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Genetically Altered Foods: A Policy Issue for Multi-unit Food Service Operators

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Abstract
Although it is a substantial issue, the technology behind genetically altered foods and the concerns being raised about them are not well understood by most people. The authors discuss how genetically altered foods might fit into the business strategies of multi-unit food service operators as well as current policies and predispositions of multi-unit food service companies toward the use of genetically altered foods. They also outline the issues surrounding genetically altered food as they relate to the food service industry and provide a picture of where multi-unit food service operators currently stand on the technology

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In the spring of 1994 the Food and Drug Administration approved Calgene's genetically altered "FlavrSavr" tomato for sale in the U.S. The FlavrSavr is the first of what promises to be many genetically altered foods that will be brought to market. What makes the FlavrSavr unique is that the naturally occurring enzyme that makes tomatoes soften and rot has been repressed by reversing a gene sequence in the tomato. This allows vine ripened tomatoes to be shipped to distant markets without spoiling.

In spite of the potential benefits of genetically altered foods, several consumer groups and members of the culinary community are speaking out against the use of these products. New technologies are often accompanied by uncertainty and controversy. The issue of genetically altered foods is highly charged because it involves the creation of new life forms.

Their large purchasing power, demand for uniform products, and high visibility make multi-unit/chain restaurants key players in the debate over the use of recombinant DNA technologies in foods. There is a dichotomy in the potential use of genetically altered foods by multi-unit food service operations. Management is attracted by the potential benefits of these products, but is leery about possible negative consumer perceptions.

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Exhibit 1
Transgenic Organisms Scientists Are Working On

Host Organism	Source of Transplanted Genetic Material	Objective of Transplant
Apple	Bacteria	Increased disease resistance
Catfish	Trout	Faster growth
Corn	Bacteria	Increased herbicide tolerance
Corn	Wheat	Reduced insect damage
Dairy cattle	Human	To produce different type of milk
Potato	Bacteria	Increased herbicide tolerance
Potato	Chicken	Increased disease resistance
Potato	Giant silk moth	Increased disease resistance
Rice	Bean, pea	Introduction of new storage proteins
Soybean	Petunia	Increased herbicide tolerance
Swine	Cattle	Leaner meat & enhanced feeding efficiency
Swine	Human	Leaner meat
Tomato	Arctic Flounder	Frost resistance

Recombinant DNA techniques are a relatively new technology. Stanford University's Paul Berg is credited with conducting the first successful recombinant DNA experiment in 1971 when he combined the genetic material from two different kinds of viruses.[1] In simplified terms, recombinant DNA techniques use restriction enzymes to cut DNA at specific points and then recombine it in a way that alters its original structure. The pieces of DNA may be recombined with genetic material from a like organism, or with that of another species. This recombined DNA is then transferred into host cells via micro insertion or a vector. A vector is a carrier molecule that can pick up the recombined DNA, insert it into a host cell, and then replicate itself within the host. Commonly used vectors include bacteria, viruses, and plasmids.[2]

In the case of plants and some simple animals, the host cells containing the recombined DNA are cloned to produce a new plant or organism. More complex animals that cannot be cloned must have the recombined DNA inserted into gametes to produce a living organism. With current technology the success rate of inserting DNA into gametes is low, but once a few like organisms are produced they can be bred to propagate the new characteristics.[3] Exhibit 1 describes just some of the more interesting organisms that are being developed with recombinant DNA technologies.

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Genetically Altered Foods Are Resisted

The culinary community has been one of the most vocal groups arguing against genetically altered foods. In May 1992, the FDA ruled that food producers need not notify the agency or otherwise label genetically engineered foods unless the substance added to the original food might cause an allergic reaction or alter the nutritional content.[4] In response to this ruling, 20 of New York City's most famous chefs called for an international boycott of transgenic foods.[5] Since then the movement has spread from coast to coast, with over 1,000 celebrity chefs joining the boycott.[6] This boycott may prove difficult to enforce. Not only do the chefs have to check the sources of their fresh food products, but transgenic foods may unknowingly enter their operations via processed foods.

The president of the American Culinary Federation, Keith Keogh, notes that the 1,000 chefs who vow to boycott genetically altered foods are in the minority. Keogh says that "they may have 1,000 chefs, but we have 21,000 who see things differently.[7]" He claims that the American Culinary Federation wants to get away from the scare tactics used by critics of food applications of biotechnology.

Are the boycotting chefs' actions justified, or are they simply overreacting to a technology that they do not understand? The answer depends on who is asked. The United States Department of Agriculture (USDA) does not treat transgenic agricultural products any differently it does traditional ones. This policy is based on two primary beliefs. The first is that the USDA views transgenic technology as an extension of selective breeding that has been done for centuries to propagate desirable traits. Secondly, the agency does not believe that products developed through transgenic techniques will differ markedly from conventional products.[8] Other groups such as the United Nations' World Health Organization, the American Dietetic Association, the Grocery Manufacturers of America, and the American Medical Association also endorse the safety of genetically engineered foods.[9]

Opponents of transgenic technology do not think the techniques are so benign. Among the issues being raised about genetically altered foods are

- health risks associated with direct consumption
- the right of people to know about the food that they eat
- risks to the environment
- economic vulnerability and social dislocation that might result from wide spread use of these products.

The Right to Know Becomes An Issue

Food safety has historically been determined through long-term experience which has shown that there is reasonable certainty that no harm will come if the food is prepared and used in the traditional way.[10] Recombinant DNA technologies will bring new foods to the table that

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have not been tested by time. Some are concerned about unknown long-term effects that these new foods might have.

Another issue is the right of consumers to know about the foods they eat. Does a vegetarian have the right to know that the tomato he is eating contains the genes of an Arctic flounder? Does a person who keeps kosher have the right to know that the beef he is eating contains genetic material from pigs? Then there is the case of the transgenic pigs at the Agricultural Research Center in Beltsville, Maryland, that carry human genetic material to make their meat leaner.[11] Under current FDA legislation, these products would not require special labeling if they were brought to market.

The National Restaurant Association supports the FDA position on labeling. In a letter to the FDA, Executive Vice President William Fisher wrote the following:

> The National Restaurant Association believes that any mandated labels for foods derived from genetic engineering should be based on the original purpose of labeling; to notify consumers of the presence of a demonstrably harmful material. We believe that any other concerns are largely subjective, and should be addressed through voluntary labels, existing controls, and market pressures .[12]

This letter also noted the following:

> Indeed, for those religious and cultural settings in which genetic source might be a legitimate consideration, current systems provide for voluntary labeling of a product's kosher status, or absence of pesticide residues, or even its geographic origin. This issue ultimately turns not on demonstrated or potential harm, but upon the emotions of those persons who perceive a harm. It is better addressed through voluntary labels and market forces than through regulation .[13]

Others object to genetically altered livestock, not out of concerns for consumer safety, but because of how these manipulations can affect the well-being of the animals involved. Transgenic animals are presenting scientists with a host of problems. Not enough is known about the secondary effects that genetic manipulations will have on animals to assure that the creatures produced will be healthy.[14] Pursel *et al.* note a plethora of problems suffered by successive generations of transgenic pigs.[15] The cow DNA that was inserted into the genetic makeup of these swine improved their weight gain, enhanced feeding efficiency, and reduced their subcutaneous fat. However, the animals also suffered from a high incidence of gastric ulcers, arthritis, cardiomegaly, dermatitis, and renal disease.

Detractors of genetically altered foods fear that the technology will lead to increased use of herbicides and fertilizers. These trends are dis-

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couraging from the standpoint of the environment, which is increasingly stressed by agricultural runoff. Farmers use herbicides to eliminate weeds that compete with crops for soil nutrients, water, and light. Some crops are resistant to particular herbicides. Not surprisingly, companies that produce herbicides are investing in recombinant DNA research that can transfer herbicide resistance from one species to another, thus enabling more widespread use of the chemicals.[16]

Recombinant DNA technology is also expected to accelerate the trend toward higher yielding crops that began with selective breeding. While there are economic advantages to higher yielding crops, these plants also require more nutrients than less productive varieties do, thereby increasing the need for chemical fertilizers.

Risks Exist With New Species in the Ecosystem

Another area of public concern regarding genetically altered organisms is the consequences that these life forms might have when they are released into the environment. Opponents compare the threat of recombinant organisms to the unforeseen devastation caused by the introduction of non-native species such as zebra mussels, gypsy moths, Dutch elm disease, and chestnut blight.

It is difficult to anticipate how new species will interact with the environment. For instance, they might out-compete native organisms for food and otherwise upset the balance of nature. Because they are alive, recombinant organisms can reproduce, mutate, and migrate. This makes it very difficult to predict the impact of their release. Furthermore, it makes it nearly impossible to recall such life forms once they are either intentionally or accidentally released.

The American Fisheries Society has questioned the implications of genetically altered organisms and recommends restricting the use of genetically engineered fish in aquiculture until a thorough risk assessment can be completed which demonstrates that there is minimal chance of environmental harm.[17] The thought of 50 percent larger brook trout may appeal to sport fishermen, but the impact on the aquatic food chain could be devastating.

Another potential ramification of genetically altered foods is that geographic shifts in production could have significant economic and social consequences. Local farmers see products such as the rot-resistant FlavrSavr tomato as a threat because that could make it possible to shift the production of "farm fresh produce" to areas with lower production costs. Other manipulations that geneticists are working on, such as crops that resist frost and drought, might also cause unexpected shifts in traditional growing areas that could threaten some farmers.

Previous studies have examined consumer attitudes about the use of biotechnology in agriculture and food production.[18] Hoban and Kendall's 1992 nationwide telephone survey of 1,228 adults found that awareness and understanding of biotechnology is rather low in the general population; however, two-thirds of the respondents supported the use of biotechnology in agriculture and food production. The study

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also found that acceptance of genetically altered products varied with the application. People are more favorably predisposed to applying recombinant DNA technology to crops than they are to applications involving livestock.

Large Food Service Operators Must Be Careful

While a good deal of research is aimed at consumer acceptance, little is known about the readiness of food service operators, particularly the large chains, to cope with this rapidly advancing technology. Food service organizations face the task of setting internal policies regarding the use of these products. This task is especially crucial for large multi-unit operators because their high visibility makes them an easy target for critics on both sides of the debate. Such operators should pro-actively consider the issue of genetically altered foods before it unfavorably thrusts them into the media spotlight.

The position of companies that franchise restaurants is especially unique as it relates to genetically altered foods. If companies that franchise restaurants do not properly address the use of these products, the issue could become a new source of contention between franchisors and franchisees, particularly if the stance of the franchisor differs from that of either the franchisee or the franchisee's customers. The consequences of such conflicts should not be underestimated given the salience of the objections being raised about transgenic foods.

Franchisees are obligated to abide by the purchase specifications set by the franchise and sometimes are required to purchase products specifically packaged for the chain. One question that may need to be asked is if franchisors should indicate their position on the use of genetically altered foods in their franchise agreements. One can envision a scenario where a franchisee finds out that his/her franchisor is using certain products, mixes, or recipes that utilize genetically altered products. Can the franchisee refuse to use these products on the basis of environmental, ethical, or other concerns?

Companies Surveyed Represent Billions in Sales

The companies surveyed represent $67.71 billion in annual food sales; this kind of purchasing power can greatly affect the market. A commitment by these companies either for or against genetically altered foods could send a strong signal to food suppliers and influence the rate of acceptance of genetically altered foods.

The study was designed to determine whether multi-unit food service operations have formulated formal policies regarding genetically altered foods. The study also asked about the likelihood that these organizations would use genetically altered foods in the near future to try to determine their predispositions toward this emerging technology.

The data were collected via a telephone survey of purchasing agents from 68 franchise and multi-unit food service companies conducted between June and August 1994. These companies represent 62,310 units and were selected from the *1994 Foodservice Operators Guide*

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Exhibit 2
Sample Profile

Types of Operations

	Frequency	Percentage
Fast food restaurants	33	48.5
Institutional food service	6	8.8
Casual / family restaurants	19	27.9
Upscale restaurants	2	3.0
Hotel restaurants	8	11.8
Total	**68**	**100.0**
Missing: 0		

Annual Sales Volumes

	Frequency	Percentage
Under $10 million	17	27.0
$10 million - $25 million	13	20.6
$25 million - $250 million	13	20.6
Over $250 million	20	31.8
Total	**63**	**100.0**
Missing: 5		

Number of Units

	Frequency	Percentage
Under 10	24	35.3
10-99	20	29.4
100-499	7	10.3
Over 500	17	25.0

which lists profiles of U.S. food service companies operating three or more units. The 20 companies with the largest annual sales were contacted; all but five completed the survey. The remaining companies were selected using a random method. Exhibit 2 shows the sample profile for this study.

The use of genetically altered foods is an emerging issue that has major implications for multi-unit food service operators. This analysis shows that irrespective of company size, restaurant type, and company revenues, the overwhelming majority of multi-unit food service operators currently do not have policies regarding the use of recombinant DNA food products. When purchasers were asked whether they have a present policy for their properties or licensees regarding the

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Exhibit 3
Likelihood of Future Use

Genetically-Altered Fruits or Vegetables

	Frequency	Percentage	Z-Score	
1 - Not at all likely	28	50.9	-0.786	Mean: 1.891
2 - Not at all likely	13	23.6	0.096	Median: 1.482
3 - Not at all likely	8	14.6	0.979	Stan. Dev: 1.133
4 - Not at all likely	4	7.2	1.861	
5 - Very likely	2	3.6	2.744	
Total	**55**	**100.0**		
Missing: 13				

Genetically-Altered Meats

	Frequency	Percentage	Z-Score	
1 - Not at all likely	30	55.5	-0.757	Mean: 1.870
2 - Not at all likely	8	14.8	0.113	Median: 1.400
3 - Not at all likely	11	20.4	0.982	Stan. Dev: 1.150
4 - Not at all likely	3	5.6	1.852	
5 - Very likely	2	3.7	2.721	
Total	**54**	**100.0**		
Missing: 14				

purchase of genetically altered fruits and vegetables, only three of the 68 answered yes (5 percent). Likewise, when the same question was asked regarding genetically altered meats, fewer than 2 percent answered yes. Apparently the issue of genetically altered foods is not yet part of the purchasing decision.

The industry's disposition toward the purchase of genetically altered foods was obtained through the use of two Likert-scale questions. Respondents were asked to rate the likelihood that their companies would, use genetically altered fruits/vegetables and use genetically altered meats, using five point scales where one represents not likely and five represents very likely. The results are shown in Exhibit 3.

Analysis of variances were performed to measure if there were significant differences among the respondents based on number of units and annual sales volume. No statistically significant differences were observed using this test. However, measures of correlation (see Exhibit 4) indicate a modest relationship between revenue classifications and the likelihood of purchasing genetically altered meats in the future ($r=0.380$, $p=0.001$). Not surprisingly, a similar relationship was found between the number of units and the likelihood of purchasing

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Exhibit 4
Correlation Analysis

	Gen. Altered Fruit/Veg.	Gen. Altered Meat	Likely Altered Fruit/Veg.	Likely Altered Meat
Number of units	0.148	0.192	0.215	0.296*
Restaurant type	0.023	0.017	0.151	0.132
Annual sales	0.072	0.161	0.240	0.380**

*P=.05 **P=.01

genetically altered meats in the future (r=0.296, p=0.05). This indicates that larger companies may be more favorably predisposed than smaller companies to future applications of genetically altered meats. There is a similar trend with genetically altered vegetables although it is not strong enough to be significant at the p=0.05 level.

Most Do Not Have Policies

The overwhelming majority of companies surveyed have not yet set purchasing policies regarding the use of genetically altered foods. Additionally, the organizations surveyed generally express a conservative approach and low levels of enthusiasm toward the use of genetically altered foods. One might surmise that these organizations either are not optimistic about consumer acceptance of these products, or they are not yet convinced about the potential benefits of recombinant DNA technology.

Previous studies show that consumers are more favorably predisposed to genetically altered crops than they are to genetically altered livestock.[19] The study concludes that multi-unit food service operators do not make a similar distinction between genetically altered plants and animals. The purchasing departments surveyed indicate that they are not significantly more likely to purchase genetically altered fruit and vegetables than they are meats. This suggests that these companies are not responding proportionally to consumer attitudes, but are taking a conservative approach to the technology.

Genetically altered foods have the potential to improve the food supply in ways that could benefit food service operators.[20] In spite of the benefits at stake, most companies are taking a cautious wait-and-see attitude toward the technology. Any miscalculation of consumer readiness to accept genetically altered foods has the potential to hurt sales throughout the company.

On one hand, the food service industry is concerned about negative reactions from consumers and activist groups who oppose genetically altered foods. On the other hand, people have historically been very adaptable to new technologies. Consumers now embrace many

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technologies that were once thought of as intimidating. For example, microwave ovens, ATMs, electric power, and air travel are widely accepted technologies that were once surrounded by controversy.

While there is resistance to genetically altered foods, technology has a great capacity to overcome barriers to its implementation. In his seminal work, *The Technological Society*, Ellul notes that, "technical progress is irreversible... There is never any question of an arrest of the process, and even less of a backward movement."[21] In all likelihood this will hold true for recombinant DNA technologies. Even with opponents of the technology it will likely become a reality. If recombinant DNA follows the pattern of most technologies, scientists will work to improve it; people will become more familiar with it; consumer concerns will diminish, and the products will gain acceptance. With this in mind, food service operators ought to keep abreast of this emerging technology and how it might affect their businesses. A healthy discourse is needed to sort out the environmental, ethical, and moral concerns being raised. Renowned futurist Marvin Cetron noted, "The people in the food service industry are not doing their homework. And they better if they want to benefit from the technology. The ones that get out there first and do it best are the ones who are going to benefit the most." [22]

Genetically altered foods are likely to become an important policy issue for multi-unit food service operators. The purpose of this study is to provide a baseline and timely study to conceptualize the problems and opportunities presented by this technology, and to characterize the biotechnology issue as it relates to, and is viewed by, multi-unit food service operators. Many companies are sensitive to consumer perceptions; however, food service operators as a group can play a role in shaping the course of product development, legislation, and consumer education about recombinant DNA technology. Further studies are needed to examine the ways transgenic foods might affect chain restaurants and their main elements of maintaining uniformity, responding to customer needs, and adopting system-wide processes.

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