Consumer Response to Functional Foods Produced by Conventional, Organic, or Genetic Manipulation

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ABSTRACT

The agro-food industry is developing a "second generation" of genetically modified (GM) foods that can offer functional health benefits to consumers. Many consumers, however, are turning to organic foods in order to avoid GM foods. This report attempts to differentiate consumer valuation of functional health properties in conventional, organic, and GM foods. A representative sample of 1,008 Canadian household food shoppers responded to twelve stated-choice experiments during a telephone survey. Because opinions about organic and GM foods varied greatly, random parameters logit models were used to analyze their choices. Results indicate that many Canadian consumers will avoid GM foods, regardless of the presence of functional health properties. For others, the introduction of GM functional plant foods should increase acceptance of GM production methods, but many consumers will likely avoid functional foods derived from GM animals. The organic food industry could also profit from the introduction of organic functional foods. [EconLit citations: I120; D120.] © 2004 Wiley Periodicals, Inc.

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1. INTRODUCTION

There is much controversy over the presence of genetically modified (GM) foods on Canadian supermarket shelves. Objections to the commercialization of GM foods are usually motivated by one or more of the following arguments: (1) there is uncertainty over the long-term health consequences of eating GM food;[1] (2) there is uncertainty over the long-term consequences of GM crops on the environment;[2] (3) GM crops are fundamentally against nature (i.e., unnatural) or an example of science gone mad; and (4) gains from the development and commercialization of GM crops are accruing to multinational corporations, not to consumers.[3] The validity of these objections has been contested in scientific circles and to a lesser extent in the popular press, but there is evidence that many consumers remain skeptical of GM foods.

Since the 1990s, numerous public opinion polls regarding GM foods have been conducted in Canada, the United States, and the European Union (Optima, 1994; Einsiedel, 2000; Hoban & Kendall, 1992; Hoban, 1996, 1998; Eurobarometre, 1991, 1993, 1996, 1999). These polls have greatly increased our general knowledge of the evolution of consumer attitudes, perceptions, beliefs, and knowledge of the use of biotechnology in the production of GM foods. For example, one recent Canada-wide survey found that only 43.8% of Canadian household food shoppers believe that they have already eaten GM foods and that 51.5% agree that the risks associated with GM foods have been exaggerated (West et al., 2002a). These findings attest to the mitigated acceptance of GM foods by most Canadian food shoppers. This conclusion is reconfirmed by two other important findings: only 13.1% categorize the presence of GM foods in the food chain as their number one food safety concern and only 11.3% had actually boycotted certain foods or grocery stores in protest over GM foods. These findings should be reassuring to North American farmers who are increasingly producing GM crops. In Quebec and Ontario alone, GM soybeans represented 24% of total soybean production, while GM corn represented 29% of total corn production in 2001 (Hategekimana & Trant, 2002).

As long ago as 1992, Hoban and Kendall found that U.S. consumers had more favorable attitudes toward the use of biotechnology as a means of lowering the price of foods than as a means to improve the quality of foods at an increased price. Lusk et al. (2001) found that students were more willing to accept GM foods if they were less expensive than the conventional variety. Recent experimental evidence has shown that many French consumers did not categorically reject GM foods, since they were willing to bid positive amounts for them (Noussair et al., 2002). These are surprising findings given the staunch negative position taken by the European Union vis-à-vis GM food imports. Nevertheless, recent consumer surveys have found that 53% of Europeans and 54% of Canadians claim to be willing to pay more for *non*-GM foods (Eurobarometre, 1999; Einsiedel, 2000). GM technology does appear to decrease consumer acceptability, and it seems almost inevitable

[1]The most often cited health concern is the fear that antibiotic-resistant marker genes used in the genetic modification process might be passed to humans through absorption in the human gut.

[2]The most notorious example of adverse GMO effect on the environment is probably the one involving the monarch butterfly. A laboratory experiment purportedly showed that monarch butterflies could die from exposure to GM pollen. However, further empirical evidence concluded that this was a false conclusion (Poppy, 2000).

[3]Moschini (2001) found that the benefits to consumers from supply-induced price reductions are far from being insignificant. Also, there is evidence of substantial investment on the part of food giants into the organic market.

that manufacturers and retailers might have to discount the so-called "first-generation" GM foods relative to conventional foods if GM labeling were to become law.

One way to offset apparent negative consumer reaction is through the development and marketing of the so-called "second-generation" GM foods. These GM foods are to have enhanced functional health properties that provide non-pecuniary benefits that are highly valued by today's health conscious consumers. Two previous studies indicate that approximately 50% of Canadians would be willing to purchase GM foods if they were more nutritious or otherwise healthier (Optima, 1994; Einsiedel, 2000). IFIC (2001) found the same results among their sample of American consumers. Similarly, Frewer et al. (1997) found that European consumers were more likely to be interested in purchasing GM tomatoes with more vitamins than GM tomatoes with a lower price or with other beneficial properties such as longer shelf life or environmental advantages. However, these European consumers were not more willing to purchase GM chicken or yogurt with higher nutritional content.

GM technology can facilitate the production of functional foods, but it is by no means necessary.[4] In fact, health properties can be enhanced in conventional and organic foods through either breeding or nutrient fortification. Very little is known about consumers' appreciation of health properties and about possible interaction between health properties and food production processes (i.e., GM, conventional, organic). To date, only one study appears to have addressed this issue. Halbrendt et al. (1995) conducted a survey of Australian consumers' response to low-fat pork from either a pig fed a diet containing GM ingredients (i.e., pork somatotrophine) or a new, conventional hybrid pig. The respondents were favorable to the GM pig only when the reduction in fat content was greater than that which could be achieved by conventional breeding.

The current report seeks to characterize Canadian consumer response to GM functional food vs. a conventional or organic food that has also been modified to enhance the same functional property. It breaks new ground in providing empirical estimates of consumers' valuation of health properties and their interaction with the three types of production processes.

2. METHODOLOGY

Our study is based on data from a representative sample of 1,008 Canadians who responded to a series of stated-choice experiments that were incorporated into a computer-assisted telephone survey. The data were collected in April 2001 by SOM Inc., an established Canadian polling firm. Through regional stratification of the random digit dialing of household telephone numbers, the final sample accurately reflects the population densities of 13 geographical regions within Canada. The estimated response rate was 38%. Before responding to a series of stated-choice questions, respondents were read the following statement, "As you may or may not know, there are many genetically modified foods on the market today. These foods have been created by isolating a gene with a specific characteristic in one plant or animal, then inserting it into another plant or animal." They were then asked to assess how much they knew about GM foods. Forty-eight percent responded "Very little."

[4]We employ the terms "functional foods" to describe foods that have been modified to offer physiological health benefits that go beyond the simple provision of vitamins and minerals. Synonyms for functional foods include terms such as pharmafoods or designer foods.

Each choice set in the stated-choice experiments asked consumers to choose between the same food produced by three different food production processes: conventional, organic, and GM. Because the choice experiments were conducted over the phone, the number of other characteristics describing the foods had to be quite small. Hence, these three alternatives differed only in terms of price and the presence or absence of a functional health property. Each respondent was presented with twelve different choice sets during the interview.

Labelling is one of the hottest issues regarding the commercialization of functional foods. New legislation is to be adopted in Canada to protect consumers against untrue and/or misleading claims while allowing enough flexibility to manufacturers to describe the health benefits on a label. Having labels does not automatically translate into better-informed consumers. Besides having a limited understanding of food technology and genetics, consumers are prone to dismiss labels.[5] In order to minimize potential misunderstanding, our interviewers relied on terms like "heart-healthy" or "anti-cancer" to describe foods with functional health properties. Before the stated-choice experiments began, respondents were told that they were to imagine being in a grocery store planning to purchase tomato sauce, potato chips, and chicken breasts. These foods were selected because they are frequently purchased by a wide spectrum of Canadians and they are significantly different from one another. For tomato sauce, the functional property was said to be "anti-cancer," while for the chicken breasts and potato chips the functional property was said to be "heart-healthy." The ultimate goal was to assess whether the type of production process used to produce the food significantly affects the monetary value of these two health properties. Each respondent was confronted with four choice sets for each product (i.e., they made a total of twelve hypothetical purchase decisions).

We opted to use random parameters logit models (RPL) to analyze the choices made by the respondents for our three food products. The advantage of RPL models is that they allow for heterogeneity among respondents. This is an especially useful property for our application because opinions about organic and genetically modified food products were expected to vary greatly among the respondents in our sample.

Allowing coefficients to vary across individuals also made sense for the variable indicating the presence/absence of a health property. It was anticipated that each respondent's level of preoccupation with their health would likely vary according to their current and past health status, their nutritional habits and the health status of their friends and relatives. We specified interactions between the health property and production processes to obtain production process specific willingness-to-pay estimates for a health property. As in Revelt and Train (1998), price was treated as a fixed variable as its effect was expected to negatively and uniformly impact upon the utility of all respondents.[6]

[5]Again, experimental evidence from France shows that consumers do not notice what is written on the labels (Noussair et al., 2002). Furthermore, there is ample evidence that a great many consumers are ignorant when it comes to foods and food processes. The fact that consumers are not thirsty for knowledge is rational to the extent that they feel that the payoff from internalizing new knowledge is low.

[6]Price is typically held fixed because it simplifies the characterization of the distribution of willingness to pay estimates. Exceptions include Nunes, Cunha-e-Sa, Ducla-Soares, Rosado, & Day (2001) and West, Larue, Gendron, and Scott (2002b) who show that the distribution of the price coefficient could span positive values for certain goods and services. Intuitively, price could have been positive for some consumers if they rely on it as a gauge for quality when they do not know the product/service very well. Given that the products chosen in our study are staples, we disregarded this argument.

RPL models appeal to random utility theory, which posits that respondent n chooses alternative j if, and only if, it yields a higher level of utility than other alternatives (i.e., $U_{nj} > U_{nk}, \forall k \neq j$). Utility is assumed to have two components, a systematic component that is a function of the characteristics, and a random one. We follow Revelt and Train (1998) and Train (1998) in assuming that the utility that respondent n enjoys from choosing alternative j (j = 1, . . . , J) in choice situation t (t = 1, . . . , T) can be depicted by:

$$U_{njt} = \beta_n' x_{njt} + \varepsilon_{nj}, \tag{1}$$

where x_{njt} is a vector of explanatory variables, β_n is a vector of unobserved coefficients specific to each respondent and ε_{njt} is an unobserved random term following an *iid* extreme value distribution, independent of both β_n and x_{njt}. It is assumed that β_n varies across respondents according to density $f(\beta_n|\theta^*)$ with θ^* being the true distribution parameters (e.g., mean and covariance). Generally, random parameters can be specified as:

$$\beta_n = b + \eta_n, \tag{2}$$

where the first term is the population mean and the second is the stochastic deviation capturing consumer n's preferences relative to the population average. The conditional probability that respondent n picks alternative j on the tth choice situation is defined by the familiar expression:

$$L_{nit}(\beta_n) = \frac{e^{\beta_n' x_{nit}}}{\sum_j e^{\beta_n' x_{njt}}}. \tag{3}$$

Defining $i(n, t)$ as the chosen alternative by respondent n in the tth choice situation, the conditional probability of respondent n's observed sequence of choices is obtained by taking the product of the choice probabilities: $S_n(\beta_n) = \prod_t L_{ni(n,t)t}(\beta_n)$. The unconditional probability of choosing i on the tth choice situation is obtained by integrating the standard logit $L_{nit}(\beta_n)$ over the random parameters $\beta_n : Q_{nit}(\theta^*) = \int L_{nit}(\beta_n) f(\beta_n|\theta^*) d\beta_n$. The unconditional probability for the sequence of choices made by the respondent is: $P_n(\theta^*) = \int S_n(\beta_n) f(\beta_n|\theta^*) d\beta_n$.

Because the unobserved η_n is constant across alternatives, it induces correlation in the utility across alternatives at the individual level and, hence, relaxes the infamous "independence-from-irrelevant alternatives" property.[7] The above integral cannot be calculated analytically and is evaluated through the method of simulated moments pioneered by McFadden (1989). For a given value of the parameters θ, a set of β_n is drawn from its distribution and used to compute $S_n(\beta_n)$. This process must be repeated many times to generate enough $S_n(\beta_n)$ to compute an average that could be considered a precise estimate of the choice probability $SP_n(\theta) = [\sum_{r=1}^{R} S_n(\beta_n^{r|\theta})]/R$, where R stands for the number of draws. Therefore, the corresponding simulated log-likelihood function is:

$$SLL(\theta) = \sum_n \ln(SP_n(\theta)). \tag{4}$$

[7]A thorough and insightful discussion of the IIA problem can be found in Louviere, Hensher, & Swait (2000).

TABLE 1. Estimation Results for a Random Parameters Logit With Interactions Between the Health Property and Food Types

	Chicken breasts	Tomato sauce	Potato chips
Price	−0.161	−1.014	−1.097
	(−9.658)	(−3.763)	(−7.895)
GM	−2.081	−2.182	−2.096
	(−12.51)	(−10.60)	(−11.39)
SD	2.087	2.442	2.310
	(13.93)	(13.34)	(15.59)
Organic	−3.335	−1.106	−1.859
	(−6.637)	(−2.620)	(−4.086)
SD	4.753	4.105	4.753
	(9.683)	(15.73)	(12.00)
Health property	0.302	0.644	0.707
	(2.869)	(5.61)	(6.070)
SD	0.598	1.078	0.802
	(2.695)	(6.978)	(4.829)
Health property (organic)	1.026	−0.141	0.563
	(4.854)	(−0.766)	(2.697)
SD	0.162	0.197	0.466
	(1.393)	(0.966)	(2.178)
Health property (GM)	−0.184	0.097	0.227
	(−0.939)	(0.448)	(1.475)
SD	1.121	1.690	0.136
	(2.720)	(6.170)	(0.610)
Likelihood ratio index	0.356	0.285	0.320

Note. t = statistics are in parentheses.

To achieve an acceptable degree of precision, R must be large. Train (1999) proposes to rely on fewer non-random draws taken from Halton sequences to circumvent this inconvenience. Halton sequences provide a more even coverage over the mixing distribution than random draws (Train, 1999). The econometric estimation was performed with GAUSS software.[8]

3. RESULTS

The RPL estimation results are reported in Table 1. The likelihood ratio indices indicate that our parsimonious specifications performed well in terms of goodness-of-fit. As expected, price impacted negatively and significantly on utility for all three food products (i.e., respondents tended to choose the least expensive product, holding everything else constant). The mean coefficients for GM and organic are also negative across all three food products, but they are associated with large SD coefficients. This indicates that these production processes are, on average, disliked relative to conventional foods, but the degree of dislike is highly variable. In fact, some consumers appreciate GM and organic

[8]We adapted the code graciously provided by Kenneth Train on his website.

production methods. Given the mean and SD coefficients for GM chicken and the normality assumption, it can be shown that almost 16% of respondents prefer a GM label to a conventional one.[9] For organic chicken, the mean coefficient is larger in absolute value than its counterpart for GM chicken, but the organic SD coefficient is so large that the percentage of respondents with a positive appreciation of the organic label relative to the conventional one reaches just over 24%. For tomato sauce, the percentages of respondents appreciating the GM and organic labels, relative to the conventional one, are 19% and 40% respectively, as opposed to 18% and 35% for potato chips.

The mean coefficients for the presence of a health property are positive across all three food products and the SD coefficients are moderately large. These findings indicate that the presence of a "heart-healthy" or "anti-cancer" health property did act to increase utility for most of the Canadian consumers in the sample, though a small percentage obviously avoided choosing products making these health claims.

For chicken breasts, the increased utility due to the interaction between the health property and the organic production process is quite homogenous across consumers. The large positive coefficient for the interaction term implies that the addition of a health property has a larger impact on utility derived from organic chicken than when it is added to conventional chicken. The interpretation of the results for the presence of a health property in organic potato chips is similar to those for chicken breasts, but the magnitude of the coefficients is different. In contrast to chicken breasts and potato chips, the coefficients for the interaction between health property and organic production process are not statistically significant for tomato sauce. While the presence of an anti-cancer property increases utility from tomato sauce consumption, this increase is the same regardless of whether the tomato sauce is organic or conventional.

The presence of a heart-healthy property also increases utility from potato chip consumption regardless of whether the potato chips are GM or conventional. The health property-GM mean coefficients for chicken breasts and tomato sauce, however, are not statistically different from zero, though their SD coefficients are significant. This implies that, for about half of the consumers, the utility induced by the addition of the heart-healthy property is larger when the property is in GM chicken breasts or GM tomato sauce than in conventional ones, but the utility of the heart-healthy property is lower for the other half of the consumers in the study. On average, the increased utility from a functional health property is the same for GM and conventional chicken breasts and tomato sauce.

As anticipated, the value of a health property depends on the type of product to which it is added. The top row of Table 2 shows that a company developing and marketing a heart-healthy property in conventional chicken breasts could potentially increase the price per kg by as much as \$1.88. This is approximately 14% of the average price of conventional chicken breasts on the market at the time of the study. If a company developed the same type of property in conventional potato chips, they could potentially increase the price of a 150-gram bag by as much as \$0.64. An anti-cancer property marketed in a 14-oz. (398 ml) can of conventional tomato sauce could also increase the price by \$0.64. These are substantial price increases, especially in the case of tomato sauce where the increase amounts to 64% of the average price. The heart-healthy property is more valued

[9]This estimate for the case involving GM chicken was obtained by computing: $1 - \int_{-\infty}^{0} \phi(x)\,dx$ where $\phi(x)$ is the probability density function of a normal distribution with mean -2.081 and standard deviation 2.087. Hence, 15.95% of the distribution spans positive values, which implies that the GM label relative to the conventional one turns off 84.05%.

TABLE 2. Estimated Values of the Health Properties

	Chicken breasts	Tomato sauce	Potato chips
Conventional			
Value of health property	1.88 $/kg*	0.64 $*	0.64 $*
Average price	13.00 $/kg	1.44 $	0.99 $
% of average price	0.144	0.642	0.444
Standard deviation	3.71 $/kg*	1.06 $*	0.73 $*
Organic			
Value of health property	8.25 $/kg*	0.50 $	1.16 $*
Average price	29.00 $/kg	3.94 $	2.49 $
% of average price	0.284	0.201	0.294
Standard deviation	3.85 $/kg	1.08 $	0.85 $*
Genetically modified			
Value of health property	0.73 $/kg	0.73 $	0.85 $
Average price	10.00 $/kg	1.14	0.79 $
% of average price	0.073	0.925	0.746
Standard deviation	7.89 $/kg*	1.98 $*	0.74 $

*Indicates that the value is significantly different from zero when type is conventional. Otherwise, indicates that the value is significantly different when comparing organic to conventional or when comparing GM to conventional.

in an absolute sense when added to organic chicken and potato chips than to their conventional counterparts. The estimated premium for a heart-healthy property in organic chicken is $8.25/kg or 28% of the average price of organic chicken on the market at the time of the study. The same property adds $1.16 to the price of a bag of organic potato chips. However, an anti-cancer property is worth less in organic tomato sauce than in conventional and GM sauces. As evidenced by their large standard deviations, the estimated premia for health properties in GM products are not statistically different from those estimated for conventional foods. This is somewhat surprising and indicates that functional health properties may be valued to the same extent regardless of whether they are developed by conventional methods or through genetic engineering.

Probabilities of purchase computed at mean prices for conventional, organic, and GM foods are reported in Table 3.[10] Three scenarios are investigated. In the first scenario, none of the foods has a health property. In the second scenario, GM foods have a health property, but organic and conventional foods have none. This will help to gauge the short run advantage that second-generation GM foods might have if they are among the first to exploit health properties. Finally, the third scenario could be construed as a long run simulation with health properties having been introduced in conventional, organic, and GM foods. The results in Table 3 indicate that Canadians are far more likely to buy conventional chicken breasts than organic or GM. In the absence of a health property, the probability of purchasing conventional chicken is 83.32 percent, which greatly exceeds the 0.3 and 16.4% probabilities for purchasing organic and GM chicken, respectively. The preference for conventional products is also strong for the two remaining food products (i.e., p = 83.53% for potato chips and p = 83.51% for tomato sauce). The introduction of health properties in GM foods, but not in other foods, increases the probability of

[10]Average prices for organic foods are roughly twice that for conventional foods. GM average food prices are slightly below their conventional counterparts.

TABLE 3. Estimated Probabilities of Purchase With and Without a Functional Health Property

	Chicken breasts	Tomato sauce	Potato chips
Conventional			
None has health property	0.83320	0.83506	0.83528
GM has health property	0.84337	0.81927	0.81122
All have health property	0.87396	0.89489	0.88361
Organic			
None has health property	0.00256	0.03166	0.03162
GM has health property	0.00259	0.03109	0.03071
All have health property	0.00588	0.01635	0.02998
Genetically modified			
None has health property	0.16424	0.13328	0.13310
GM has health property	0.15404	0.14964	0.15807
All have health property	0.12017	0.08875	0.08641

purchasing GM chips (16 vs. 13%) and GM tomato sauce (15 vs. 13%), but it slightly reduces the probability of purchasing GM chicken (15 vs. 16%). The observed gains for GM chips and tomato sauce are mostly at the expense of conventional foods. Having the possibility of consuming heart-healthy chicken breasts, regardless of the production process, increases the probability of purchasing conventional chicken at the expense of GM chicken. The probability of buying organic increases as well, but it remains below 1%. For potato chips, the long run scenario favors conventional chips as the probabilities of purchase for heart-healthy organic and GM chips, respectively, stagnate and drop relative to the two other scenarios. The short and long run effects of introducing a health property in tomato sauce are qualitatively the same as those for potato chips. Anti-cancer GM tomato sauce would do much better competing against non-functional organic and conventional sauces than against other anti-cancer sauces. This result is hardly surprising when one is reminded that sales of “healthy” GM tomato sauce were doing well in England before a series of crises destabilized the whole food industry in that country (Best, 1997). Finally, the probabilities are very sensitive to the prices assumed, but the overall pattern is robust. Lowering the price of organic tomato sauce to the level of the conventional alternative would generate probabilities of purchase for conventional, organic, and GM non-functional tomato sauces of 65.8, 23.7, and 10.5%, respectively. The probabilities for scenarios 2 and 3 would be 64.8, 23.4, 11.8% and 78.4, 13.8, 7.8%.

4. CONCLUSION

This report presents results from stated-choice experiments conducted with a representative sample of 1,008 Canadian household food shoppers. The choice sets offered conventional, organic, and GM choice alternatives for three different foods: chicken breasts, tomato sauce, and potato chips. In the experiments, these products differed in price and the presence/absence of a functional health property. While labelling is a major controversy in the marketing and regulation of functional health claims, food production processes are not immune to controversies. For our survey questionnaire, we made every effort to minimize possible confusion over the wording of the functional health claims. While this helped minimize survey completion time, the clarity and the possibly overly-optimistic terminology we employed led us to consider the derived willingness-to-pay estimates as upper bounds.

Our statistical results harbor moderately good news for developers of "second generation" GM foods, while at the same time confirming continued consumer preference for conventional foods. When consumers were offered the choice between the same types of foods labelled as being either conventional, organic, or GM, the majority exhibited very strong and fairly consistent tendencies to avoid both organic and GM production methods. There was also strong evidence, however, of the existence of small niche markets for both organic and GM foods. Some consumers in the study actually preferred GM or organic over conventional foods regardless of their price and regardless of the presence or absence of a functional health property.

Lower prices and the presence of functional health properties continue to weigh heavily in the purchasing decisions of Canadian household food shoppers. Most respondents were not only willing to purchase, but also willing to pay extra for functional health properties in foods, such as anti-cancer tomato sauce and heart-healthy chicken breasts or potato chips. The average price premium for these functional health properties was approximately the same for tomato sauce and potato chips produced by either conventional methods or through genetic engineering. However, this was definitely not the case for chicken breasts from chickens that were supposedly genetically modified to make them heart-healthy. Consumers surveyed in this study were less willing to purchase GM heart-healthy chicken breast and were only willing to pay a small premium for the GM heart-healthy property. This is entirely consistent with previous findings that genetic manipulation of plants is more acceptable to consumers than is genetic manipulation of animals (Optima, 1994; Frewer et al., 1997).

On the other hand, consumers who prefer organic production methods appeared to be willing to pay even greater premiums for a heart-healthy functional property in either organic chicken breasts or organic potato chips. This is somewhat surprising since organic food consumers are already paying premium prices for organic foods. Perhaps this finding reflects the extent to which organic consumers are also health conscious consumers who would not hesitate to spend even more on foods that they consider to be exceptionally "healthy." Thus, the small but thriving market for organic foods would not have to lower prices to maintain or increase its market share if it were to exploit the concept of functional foods.

Will Canadian consumers be swayed by the "second generation" of genetically modified foods? The results from our study lead us to conclude that the introduction of health properties in GM foods will make them slightly more popular providing that the same heath properties are not introduced in conventional and organic foods. However, GM and organic labels constitute a substantial handicap, hence the resistance toward the labeling of GM foods and the struggling Canadian organic industry. In the end, the best thing that could happen to GM manufacturers is for consumers to be convinced that GM foods pose no additional risks to their health. The successful continuation of the "grand North American" experiment with GM foods should eventually sway consumers to treat GM and conventional products on par.

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