

Consumers' Food Safety, Environmental, and Animal Welfare Concerns:

Major Determinants for Agricultural and Food Trade in the Future?

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Abstract

A holistic approach to consumer demand recognizes that it can be expressed through government programs, consumer purchasing behavior, and the supply chain. Overall, the impact of consumer demand for quality on the agricultural and food system is an increased emphasis on quality differentiation but not all in the direction of the upgrading of product quality. The more elite market segments are thriving and reaching growing numbers of consumers but the basic price/quality markets remain strong. Most recent economic studies find that consumers are willing to pay for food safety and other attributes, and for information about them. While these studies generally detect a willingness to pay, the magnitude varies by attribute, food product, and country. This literature, along with trend analysis of market developments, suggests that consumer demand is likely to have an important effect on agricultural and food trade. However, we argue that, in its life cycle, this impact is in its maturity having passed through its introduction and growth stages. We do not expect it to enter a decline period but to remain a strong force in global trade over the coming decades. However, the shape of that impact is known and, in large part, the adjustment to it has already occurred.

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Consumers' Food Safety, Environmental, and Animal Welfare Concerns: *Major Determinants for Agricultural and Food Trade in the Future?*

1 Introduction

Analyses of the effect of changes in consumer demand on agricultural and food trade have a tendency to begin with sweeping statements such as “consumer demand is a key driver of today’s agricultural and food trade,” “demand for quality is increasing among consumers around the world,” or “the agricultural system is moving from being commodity based to being based in differentiated food products.” While these statements may be generally true, they have the usual drawback associated with sweeping statements—they tend to obscure important facts. Here we focus on where demand for specific food attributes is coming from, its nature and level, and how it is likely to affect agricultural and food trade in the future.

For consumers, information on the health risks and benefits of eating particular foods is featured in the media, and delivered by health care professionals, government, and consumer groups. For example, in the last two years in the United States there have been stories about the dietary risks posed by mad cows; the obesity epidemic; toxins in farmed salmon; methylmercury in some types of fish; *E. coli* O157:H7, *Salmonella*, and *Listeria monocytogenes* in a variety of foods; illegal hormone use in the veal industry; and numerous other issues. Outside the health profiles of foods, consumers are thinking about much more in making their food selections as organic, fair trade, free range, and other differentiated products vie for consumer attention.

In our view, a holistic approach to consumer demand recognizes that it can be expressed through government programs, consumer purchasing behavior, and the supply chain. We discuss each in turn after first setting the general stage for quality in markets for food.

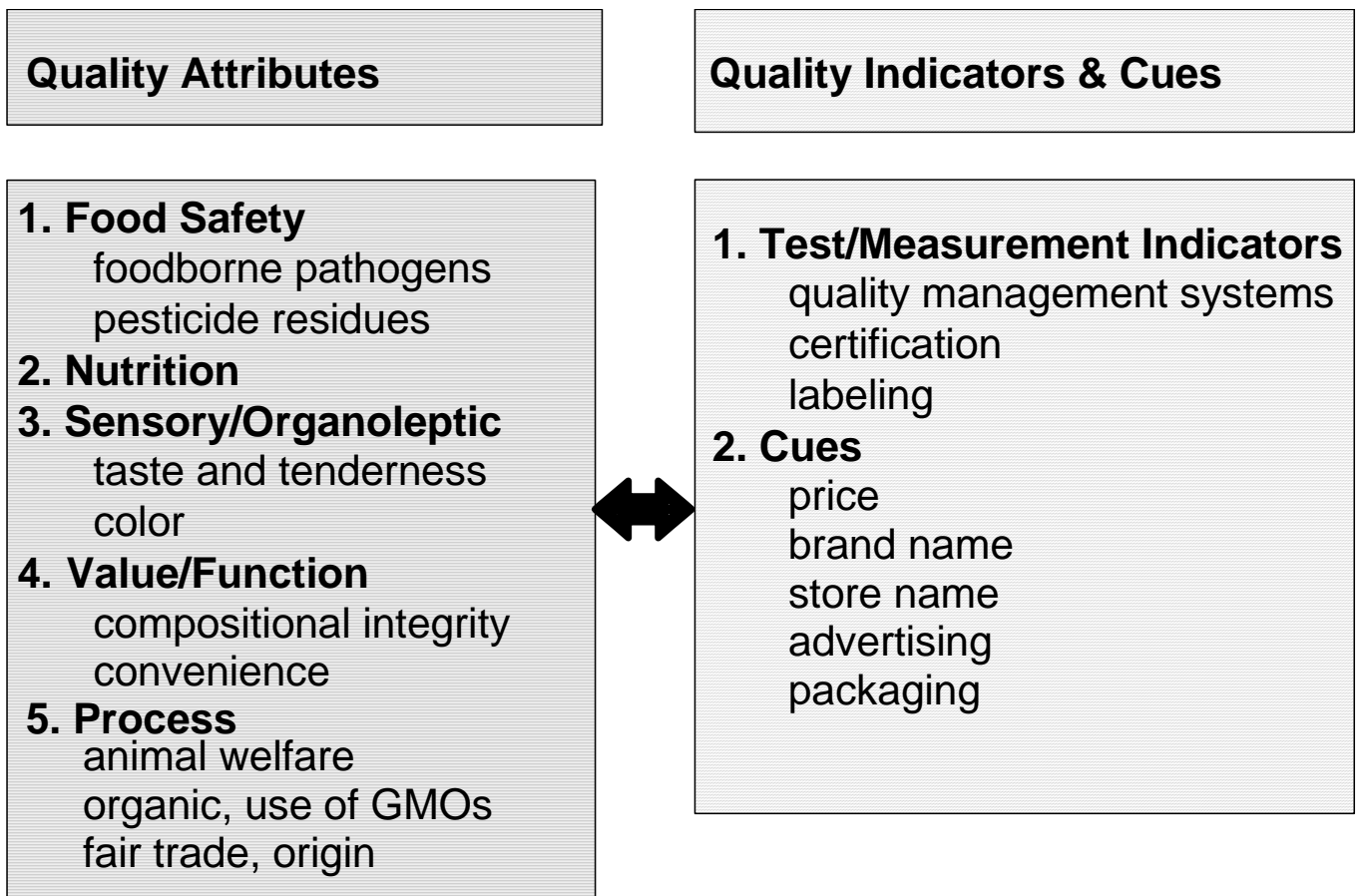
2 A Multi-Attribute World

Product quality is determined by the set of attributes or characteristics of a food product, as well as how those attributes and characteristics are assured and communicated to consumers. Overall, consumer food choices are influenced by a variety of factors including taste, convenience, price and accessibility, available alternatives, health status, and cultural traditions. There is nothing new in consumers caring about multiple attributes of food products but the continuing differentiation of food products means that consumers can get information on and care about a broader range of attributes.

A basic list of quality attribute categories is shown in Figure 1 (Caswell, Noelke, and Mojdzuska, 2002). A major feature of the attribute categories is their interaction (complementarity and/or substitutability). For example, consumers may use a quality attribute such as the origin of the product to draw conclusions about additional attributes of the product such as safety and taste. Similarly organic or environmentally-friendly production practices may be used as indicators of safety, taste, or other product characteristics.

Consumers come to the market with prior experience, a level of education, perceived quality risks, a quality consciousness, goals they hope to achieve in using the product, and other personal and situational factors. Companies use these factors to design marketing efforts and choose quality control systems that will produce quality and also allow them to signal (communicate) quality to consumers using the types of indicators and cues shown in the right column of Figure 1. These cues and indicators, such as certification systems, labeling, and branding are particularly important for credence attributes that the consumer has difficulty in evaluating, such as whether there are pesticide residues in a particular tomato. The central point is that quality is multidimensional, as is quality signaling.

Figure 1 Quality Attributes and Their Indicators and Cues (with Examples)



Source: Caswell, Noelke, and Mojdzuska.

3 The Impact of Government Demand for Quality

Government sector demand for food quality is the subject of other papers in this symposium and so is not a major focus here. However, it is important to recognize that in most countries a major force for demand for food quality, particularly food safety, is the government. This is true of higher income countries where already high standards continue to be ratcheted up and for lower income countries where standards are beginning to be established and enforced. Domestic government demand stems from at least two concerns. On the safety and nutrition side is an interest in improving public health. On the quality side there is an interest generally in assuring that consumers are protected from substandard product or being duped about product quality. Part of government demand is derived from citizens/consumers, thus the total effect of consumer demand on agricultural and food trade must include demand expressed through government regulation.

Governments are involved in regulating food quality across the entire range of attributes. While food safety has been of central importance in regulatory programs, the desire to protect consumers from fraud and/or to promote particular values (e.g., small scale, local production) has led to a heavier government involvement in what are essentially quality control and certification schemes (e.g., organics, PDOs, PGIs, country of origin). Government labeling programs have been used or are being developed in several others areas, including for nutrition and some process attributes (Golan et al.). Overall, stricter food safety regulation is prompted by the identification of new risks, the better understanding of existing risks, or, in some cases, a lower tolerance for known risks. A broader involvement by government in nutrition is prompted by the growing public health impacts of overnutrition. Of course, the sorting out of consumer derived demand for quality from other motivations for regulatory activity is an on-going challenge.

4 The Impact of Consumer Demand for Quality

The impact of consumer demand for quality, including safety, on food markets must be considered in terms of market segments and industry developments. Some segments have strong demand for what they perceive to be higher quality products. For example, the organic market has been growing very rapidly in many countries. In the United States, the growth rate for organic products exceeded 20% in the years throughout the 1990s and is estimated to be 9-16% through 2010 (Dimitri and Oberholtzer). This demand is evident in the rapid growth of food chains such as Whole Foods. However, low price, or more accurately high value (price for quality), drives a large share of the food market. For example, fueled by high levels of efficiency in its supply chain and low prices, Wal-Mart has grown to be the largest food retailer worldwide with nearly \$300 billion in sales (Supermarket News). Most interestingly, the same consumer can dip into very different product and store markets to meet different needs. For example, recent research shows a marked increase in multioutlet shopping. The

ultimate outcome is consumers who pick and choose products based on quality/price considerations, dropping into different stores for particular needs.

Consumer concerns about food safety are colored by the degree of confidence they have in government safety assurance programs. The European Union countries, particularly the United Kingdom, have had to work very hard to begin to regain this confidence after multiple lapses in control in the 1990s and into this century. In contrast, the Canadian and US governments enjoy relatively high consumer confidence. The Food Marketing Institute reports that as of January 2004, 82% of the US consumers it surveyed were completely or mostly confident their food is safe, up from 74% in 2000 (The Food Institute Report). These numbers reflect a general feeling of complacency among consumers about the level of protection being provided by government and industry. That level of confidence and trust may perhaps be too high leaving consumers unaware of risks and actions that should be taken to protect themselves from foodborne illness.

Overall, the impact of consumer demand for quality on the agricultural and food system is an increased emphasis on quality differentiation but, and this is key, not all in the direction of the upgrading of product quality. The more elite market segments are thriving and reaching growing numbers of consumers but the basic price/quality markets remain strong, especially as lower income consumers face increasing budget challenges. Commentators frequently talk about whether North American consumers will become “Europeanized” in the sense of becoming more discerning regarding quality attributes other than safety. The much more basic question is the potential for North American consumers to become “Europeanized” in the sense of needing additional confidence in the regulatory system’s ability to deliver safe foods.

4.1 Beyond the Generalizations: Evidence on Consumer Willingness to Pay for Quality Attributes

The role of consumer demand in shaping markets for agricultural and food products has been increasingly emphasized over the last two decades. The problem, however, is to identify causality—are changes in consumer demand shaping international agricultural and food markets or are companies, other interest groups, and governments shaping consumer demand? Of course, the answer is both and thus we emphasize the roles of governments, consumers, and the supply chain in shaping demand for quality attributes. Without capturing causality, we reviewed research done by several economists in recent years on consumer demand for a variety of quality attributes. Our goal was a type of partial meta-analysis. The literature has become quite voluminous; here we provide an overview of the findings.¹

¹ Citations of relevant literature are provided in the references section. Contact the authors for a detailed description of the studies on which the discussion here is based.

4.1.1 *Willingness to Pay for Food Safety: Observed Characteristics*

Educated and employed consumers are more concerned about food safety and are willing to pay a premium for food safety. In the event of an outbreak, consumers who are younger are more susceptible to negative media. Common trends observed during outbreaks, for example in the case of BSE, are substitution to other meats and more emphasis on food safety. Firms that handle organic and food products with quality assurance systems are found to benefit in these situations. With an outbreak, consumers are willing to pay more for products that are tested and labeled, i.e. they are more willing to pay for products that provide information in comparison to products that do not.

In general, consumers are not very open to food treated with some technologies (e.g., irradiation, genetically modified (GM) foods, and antibiotic use in livestock), more so when there is a lack of information regarding the risks attached to them. They may prefer categories of food products that use these technologies if they are offered extra benefits in the form of price discounts, or a health or environmental emphasis, i.e., when perceived benefits outweigh the perceived risks. There is a whole spectrum of degrees of acceptance/rejection of food treated with biotechnology. At one end of the spectrum is Japan and Korea with low consumer acceptance; at the other extreme are China and Taiwan that show much greater acceptance. Europe is in between with varied degrees of acceptance. Studies in developing countries are scarce but work in Kenya finds consumer acceptance may hinge on factors such as urgent food needs. Other reasons for acceptance or rejection of technologies can be the level of trust associated with government programs, perceptions of science, and the positive or negative influences of the media.

Similarly, there is a demand for food products that are explicitly specified as pesticide free. In most cases, it has been found that willingness to pay is expressed by consumers who are more concerned about health and the environment, insensitive to price, younger in age, higher in education, and who have more household income.

Food safety is believed to be assured to a large extent by practices such as traceability, transparency and assurance (TTA); labeling of different characteristics with emphasis on food safety such as Country of Origin Labeling (COOL); and information on processes such as use of Hazard Analysis Critical Control Points (HACCP). However, there are differences in the European Union and the United States in the objective of implementation of these systems that can ensure food safety. TTA systems in the EU have been implemented because it is a requirement to gain access to markets whereas in the US it has focused more on consumers' willingness to pay. In other words, these systems are more often mandatory in the EU than in the US. However, there are experiments in which consumers have chosen food safety over traceability. Consumers in the US and Canada are found to be more willing to pay for information on animal treatment and food safety assurance than on traceability alone.

Along the same lines, country of origin labeling is perceived to be an instrument that imparts information on the origin of the food product. Various studies show that consumers are willing to pay a higher price for the label because they use this information as both safety and quality cues. It serves as a means by which consumers can differentiate domestic goods from imports. Hence they are willing to pay for the information, especially when they prefer domestic goods and consider them to be safer. With country of origin labeling, willingness to pay is also dependent on a number of factors such as consumer awareness, price sensitivity, and demographics.

To conclude, in most studies it has been found that consumers are willing to pay for food safety, and, importantly for information that they believe provides food safety assurance. However, willingness to pay in these studies is contingent on certain factors such as consumers' age, income, demographics, and the method the study used. In generalizing the results of such studies, it is important to keep these caveats in mind.

4.1.2 Concern About and Willingness to Pay for Animal Welfare and Reduced Environmental Impacts

Some studies have shown that consumers are concerned about animal welfare, and about the use of antibiotics in animal feed and the use of growth hormones. This is however highly subject to the type of study conducted and its objective. To date, the studies of traceability systems put the most emphasis on animal welfare concerns and health effects.

Consumers may perceive environmentally friendly practices in farming and breeding as an indicator of food safety and the taste of the final product. Environmental friendliness, however, may not be a dominant driver in consumers' choice of product but an additional and secondary consideration. Evidence suggests that the evaluation of environmental promises may be influenced by other product attributes and cues. An example is the prices of the food products; low priced products may not be perceived to be environmentally friendly.

4.1.3 What Do the Numbers Say?

There have been a number of studies completed that attempt to measure consumer willingness to pay (WTP) for particular food attributes or combinations of attributes. Table 1 presents our review of a sample of these studies published in the last five years. These studies are organized in the table by country and attribute. The cells of the table report findings of consumers' willingness to pay in

	Food safety			Animal welfare		Country of Origin Labeling		Traceability	
	<i>Beef</i>	<i>Pork</i>	<i>Grain/ Salmon</i>	<i>Beef</i>	<i>Pork</i>	<i>Beef</i>	<i>Produce</i>	<i>Beef</i>	<i>Pork</i>
Canada	20%^a and 18%^b sandwich	17%^a and 13%^b sandwich		18%^a and 19%^b sandwich	16%^a and 13%^b sandwich			7%^a and 9%^b sandwich	10%^a and 7%^b sandwich
US	20%^b and \$0.63^c per sandwich \$0.77/lb^d irradiated ground beef \$6.98/lbⁱ and \$8.12 /lb^j growth hormone-free steak \$3.23/lbⁱ and \$3.31/lb^j non-GM feed steak	23%^b and \$0.59^c per sandwich	5-8%^e, 50-62%^f, 41.2%^g non-GM vegetable oil, 15-28%^e and 52.5%^g non-GM Salmon, 12-17%^e non-GM cornflakes, 31.4%^g non-GM cornflakes, 40.9%^g non-GM fed salmon	16%^b and \$0.50^c per sandwich	20%^b and \$0.53^c per sandwich	11%^h steak , 24%^h hamburger	\$0.49/lb^m apples, \$0.48/lb^m tomatoes	7%^b and \$0.23^c per sandwich	18%^b and \$0.50^c per sandwich
France	\$9.34/lbⁱ , 9.94/lb^j and 0.30/lb^k growth hormone-free steak, \$9.18/lbⁱ , 9.32/lb^j and 2.79/lb^k non-GM feed steak								

	Food safety			Animal welfare		Country of Origin Labeling		Traceability	
	<i>Beef</i>	<i>Pork</i>	<i>Grain/ Salmon</i>	<i>Beef</i>	<i>Pork</i>	<i>Beef</i>	<i>Produce</i>	<i>Beef</i>	<i>Pork</i>
Germany	\$6.99/lbⁱ, 7.29/lb^j and 1.93/lb^k growth hormone-free steak, \$7.63/lbⁱ, 7.67/lb^j and 2.55/lb^k non-GM feed steak								
Norway	\$1.39/lbⁿ hormone-free steak		55-69%^f non-GM vegetable oil, 54.2%^f non-GM fed salmon and 67%^f non-GM salmon						
Spain	5%^o label certified beef								
U.K.	\$8.72/lbⁱ, 7.39/lb^j and 0.86/lb^k growth hormone-free steak, \$7.47/lbⁱ, 6.31/lb^j and 8.88/lb^k non-GM feed steak								
Japan	56%^p BSE-tested		30-40%^q non-GM canola oil, 33-40%^f non-GM vegetable oil						

	Food safety			Animal welfare		Country of Origin Labeling		Traceability	
	<i>Beef</i>	<i>Pork</i>	<i>Grain/ Salmon</i>	<i>Beef</i>	<i>Pork</i>	<i>Beef</i>	<i>Produce</i>	<i>Beef</i>	<i>Pork</i>
Korea			54.2% ¹ non-GM vegetable oil, 81.2% ¹ non-GM tofu						
Taiwan			17-21% ^f non-GM vegetable oil, 21.19% ^t non-GM soybean oil, 37.42% ^t non-GM tofu, 108.4% ^t non-GM fed salmon						
China			38% ^u GM rice, 16.3% ^u GM soybean, 23.4% ^r non-GM soybean oil, 41.5% ^r non-GM rice, 23.3% ^r non-GM vegetable oil						
Kenya			13.7% ^s GM maize						

Table 1 Footnotes

^aHobbs, Bailey, Dickinson and Haghiri 2005

Methodology: Vickrey second price auction
 Time of study: March 2002
 Place of study: Saskatchewan and Ontario; Canada
 Food product being studied: Ham and roast beef sandwich

^bDickinson, Hobbs and Bailey 2003

Methodology: Vickery style auction experiments
 Time of study: October 2001 and March 2002
 Place of study: Logan, Utah; USA and Saskatoon, Saskatchewan; Canada
 Food product being studied: Ham and roast beef sandwich

^cDickinson and Bailey 2002

Methodology: Lab auction study, non-hypothetical bid data
 Time of study: October 2001
 Place of study: Logan, Utah; USA
 Food product being studied: Ham and roast beef sandwich

^dNayga, Aiew, Woodward 2004

Methodology: Face to face WTP experiment, Contingent Valuation Method
 Time of study: March- June 2002
 Place of study: Austin, Houston, San Antonio, and Waco, Texas; USA
 Food product being studied: Irradiated ground beef

^eChen and Chern 2002

Methodology: Contingent Valuation Method, Mail survey
 Time of study: March 2001
 Place of study: Columbus, Ohio; USA
 Food product being studied: non-GM vegetable oil, non-GM salmon and non-GM cornflake breakfast cereal
 Note: GM and GM-fed salmon in same category

^fChern, Rickertsen, Tsuboi and Fu 2002

Methodology: Stated preference approach, National telephone survey
 Time of study: March-April 2002
 Place of study: Agricultural university of Norway, Norway and Ohio State University, USA
 Food product being studied: non-GM vegetable oil, non-GM fed salmon and non-GM salmon
 Note: Mean WTP is measured as a range because the base price for GM food was varied in the design of offered prices in the survey.

^gKaneko and Chern 2003

Methodology: Contingent Valuation Method, Telephone survey
 Time of study: April 2002
 Place of study: sample entire US
 Food product being studied: non-GM vegetable oil, non-GM cornflake cereal, non-GM-fed salmon, non-GM salmon
 Note: WTP highest to non-GM salmon and different from GM-fed salmon due to weaker aversion to GM foods involving only modification of plant genes

^hUmberger, Feuz, Calkins, and Sitz 2003

Methodology: Face to face survey and auction
 Time of study: 2002
 Place of study: Chicago and Denver; USA
 Food product being studied: Steak and hamburger- beef
 Note: "USA guaranteed" label

ⁱLusk, Roosen and Fox 2001

Methodology: Contingent Valuation Method, Mail survey
 Time of study: Spring 2000
 Place of study: France, Germany, UK and USA
 Food product being studied: Hormone-free, GM-free feed beef steak

^jLusk, Roosen and Fox 2003

Methodology: Contingent Valuation Method, Mail survey
 Time of study: Spring 2000
 Place of study: France, Germany, UK and USA
 Food product being studied: Hormone-free, GM-free feed beef steak
 Note: Estimated premiums are large in magnitude as consumers overstate their WTP in hypothetical settings (hypothetical bias). *Relative* magnitude of the WTP values assuming hypothetical bias is similar across countries.

^kTonsor and Schroeder 2003

Methodology: Survey and choice experiments
 Time of study: August 2002
 Place of study: London; UK, Frankfurt; Germany and Paris; France
 Food product being studied: Hormone-free and GM-free beef steak
 Note: "USA grown" label

¹ **Kim and Kim 2004**

Methodology: Contingent Valuation Method, Student survey
Time of study: Nov-Dec 2003
Place of study: Seoul; Korea
Food product being studied: non-GM vegetable oil and non-GM tofu

^m **Mabiso, Sterns, House, and Wysocki 2005**

Methodology: Vickrey auction, Face to face interview
Time of study: Nov 2003- Jan 2004
Place of study: Gainsville, Florida, Lansing, Michigan and Atlanta, Georgia; USA
Food product being studied: Fresh apples and tomatoes
Note: "USA grown" label

ⁿ **Alfnes and Rickertsen 2003**

Methodology: Stated Choice survey-Contingent Valuation Method, Experiment auction
Time of study: April 2000
Place of study: Norway
Food product being studied: hormone status for beef
Note: Uses non-hypothetical techniques

^o **Angulo and Gil 2004**

Methodology: Telephone survey
Time of study: Spring 2002
Place of study: South of Spain
Food product being studied: label-certified beef

^p **McCluskey, Grimsrud, Ouchi, and Wahl 2005**

Methodology: Contingent valuation method, Face to face survey
Time of study: Dec 2001
Place of study: Nogano; Japan
Food product being studied: BSE-tested beef

^q **Kaneko and Chern 2004**

Methodology: Vickery second-price auction
Time of study: Dec 2003
Place of study: Tsukuba, Tokyo; Japan
Food product being studied: non-GM canola oil

^r **Lin, Somwaru, Tuan, Huang, and Bai 2005**

Methodology: Contingent Valuation Method, Personal interviews
Time of study: Fall 2002
Place of study: Beijing, Shandoney, Jiangsu, Zhejiang and Shanghai; China
Food product being studied: Non-GM rice, non-GM soybean oil and non-GM vegetable oil
Note: Overstate WTP due to hypothetical bias. Rice is the main food staple that is not consumed in a highly processed form, while soybean oil is a food product consumed after crushing which destroys much of the DNA sequence; more WTP for non-GM rice.

^s **Kimenju and Groot 2005**

Methodology: Contingent Valuation Method, Face to face interview
Time of study: Nov-Dec 2003
Place of study: Nairobi; Kenya
Food product being studied: GM maize

^t **Chiang (2004) as cited by Lin, Somwaru, Tuan, Huang, and Bai 2005**

Methodology: Contingent Valuation Method, National Telephone survey
Time of study: January 2000-September 2002
Place of study: Taiwan
Food product being studied: non-GM soybean oil, non-GM tofu and non-GM salmon

^u **Li (2003) as cited by Lin, Somwaru, Tuan, Huang, and Bai 2005**

Methodology: Contingent Valuation Method
Time of study: August 2002
Place of study: Beijing, China
Food product being studied: GM rice and GM soybean oil

particular countries for different attributes of concern in food products, namely, food safety², animal welfare, traceability, and country of origin labeling.

A common feature in WTP studies is the use of various types of contingent valuation methodologies to elicit WTP, including surveys, choice experiments (conjoint analysis), and experiments. Since we focused on the past five years, the studies included in the table tend to showcase issues that have been prominent during this period, including the impact of BSE and genetic modification on the attitudes of consumers as measured in terms of their WTP for food products with particular attributes. The figures in the table are reported either as percentage changes from a base price, dollars per pound, or dollars per sandwich. Many studies are for meat products. There is variation in the form of meat used in experiments or surveys; common forms are sandwiches, steak, or hamburger. A majority of the experimental studies have been conducted with students at different universities. In some studies, there is a WTP range as the base price was varied in the design of offered prices in the survey. Estimated premiums are often large in magnitude. This raises the concern that contingent valuation methodologies may overstate WTP in hypothetical settings (i.e., there is hypothetical bias). Consumer characteristics have varying and nonuniform effects in different WTP studies.

Studies of consumer valuation of the use of genetic modification have been done in a broad range of countries. Studies show that GM/non-GM food have different interpretations in these countries. Some countries are more open to GM food, while others are not. Countries where GM food is disfavored outnumber those where it is more favored. The studies indicate that in China and Kenya, consumers support GM food. For example, consumers in China had nearly equivalent WTP for GM and non-GM rice and soybean oil.

We also note that different studies report different WTP figures for the same characteristic of a food product. There are huge variations in the numbers. For example, in the case of non-GM vegetable oil in the US, the premium estimate ranges from 5-62% across studies. The variation may be attributable to hypothetical bias and consumer characteristics. Country of origin labeling studies do not distinguish between consumers' desire for domestic goods as opposed to any country specific good. For example, consumers in the US may consider "US grown" as country of origin labeling. Table 1 is dominated by work on GM/non-GM food. However, in the US and Canada there are a number of studies spread over consumers' WTP for food safety, animal welfare, COOL, and traceability.

4.2 Summary

Recent literature suggests that consumers are willing, at least hypothetically, to pay varying amounts for enhancement of some food attributes or the absence of other attributes. At the least, we can say that

² The use of genetic modification is categorized as a food safety issue in this table. For extensive discussion of GM see a following symposium paper.

these WTP differentials depend on the product, the attribute, the country, and the information environment. The reported, although perhaps not the actual, amounts may also depend on the study design. Beyond this, we believe that broad conclusions are difficult to make. The blank cells in Table 1 suggest there is a potential for more research. The research could be helpful to marketing agencies and public policy makers as well as in understanding consumer demand. However, it is unclear how to structure further research to yield more than snapshot pictures of the strength of consumer demand for particular attributes or attribute combinations. Perhaps snapshots are enough.

5 The Impact of Supply Chain Demand for Food Quality

As noted above, a third way in which consumer demand can be expressed is through the quality requirements of supply chain participants who are reflecting, shaping, and/or creating consumer needs and wants. The requirements put into place by supply chain participants are increasingly comprehensive across the range of attributes, reflecting marketing opportunities as well as strategies to control risk associated with marketing poor quality products. Ibery and Kneafsey (1998) point out that national and international regulatory bodies may have a different perspective on quality, relating it to “objective, scientific” measures such as hygiene requirements or good agricultural/ manufacturing practices.

Recently, the demands of retailers have been identified as a driving force in the overall demand for quality. According to Sterns et al.(2001) in a case study of retailers in the United Kingdom and Germany, retailers have emerged to be the driving force in defining quality and requiring suppliers to implement quality assurance systems (Morris and Young 2000). This role is attributed to the retailers' market power arising from market concentration, their role as consumer gatekeepers, and their comparative advantage in logistics. Fresh produce quality is a factor retailers use to compete for consumers but there is evidence of industry consensus on some quality attributes, particularly, safety, environmental, and social attributes. EurepGAP is a leading example of a retailer-led industry initiative for setting minimum quality standards.

If there is a market premium for “safer” food, retailers have an incentive to achieve enhanced levels of food safety, which may be communicated in part by means of a label. For example, food retailers can act as a catalyst for improved traceability and food safety if this improves product recall effectiveness, reduces risk exposure, or reduces the transaction costs arising from the monitoring of product quality, including the production methods of suppliers. In many cases, the main motivation for enforcing traceability is more to reduce the transaction costs of supply chain management than to provide information to consumers on credence attributes (Hobbs et al. 2005). However, retailers do try to fill the gap in consumer confidence by providing quality assurances especially in cases where confidence in public food safety agencies has been weakened.

Retailers are often under pressure due to competition and the price sensitivity of consumers. As a result, it is often not clear if there is a preference for food marketed according to origin or differentiated by environmentally-friendly practices. Some studies have found that retailers showed more interest in origin but this is dependent on a number of factors such as the area of study and the characteristics of the market served.

In developing countries, supermarkets have a dual objective; one to improve quality and eventually safety of the product and another to reduce costs and increase volumes (Reardon et al. 2004, 2001). Recently the number of supermarkets opened in developing countries is on the rise mainly due to foreign direct investment by richer countries. This investment in developing countries can be attributed to saturation and intense competition in home markets and the opportunity of higher profits. The supply of supermarket services is supported on the demand side by increasing urbanization, the rise of the middle class, and increasing workforce participation by women.

To conclude, the main motivation for retailers to ensure food safety has been found to be reduction of transaction costs and risk exposure. In cases of outbreak of diseases, retailers have taken a more proactive role in ensuring food safety than is required by law to salvage consumer confidence in their products.

6 How It All Comes Together in a Global Trade Environment

Globalization is of significance for government, consumer, and supply chain demand for food quality. On the government side, the globalization of the food supply means the management of a more diverse risk profile with the addition of large volumes of imported foods. If export markets are important to a country's food industries, food safety policy and infrastructure become key to entering such markets and maintaining or expanding market share. Also, governments are involved in trying to squash the regulatory initiatives of their trading partners when they believe these policies are unfairly disadvantaging companies trying to sell into those markets. Thus there is a well recognized potential for governments to use regulatory programs, or opposition to such programs, as strategic weapons in trade competition. Agreements contained in the World Trade Organization are intended to limit this tendency but the regulatory wrestling continues between countries, albeit under stricter rules of the game.

On the consumer side, the global sourcing of food products means the year-around availability of both commonplace and exotic products. In addition, the variety within product categories is greatly extended with global trade. Global food sourcing may add to the attributes of concern to consumers in making food choices. For example, if consumers are buying salmon, they may want to know where and how the salmon was produced in order to gauge possible undesirable contaminant and desirable fatty acid levels, as well as to know what environmental effects are associated with the product. On the

supply chain side, retailers have to coordinate and control the attributes of their offerings across longer supply chains.

To see how the government, consumer, and supply chain demands for food quality come together, we briefly discuss the case of bovine spongiform encephalopathy (BSE) in North America. BSE (popularly known as mad cow disease) is a disease of the central nervous system in cattle, which is eventually fatal to them. BSE started as an animal health issue. However, since 1996 BSE has been recognized as a human health risk because the human disease called variant Creutzfeldt-Jacob Disease (vCJD) is thought to be linked to the consumption of particular meat products from BSE-infected cattle. This human disease is in turn fatal; up to this point, nearly 150 people have died from it in the United Kingdom (UK). The European beef market, especially in the UK, was devastated for some time by the mad cow epidemic and consumer confidence in regulators and industry was shattered.

In North America, the European experience generated government demand for improved animal and human health protection against BSE; consumer awareness of the issue was low. Canada and the United States passed new regulations focused on stopping the feeding of most mammalian protein to ruminants, including cattle. Although these regulations were generally not as stringent as those adopted in the UK, no indigenous cases were detected up to 2003 and the North American countries, including Mexico, were considered BSE free.

The BSE risk came at a time when the beef and cattle markets had become highly integrated between Canada, the United States, and Mexico under the Canada-United States Free Trade Agreement, then under the North American Free Trade Agreement (NAFTA) (Sparling and Caswell). Live animals were coming into all parts (stocker/backgrounders, feedlots, and processing plants) of the US supply chain from Canada, and into feedlots and processing plants from Mexico. At the same time, Canada and Mexico were selling beef products into the US market, and the US was selling beef into the Canadian and Mexican markets. While all the countries were connected to each other, Canada was most vulnerable because it was exporting 40% of its slaughter cattle and 30% of its beef. This trade was contingent on the countries remaining BSE free. This ended in 2003 with the confirmation of a case in Canada in May and a case in the US in December. The immediate governmental action in North America and elsewhere was border closings. The North American market for live animals and beef products disintegrated. While there has been partial reopening of the borders for some types of meat products, major parts of the market remained closed until 2005. The trade disruption has been particularly damaging for Canada.

The North American BSE crisis is interesting because of a lack of demand factors. In the US, the government had not adequately communicated to consumers the controls that were in place and the very low human health risk posed by BSE. It is unclear whether such communication would have been effective or advisable given the low consumer knowledge and interest about BSE. When the Canadian case was confirmed in May 2003, the US anticipated a food scare among US consumers and problems

with US trading partners. So the border was closed to Canadian cattle and beef products. The consumer scare did not develop but, in any case, closing the border only provided a false sense of action given the highly integrated nature of live animal and beef markets. When a case was confirmed in the US later in 2003, the government rushed to institute a new set of regulatory controls on an emergency basis, while assuring consumers that everything possible had previously been done to mitigate the possibility of risk from BSE. The NAFTA countries have cobbled together a reopening of trade even as subsequent cases of BSE have been found in both Canada and the United States.

BSE is a good example of the interaction of globalization, agribusiness, and consumer and government demand for food safety. Given the market disruption, it appears that the governments involved had actually underestimated their true demand for BSE controls because they did not make a full market assessment of the impact of BSE in terms of the trade impact, particularly within NAFTA. To the US government it seemed clear before 2004 that the public health benefits of stricter controls were likely to be very small, if not near zero, given the probable extremely low incidence of BSE. However, the benefits of stricter regulation in terms of providing a regulatory base that could withstand the confirmation of one or a small number of BSE cases—one that would assure consumers without generating a scare and prevent border closings—were not counted heavily enough. On the cost side, there were estimates showing the costs of stricter controls would be significant. As is often the case, the direct costs, which were thought to be well known, outweighed the less well considered benefits.

In this case the underestimation of its own demand by the US government was facilitated by the relative lack of consumer concern, supply chain concern, and media coverage of BSE in North America. The obverse frequently happens as well—high consumer interest and intensive media coverage lead governments to overestimate their true demand for food quality resulting in too much rather than too little action.

7 Is Consumer Demand a Driving Force in Global Agricultural and Food Trade?

Managing food safety risks and providing desired levels of other quality attributes is a complex task, particularly in globalized agricultural and food markets. Farmers, food processors, food distributors, retailers, and food service companies are faced with varied demands for food quality, including food safety, from consumers and governments. In this paper we have pointed out that consumer demand for food attributes such as food safety, environmentally friendly products, and care for animal welfare is expressed through governments, consumers, and the supply chain. Causality is hard to pin down in this context.

We have reviewed recent studies on consumer willingness to pay for particular attributes and packages of attributes. These studies can be important to companies and governments in understanding

consumer demand. The studies generally detect a willingness to pay but the magnitude varies by attribute, food product, and country. This literature, along with trend analysis of market developments, clearly suggests that consumer demand is likely to have an important effect on agricultural and food trade. However, we conclude that, in its life cycle, this impact is in its maturity having passed through its introduction and growth stages. We do not expect it to enter a decline period but to remain a strong force in global trade over the coming decades. However, the shape of that impact is known and, in large part, the adjustment to it has already occurred. Consumer demand factors will evolve but it will be in the shape of adding to and further differentiating the list of attributes. This leaves some room for enterprising companies and countries to respond to and lead consumer demand.

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