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Is China the Market for Genetically Modified Potatoes?

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Major food companies have refused to use genetically modified (GM) potatoes in their processed potato products for fear of consumer backlash resulting from anti-GM food attitudes in Europe and Japan. However, recent findings conclude that consumers in China appear more positive about GM foods and that China may be an attractive market for GM products including GM potatoes.

Key words: biotechnology, China, genetically modified foods, potatoes.

Decisions made by quick service restaurants and snack-food distributors in 2001 to avoid genetically modified (GM) ingredients in their potato products dramatically reduced demand for GM potatoes. Companies such as McDonald's, Wendy's, and Frito-Lay refused to use GM potatoes in their french fry and potato chip products for fear that consumers would consider the potatoes unsafe and lose confidence in their products (Cook, 2000). Requests for non-GM potato products from the major food companies forced large potato processors to stop buying GM potatoes from US and Canadian growers. This resulted in decreased production of GM potatoes from 50,000 to 20,000 acres between 2000 and 2001 (Thornton, 2003). However, a recent study completed by the National Center for Food and Agricultural Policy (2002) revealed that the potential value from the use of GM potato crops in the US on an annual basis was approximately $86.3 million, with a 1.5 billion pound increase in the potato crop and reductions in pesticide use of 29 million pounds per year.

The reluctance of the major food companies to use GM potato products is primarily due to consumer skepticism regarding the unknown environmental and health consequences of GM crops. The worldwide debate over the use of genetically modified organisms (GMOs) has caused many European and Asian policymakers to ask for additional health and environmental safety testing for GM food products before they are approved for public consumption. The European Commission currently has 80 separate GM safety research projects underway, most of which are due to be completed in 2003 (European Commission, 2002).

Generally, European and Japanese consumers have little trust in government regulators. Sir John Beringer, former chair of the United Kingdom Advisory Committee on Releases to the Environment (ACRE), testified in a recent review of European Commision GM safety projects that Europeans are distrustful of the government regarding food safety, especially after recent outbreaks of Bovine Spongiform Encephalopathy (BSE). Additionally, negative media influences and cultural preferences for tradition have played a large role in consumer skepticism.

Previous studies on consumer attitudes towards GM foods in Europe and Japan confirm the lack of consumer acceptance of GM foods in these countries. McCluskey, Grimsrud, Ouchi, and Wahl (in press) conclude that consumers in Japan were willing, on average, to purchase GM noodles only if offered at a greater than 50% discount over non-GM noodles. Burton, Rigby, Young, and James (2001), in a study of consumer attitudes toward GM foods in the United Kingdom, concluded that infrequent male shoppers would be willing to pay an extra 26% to avoid animal and plant GM technology, whereas female shoppers would be willing to pay an extra 49.31%. In a study by Moon and Balasubramanian (2001), 46% of the survey respondents in the United Kingdom opposed biotech foods. In Norway, consumers were reluctant to accept genetic modification in meat and fish products but were less reluctant to accept GM vegetable varieties (Kuznesof & Ritson, 1996). These findings from Europe and Japan paint a relatively negative picture for the future of GM foods. However, it may be unreasonable to assume that consumers in all regions of the world would have the same preferences for GM foods, especially as there are a number of benefits (both to producers and to consumers) surrounding GM crops. Countries such as China, with a large and growing population, an increasing demand for western-style foods, and a growing biotech industry may find GM potatoes acceptable.

Background on GM Potatoes

In order to produce uniform processed potato products, potatoes must be of a certain size, specific gravity (solid content), and sugar content, with little or no bruising or

internal discoloration. High-quality potatoes allow potato processors to operate more efficiently due to lower levels of potato waste. The farming practices employed by the grower directly affect potato quality. Traditionally, insecticides and herbicides were used in an effort to control pest and virus infestation. Due to environmental and consumer concerns, genetic modifications of the plant itself were developed to decrease or eliminate the use of chemical crop applications. Genetic modification in potato plants attempts to achieve the goals of insect, viral, and fungal resistance, as well as herbicide tolerance. Such modification provides the potato plant with the ability to protect itself from many of the common potato pests, such as the Colorado potato beetle and the green peach aphid, fight off fungus such as Verticillium wilt, and provide tolerance to herbicides, which fight off weeds.

These genetic modifications in potato plants can result in a reduction in necessary pesticide applications (providing a safer environment for growers), reduced pollution from irrigation water run-off, and reduced public health consequences associated with pesticide ingestion. Growers may also benefit from the reduced need to scout their crops for pests. Genetically modified crops also reduce soil erosion, because they require less tillage due to the plant's resistance to herbicides.

Additionally, GM potatoes are bruise resistant and have an increased starch content, which leads to less oil absorption during the frying process (Thornton, 2003). As consumers become more health conscious, the demand for french fry and chip products has fallen off. Genetically modified potato products may provide a lower-fat alternative, which can be marketed to the health-conscious consumer.

Why China?

China should be considered a potential market for GM potatoes for several reasons. First, China currently has almost 1.3 billion people and is likely to exceed 1.4 billion by 2050 (Population Reference Bureau, 2002). China recognizes that if it is going to continue to feed its people, it must find more efficient agricultural production methods. To this end, China is spending close to $120 million each year on biotech research. In fact, China is the fourth largest producer of GM crops in the world after the US, Canada, and Argentina, and has approved more than a dozen genetically modified crops for development (Huang, Rozelle, Pray, & Wang, 2001).

Second, China is an important destination for US agricultural exports and has an ever-increasing demand for western-style convenience foods such as french fries and potato chips. This movement towards the consumption of western-style convenience foods in China is the likely result of increased incomes, busier lifestyles, and the availability of a greater variety of food options. Chinese income levels have increased dramatically over the last two decades, primarily due to average annual growth rates in per capita gross domestic product of nearly 8% since the early 1980s. The result is a growing middle class, composed primarily of singles and two working spouse households. Not only are prepackaged and preprepared meals now affordable for this segment of Chinese society, it is highly likely that they are seen as a necessity.

A study by Curtis, McCluskey, and Wahl (2003) conducted in Beijing, China, found that 41% of the survey respondents consumed french fries at least monthly, and 48.4 % of the respondents consumed potato chips at least monthly. Also, interestingly, 80% of the respondents had eaten at a McDonald's or KFC in the last year. Marr and Hatfield (2001) found that consumers in Shanghai, China, spent 9% of their total grocery bill on snack foods. In fact, Pringles potato chips (a Proctor & Gamble product) were found to be quite popular in Shanghai, even though they are priced higher than domestic brands. Increased processed potato consumption in China is evident in the expansion of frozen potato imports, which went from 6,600 metric tons in 1991 to 64,700 metric tons (a total value of US$49 million) in 2000 (Food and Agricultural Organization of the United Nations, 2002). Domestically, China produced 64 million metric tons of potatoes in 2001. However, growers in China are currently unable to produce high-quality potatoes with the characteristics necessary for potato processing—primarily due to soil and pest issues.

Third, as of October 1, 2002, regulations in China regarding processed potato imports require a US Department of Agriculture Agricultural Marketing Service (AMS) Certificate of Quality and Condition (Russell, 2003). China does not currently have special requirements for GM potatoes. China requires that GM soy, corn, and tomato-based products have government approval for importation; be certified not to cause harm to humans, animals, or the environment; be for sale in the country of origin; and contain labeling noting the use of genetically modified ingredients (Foreign Agricultural Service, 2002). Fears concerning environmental and health hazards prompted Chinese officials to require labeling, but the level of debate concerning GM products has not reached the level that is has in Europe. The only instance of government interference over imports

of potato products took place in 2001, when Chinese authorities halted and then restored imports of mashed potato powder used by KFC due to its higher than acceptable (by Chinese standards) sulfite levels (*Global Potato News*, 2002).

Finally, recent studies have found Chinese consumers to be positive about GM foods and in some cases willing to pay a premium for such foods. Li, Curtis, McCluskey, and Wahl (in press) concluded that consumers surveyed in Beijing, on average, were willing to pay a 16% premium for GM soybean oil and a 38% premium for GM rice over the non-GM alternatives. Curtis (2003) found that surveyed consumers in Beijing were willing, on average, to pay a 16% premium for processed potato products made from GM potatoes. Additionally, a 1999 survey of ten countries completed by Environics International (1999) found that Chinese consumers were the strongest supporters of agricultural biotechnology research, with the United States and India following close behind.

Implications for the Potato Industry

Recent studies, which show that Chinese consumers are positive about the use of biotechnology in foods and that the demand for western-style foods (such as french fries) is growing in China, suggest that there is a potential market for GM potato products in China. However, whether the present consumer attitudes toward GM foods are negative or positive, the consumer benefits of such foods and evidence of safety must be communicated to preserve and enhance markets (Gaskell, 2000).

If it is cost effective to do so, the potato industry should implement a dual marketing system based on the growing process—i.e. GM and non-GM potato products would be marketed based on consumer preferences in a particular region or country. Traceability requirements, aimed at eliminating the risk of mingling GM and non-GM potatoes, would include separation of the potato seed system, fields dedicated strictly to one growing process, processing plants dedicated to one potato type, and full labeling before shipment. Policymakers worldwide are now instituting labeling requirements for such items as country of origin, process attributes, and genetically engineered ingredients. A dual marketing system would conform to these new standards. As Louriero (2003) points out, a total traceability system for GMO products may be too expensive to implement, "yet it may be the only solution for the European Union in the short run until consumer confidence is restored" (p. 21).

Complications

An additional consideration is that multinational food companies are generally concerned about their brand name and company image. Started partly in response to the best seller *Fast Food Nation* (Schlosser, 2001) as well as recent lawsuits against quick service restaurants, there is now a movement by food companies to market themselves as providers of healthier snacks (McKay, 2002). If GM potato products are not perceived by consumers as healthy, selling them in China might possibly damage the food company's image.

Further, there may be criticism that GM products are being sold to consumers in a developing country, while non-GM products are being offered to consumers in Europe and Japan. Some developing countries have refused food aid that may have contained GM products. In contrast, one of the primary concerns voiced in developing countries is the issue of the right or ability to save seeds from GM crops. Another counterargument is found in the United States, where GM products (not including potatoes) are being sold to American consumers.

Conclusions

Based on consumer attitudes toward GM foods in Europe and Japan, quick service restaurants and snack-food companies stopped using GM potato ingredients in their food products. Hence, an infant industry in GM potatoes disappeared due to a lack of demand. Additionally, consumers may benefit through reduced-fat potato products. This article provides evidence of a potential market for GM potato products in China. Increased demand for western-style convenience foods, growing income levels, favorable import regulations, and positive consumer perceptions of GM foods and the application of biotechnology to crops provide grounds for optimism.

Finally, a dual marketing system for GM and non-GM products is needed in order to market GM potato products to China. It is necessary to evaluate consumer attitudes toward GM foods in each country and/or region, so that retailer marketing strategies can be properly implemented. Certification may be needed to reassure consumers who are concerned about the potential health and environmental consequences of GM food products. The traceability requirements for certification would include segregation of GM seed, potato plants, and yields up to the labeling process. This type of marketing system may provide an efficient way of dealing with new worldwide labeling requirements.

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