. Consequently a special consumer panel survey was performed, using consumers whose purchase behavior is constantly monitored which allowed a comparison between people's attitudes toward GM food and their actual purchasing behavior of GM food products.

Shop visits

In order to identify the food products containing GM ingredients a series of shop visits were performed. In all the participating ten countries supermarkets were checked for the presence of GM labeled products. In order to get an idea of the amount and type of GM products available the project participants used two strategies. At first supermarket retailers were approached personally and asked for an overview of the GM

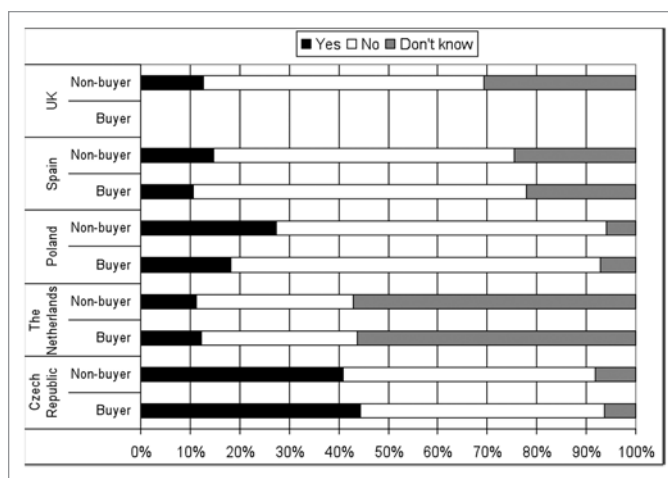


Figure 1. The percentage of respondents per country—where GM products are for sale—who say they buy GM labeled products (Q5) given for GM buyers and non-buyers.

labeled products they had one sale. This strategy proved to be not very successful as not many retailers were willing to disclose this information to us. The second strategy was conducting shop visits, checking products for a GM label. As many as possible different brands of supermarkets were visited, varying in city size, shop size and area in each country. These ranged from discount supermarkets to all inclusive hypermarkets. All supermarkets were visited at least twice between May 2006 and May 2008. During the two visits all products were checked for showing a “does contain GM” label, the barcode was noted together with their location in the supermarket and on the shelves. Table 1 shows the number of products found in each participating country.

Panel survey

For the survey we used an international market research consumer panel of Growth for Knowledge (GfK). In almost all participating countries this institute has a consumer panel of a minimum of 2000 members that is constantly monitored for all the products they purchase in supermarkets and local markets through barcode scanning or special coding for local produce. Each panel represents a cross section of its countries society based on demographic information; however, the panel size varies per country. Besides, the panel members are regularly asked to participate in small surveys, and most of the times the person answering the questionnaire is also the person in that household who is responsible for the weekly shopping.

From the country panels two groups were selected, “buyers” and “non-buyers” based on the purchases of GM labeled products that panel members made between September 2006 and October 2007. A buyer is a consumer who at least once purchased a selected GM labeled product during the period of between September 2006 and October 2007. Of the overall panels, 1220 consumers could be identified as “buyers.” Of those we selected 1001 consumers, while we also selected 2500 consumers who had never bought one of the GM products. Both groups were invited to participate in the survey. The average response to

the questionnaire of buyers and non-buyers for all countries to complete the survey was 62.2% and 70% respectively.

There were no panels present in Estonia and Slovenia so they were not included in the survey. Sweden and Germany could not be included in the survey because their GM labeled product was not available in supermarkets and therefore should not appear in the consumer panel database. Greece could not be included in the survey because there were no GM labeled products for sale in Greek supermarkets in the selected period. And although there were three GM labeled products for sale in the UK they were not purchased by any of the UK panel members during the selected period. Therefore the UK results come from non-buyers only.

In the four remaining countries where GM labeled products were purchased by members of the consumer panel we asked the selected groups of “buyers” and “non-buyers” to complete a small survey. The questions were based on questions used in similar surveys such as the Eurobarometer on biotechnology of 2005 and the Dutch TNS/NIPO study.^{18,19} The participants were asked about their knowledge and understanding of the (compulsory) labeling of GM products, their attitudes toward GM labeled products and their perceived behavior toward these products (see **Tables 2 and 3** for the questions). For most questions only a yes, no or don't know answer could be recorded. For one question

a five point approval scale plus don't know was used and for one question a ten point valuation scale was used. For the later analyses this was recalculated into a five point scale plus don't know.

The data was analyzed using the Statistical Package for Social Sciences (SPSS) software, version 16. To compare answers given by buyers of GM labeled products with their related non-buyers we used Chi-square tests.

Disclosure of Potential Conflicts of Interest

No potential conflict of interest was disclosed.

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