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Food Labels: Implications for U.S. Agricultural Imports

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Labels have been used to make food attributes transparent and to satisfy the increasing consumer demand for information about food credence values. Several types of prevalent U.S. food labels, their contributions, and the regulatory agencies behind them are examined in this paper. Additionally, studies dealing with the willingness-to-pay (WTP) for labeled products and the use of food labels as non-tariff trade barriers are discussed. While unilateral labeling requirements are identified as a major form of non-tariff trade barriers, positive media influence and trust in the government and science are important factors that affect consumer WTP for food credence characteristics.

Key Words: consumer willingness-to-pay, food credence characteristics, food labeling, non-tariff trade barrier

With the improvement of living standards, today's consumers in many countries, including the U.S., have increasingly become concerned about the safety, quality, nutritional content, production process, and origin of their foods. At the same time, the developments in food science and technology have enabled producers and food processors to provide information about the various characteristics of contemporary foods. Increasingly used across the globe in recent years, food labels allow producers not only to provide quantitative and qualitative information about foods but also to increase their demand. Both voluntary and mandatory labels have been used to disseminate information, including nutritional content, country of origin, production process, health claims, and warnings about the product (Henneberry and Armbruster, 2003).

A better understanding of food labels and the information they intend to present is expected to benefit both consumers and producers. Labels might be used as a non-price promotion tool with the objective of increasing consumer demand and producer surplus, but consumers also gain from the value of information provided by food labels. Given the recent push by the U.S. government for healthier diets and lower obesity, food labels can be used to make consumers aware of the characteris-

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tics of the foods they might consume. Despite its apparent benefits, implementing any labeling policy entails some costs. In addition to the physical costs of placing a label on a product (such as paper and printing), other implicit costs are involved, primarily those associated with verification and identity preservation (Tegene et al., 2003). These costs are expected to increase production and processing costs and, consequently, to increase consumer prices for food products. Hence, the economic viability of food labels depends on consumer preferences and their willingness to pay the price premium for labeled food products.

The consumer willingness to pay (WTP) for food labels has been the subject of many studies in recent years. However, there is no consensus on this issue. For example, while Dickinson and Bailey (2002) found that consumers were willing to pay an additional 33% of the average meat price for meat traceability, transparency, and extra assurance (TTA); Loureiro, McCluskey, and Mittelhammer (2001) found that consumers would buy apples labeled "organic," only if the prices of organic and non-organic apples were equal. Therefore, it is important to understand the value of certain food characteristics to consumers and the price premium that consumers are willing to pay for products carrying labels that certify those characteristics.

Finally, although food labels can be used as a tool to promote trade and sales, they have also reportedly been used as a non-tariff trade barrier (Tegene et al., 2003). However, while the international trade literature has placed a great deal of emphasis on the effects of various non-tariff trade barriers (NTBs), little attention has been paid to food labeling used for this purpose. Among NTBs, the ones most frequently encountered and studied are subsidies, quotas, import licensing systems, sanitary and phytosanitary measures, and buy-national policies.

Hence, this study has two objectives. The first objective is to provide a better understanding of various food labels used in the U.S. and to discuss empirical research regarding consumer preferences and WTP for several types of food quality or attribute labeling. The selected U.S. food label categories discussed in this study are eco-labels, fair trade labels, genetically-modified labels, nutrition and health claim labels, promotional labels, and geographic origin labels. These labels were selected because the food attributes they promote have been the subject of controversy and because their use has risen in recent years. The second objective of this study is to examine food labels as a non-tariff trade barrier in the context of U.S. agricultural trade, and more specifically, U.S. agricultural imports. A graphical illustration of the impact of food labels on trade is presented.

The remainder of this study is organized as follows. Various labels that are currently used in the U.S. to market agricultural and food products are discussed in the next section. This section is followed by a discussion on empirical research regarding consumer preferences and WTP for various types of food labels. A discussion of food labeling as a non-tariff trade barrier is followed by the summary and conclusions.

An Overview of U.S. Food Labels

One of the objectives of food labels is to increase consumer demand for the product by advertising certain product characteristics that are perceived as important to the

buyers. Labels have been used to give consumers information about various product attributes, including intrinsic and extrinsic. The quality of intrinsic attributes (experience characteristics), such as taste, leanness, and absence of certain chemicals or ingredients, can usually be determined after purchasing. Extrinsic (credence) characteristics are usually less observable and harder to measure. Examples include production processes that consider animal welfare, environmental and ethical responsibility, or the absence of genetically modified organisms (GMOs). The more useful information a label contains, the more successfully it addresses the concerns of host-country governments and consumers.

Today's consumers are faced with a wide range of food labels addressing different credence and content characteristics, including food safety, nutrition, health claims, geographic origin, and eco-friendliness, to name only a few. The success of public labeling in signaling to the consumer the true characteristics of a product has been addressed in past studies. According to Crespi and Marette (2003), the absence of consumer detection of credence characteristics makes labeling very important because it is intended to transmit a credible signal to the consumer about the true characteristic of the product.

Labels might help confused consumers make choices that better reflect their preferences. One goal of government intervention in labeling is to help align individual consumption choices with social objectives (Golan, Kuchler, and Mitchell, 2000). In the U.S., many government and non-government agencies are involved in the certification of various labels. A summary of the most common labels used in the U.S. that deal with intrinsic and extrinsic attributes of food products is given below.

Eco-Labels

Eco-labels describe environmentally preferable products based on an environmental-impact assessment (production process, use, and disposal) of the product compared to other products in the same category (McCluskey and Loureiro, 2003). The eco-labels most frequently used in the U.S. are organic labels, the food-alliance label, the integrated pest management label, and the dolphin-safe tuna label.

The Organic Label

One of the most discussed labels in the U.S. is "certified organic." To bear the USDA organic label (figure 1), the product must be produced and processed on ecologically-based practices, such as biological pest management and composition and the absence of synthetic chemicals, antibiotics, and hormones in crop and livestock production (Dimitri and Greene, 2002). Given that consumer demand for organic products continues to grow, many U.S. producers, manufacturers, distributors, and retailers have specialized in growing, processing, and marketing organic food products. According to the most recent U.S. Department of Agriculture (USDA) estimates, U.S. certified organic cropland doubled between 1992 and 1997

to 1.3 million acres (Dimitri and Greene, 2002). A rapid expansion in organic livestock and poultry has occurred since 1997, with a further doubling of certified organic pasture and rangeland between 1997 and 2001 (Greene and Kremen, 2003). The total acreage in the 48 states increased to 2.34 million acres in 2001, representing 0.3% of U.S. cropland and pasture. The percentage share was even higher for some crops, such as vegetables.

Source: http://www.ams.usda.gov/nop/Consumers/Seal.html.

Figure 1. The USDA organic label

Note: This label, like all Federal government seals, emblems, and logos, is in the public domain and has no copyright restrictions.

Certified organic beef cows, milk cows, hogs, pigs, sheep, and lambs increased about four-fold from 1997 to 2001, with a 27% increase between 2000 and 2001. Poultry exhibited a more than five-fold increase between 1997 and 2001, with a 59% increase from 2000 to 2001. Dairy animals were also one of the fastest growing segments of the organic foods industry, with milk cows accounting for over half of certified livestock animals. New certified-organic products are also being developed rapidly; for example, 800 new products were introduced in the first half of 2000. USDA is the regulatory agency that has developed a set of standards for organic foods, which was fully implemented by 2002 (figure 1). The U.S. Department of Agriculture accredits certifying organizations to verify that any company using the label on its products is following the standards.

Food Alliance Certified Label

Food Alliance is a non-profit, third-party certifying organization based in Oregon. Food Alliance uses market incentives for farmers in the Pacific Northwest to promote sustainable agricultural practices such as reduction or elimination of pesticides, conservation of soil and water, and the provision of safe and fair market conditions (McCluskey and Loureiro, 2003). The incentive for meeting these criteria is being able to use the Food Alliance Certified seal (figure 2), which in some cases may carry a small premium of less than 5%.

Source: http://www.foodalliance.org/seal/index.htm

Figure 2. Food Alliance Certified label

Note: The authors received permission to print this label in this article from the Business Development Managers, Food Alliance, on August 7, 2007.

Integrated Pest Management (IPM) Label

IPM is an effective and environmentally sensitive approach to pest management in agricultural settings. For example, growers inspect crops and monitor for damage before they use pesticides. Integrated Pest Management (IPM) programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information is used to manage pest damage by the most economical means and with the least risk to people, property, and the environment. In agriculture, effective, less risky pest controls are chosen first, including biopesticides such as pheromones to disrupt pest mating or mechanical controls such as trapping or weeding. If less risky controls do not work, then additional pest-control methods are employed, such as selective and targeted spraying of pesticides. In most cases, the cost of different control options must be taken into consideration. In summary, IPM is not a single pest-control method; rather, it is a series of pest management evaluations, decisions, and controls. Wegmans, a supermarket chain based in Rochester, New York, in a partnership with several universities, has developed an IPM certification program for fresh and processed vegetables (figure 3). Wegmans launched its IPM label program in 1995 (for more information, see the Wegmans website: http://www.wegmans.com).

Dolphin-Safe Tuna Label

Reacting to the high levels of dolphin mortality in the Eastern Tropical Pacific Ocean (ETP), the U.S. Congress amended the Marine Mammal Protection Act (MMPA) in 1990 by passing the Dolphin Protection Consumer Information Act (DPCIA). The DPCIA created a highly popular consumer labeling program for "dolphin-safe tuna" (figure 4). This program outlawed the labeling of tuna caught by intentionally netting dolphins as "dolphin-safe" and established an extensive tuna

tracking and verification program to assure the proper labeling of tuna products in the U.S. market. The next section discusses extensively the dolphin-safe tuna label in the context of non-tariff trade barriers.

Figure 3. Wegmans Integrated Pest Management label

Note: The authors received permission to print this label in this article from the Director of Media and Consumer Relations, Wegmans IPM Program at Wegmans Company, on January 13, 2006.

Figure 4. The Dolphin-Safe Tuna label

Note: The authors received permission to print this label in this article from the Acting Director, Office of International Affairs, National Marine Fisheries Service, on September 25, 2005.

The Fair Trade Labels

The Fair Trade label program indicates social responsibility. The standards aim to ensure that the farmers receive a fair price for their product. At the present time, TransFair USA (TFUSA) has been certifying coffee and in 2002, began certifying tea. To bear the Fair Trade label (figure 5), coffee must be grown by small farmers who belong to cooperatives and who are paid a fair minimum price. In addition, in order to use the Fair Trade label, the buyer must pay a fair price and be willing to pay up to 60% of the purchase in advance. In these ways, TFUSA hopes to reduce the vulnerability of small farmers to the volatility of the coffee market. TransFair describes fair trade as a powerful, dynamic, alternative economic model that strives

to protect the market over the long term, including the self reliance of small-scale farmers and the protection of vital eco-systems throughout the developing world, thereby strengthening rural communities (for more information see the TransFair website: http://transfairusa.org/).

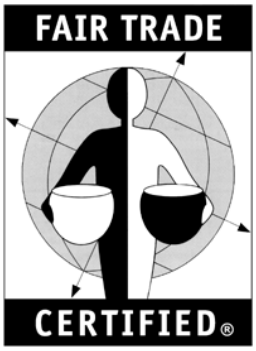


Figure 5. The Fair Trade label

Note: The authors received permission to print this label in this article from the New Products Manager and Designer/Marketing Associate, TransFair USA, on September 27, 2005.

Genetically-Modified Labels

The U.S. Food and Drug Administration (FDA) has a voluntary process through which companies marketing bioengineered foods and feeds may consult with the agency on safety and other regulatory issues. However, the FDA has recently proposed a regulation that will make this process mandatory. Companies will be required to notify the agency at least 120 days before marketing a new bioengineered food or feed and to provide the agency with sufficient data and other information to establish that the food or feed is as safe as its conventionally-derived counterpart. FDA also recently issued draft guidance on the voluntary labeling of foods that indicate whether they have or have not been developed through bioengineering. This guidance will aid manufacturers in ensuring that their labeling is truthful and not misleading (FDA, 2001).

Nutrition and Health Claim Labels

The Nutrition, Labeling, and Education Act (NLEA) of 1990 made significant changes to the voluntary system of labeling originally established in 1973 by the FDA. The NLEA required mandatory nutrition labeling for almost all packaged foods (table 1) and set strict regulations for health claims. However, this policy has been costly to producers and eventually to consumers in the form of higher food

prices. Estimates for the next 20 years show that the NLEA would cost the government $163 million and the food industry $1.4 billion to $2.3 billion (Nayga, 2003). With the exception of poultry and meat labels, which are regulated by the USDA, the FDA primarily governs health claims, whereas advertising claims are primarily under the jurisdiction of the Federal Trade Commission (FTC). Basically, the FTC develops guidance for the truthful use of labels and takes legal action against manufacturers that misuse labels.

Table 1. Nutritional Information Label, an Example of Nutrition and Health Claim Labels

Nutrition Facts	
Serving Size: 1 package 8 oz	
Amount Per Serving	
Calories 200	Calories from Fat 53
	% DV
Total Fat 7g	11%
Saturated Fat 2g	10%
Cholesterol 25g	8%
Sodium 580mg	24%
Total Carbohydrate 30g	10%
Dietary Fiber 4g	16%
Sugars 7g	
Protein 15g	23%
Vitamin A 0%	Vitamin C 0%
Calcium 10%	Iron 8%
Unofficial Pts: 5	

Source: Adapted from a nutritional label.

Promotional Labels

An example of this category of labels is the *Certified Angus Beef*® brand (figure 6). The Certified Angus Beef Program was formed in 1978. It was a venture that strengthened relationships between the American Angus Association, the world's largest beef cattle registry, and beef producers, packers, distributors, restaurants, and grocery stores. The goal was to provide assurances of beef quality and flavor for consumers. Today, Certified Angus Beef LLC (CAB) functions as a not-for-profit division of the American Angus Association. The Association consists of more than 28,000 Angus breeders who are dedicated to producing high-quality beef, superior in taste and tenderness (for more information, see http://www.angus.org/pr/pr_main.html).

Figure 6. Certified Angus Beef label

Note: The authors received permission to print this label in this article from the communications manager, Certified Angus Beef LLC, on September 27, 2005.

Geographic Origin Labels

Country-of-Origin (COOL) Label

The U.S. 2002 Farm Security and Rural Investment Act (more commonly known as the 2002 Farm Bill) amended the Agricultural Marketing Act of 1946 to require retailers to inform consumers of the country of origin for covered commodities. The term "covered commodity" is defined as muscle cuts of beef, lamb, and pork; ground beef, ground lamb, and ground pork; farm-raised fish and shellfish; perishable agricultural commodities; and peanuts. Perishable agricultural commodities are defined as fresh fruits and vegetables. On January 27, 2004, President Bush signed Public Law 108-199, which delays the implementation of mandatory COOL for all covered commodities, except for wild and farm-raised fish and shellfish, until September 30, 2008. As described in the legislation, program implementation is the responsibility of USDA's Agricultural Marketing Service (for more information, see http://www.ams.usda.gov/COOL/).

Industry and producer views on the potential impacts of COOL are mixed. The industry is concerned that beef will become more expensive relative to poultry, which is not covered under COOL, and that retailers will move increasingly to pre-packaged meats at the expense of in-store processing. Some individuals are also concerned about the negative impacts of COOL on ranchers who are not able to document the history of their animals. They state that these ranchers will find themselves unable to sell to supermarkets, thereby forcing their beef into the export or food-service markets, which are not covered under COOL regulations. Proponents say that producers will benefit, as they believe that U.S. consumers would be willing to pay a higher price for products of U.S. origin.

The Made in Oklahoma Label

The Made in Oklahoma Label is an example of product promotion through regional identification. In order to be qualified to receive this label (figure 7), the product

must be grown, manufactured, or processed in Oklahoma. The producers may sign up with the Oklahoma Department of Agriculture and are included in the *Made in Oklahoma* directory. The service is free of charge for producers of agricultural-based products in Oklahoma (for more information, see http://www.ok.gov/~okag/).

Source: http://madeinoklahoma.net.

Figure 7. Made in Oklahoma label

Note: This label, like all Federal government seals, emblems, and logos, is in the public domain and has no copyright restrictions.

Consumers' Preferences and Willingness to Pay for Food Labeling

Recently, with the outbreak of animal diseases and the fear of production processes that harm human health and the environment, a great deal discussion has been generated about implementing a system in which foods can be traced back to their production points. Nevertheless, markets for safe food tend not to work perfectly (Caswell, 1998). Information asymmetries and consumers' difficulty with assessing a product's safety have been reported as reasons for safe food market failure (Roosen, 2003). In general, policies that allow consumers to make purchasing decisions that match personal preferences are desirable as long as these policies are not too costly. Therefore, understanding the preferences and price premiums that consumers are willing to pay for products carrying labels that certify certain production and process-based characteristics, such as traceability and quality assurance, is important. Many recent studies have addressed this issue by measuring consumer WTP for various product attributes. The following paragraphs discuss empirical studies on consumers' preferences and WTP for different food labels.

Dickerson and Bailey (2002) measured consumer WTP for meat traceability, transparency, and extra assurances (TTA). Their results show that consumers would be willing to pay an additional 33% of the average price to upgrade beef and pork sandwiches to a TTA sandwich. Loureiro, McCluskey, and Mittelhammer (2001) used a multinomial logit model to assess consumer WTP for organic and regular apples. Their findings suggest that many consumers considered organic apples to be safer and a more environmentally-friendly alternative than regular apples. Moreover, their results indicate that consumers would buy more organic apples if all apples (organic and regular apples) were offered at equal prices. McCluskey et al. (2003) also obtained positive WTP for apples labeled as being produced by farm workers who enjoy fair and safe working conditions.

Researchers have also estimated consumer response to genetically-modified (GM) food labeling. Several studies have indicated that consumers' perceptions regarding

GM foods depend on their country of origin or culture. While 53% of European consumers reject genetically modified foods as too risky and morally unacceptable, 64% of U.S. consumers are either supportive or neutral toward GM foods (Marks, Kalaitzandonakes, and Zakharova, 2002). Interestingly, in developing countries (LDCs), a positive perception towards GM foods might exist, stemming perhaps from more urgent needs in terms of food availability and nutritional intake; in addition, the perceived levels of risk associated with GM foods in LDCs might be smaller due to trust in government, positive perceptions of science, and positive media influence (Curtis, McCluskey, and Wahl, 2004).

Furthermore, while many European and Japanese consumers believe GM foods pose a threat to human health, the consumer response is not as unfavorable in China. Li et al. (2002) showed that Beijing consumers' attitudes toward GM foods were generally positive, although the majority reported that they had little or no knowledge of biotechnology. The results of their study indicate that Chinese consumers' WTP for GM rice and GM soybean oil was positively affected by respondents' positive opinion of GM foods. Regarding Japanese consumers, McCluskey et al. (2003) found that their WTP for GM noodles was at a 60% discount over non-GM noodles, and WTP for GM tofu was at a 64% discount over non-GM tofu. Lusk, Roosen, and Fox (2003) estimated consumer WTP for beef in France, Germany, the United Kingdom, and the U.S. while using a variety of quality variables, including GM corn. Their results show that compared to U.S. consumers, European consumers placed a much higher value on beef from cattle that had not been fed with GM corn.

Moreover, Lusk and Fox (2002) estimated consumers' preferences and WTP for labeling cattle produced with growth hormones or fed with GM corn. Their results show that at no cost, 85% of the respondents desired mandatory labeling of beef produced with growth hormones and 64% of respondents preferred mandatory labeling of beef fed with GM corn. In terms of WTP, their estimates suggest that consumers would be willing to pay 17% and 10.6% higher than average prices for beef carrying mandatory labels indicating the use of growth hormones or GM corn, respectively. Wachenheim and Van Wechel (2004) used an experimental auction to assess U.S. consumer WTP for food items labeled as free of GM ingredients and to evaluate the influence of positive and negative information about the impact of biotechnology on the environment. Their findings indicate that the average bid for non-GM versions of potato chips, cookies, and muffins was 11.0%, 10.2%, and 13.5 % higher than their presumed-GM counterparts, respectively.

Regarding consumers' preferences and WTP for Nutritional content labels, mixed results have been found. Mojduszda and Caswell (2000) concluded that private nutritional labeling was generally ineffective in providing consumers with sufficient information about product quality. They stated that to signal quality appropriately, mandatory nutritional labeling is necessary. On the other hand, Teisl, Bockstael, and Levy (2001) showed that the value of information provided by brand-specific nutritional labels is generally positive and varies by commodity: from about $0.09/month/household for mayonnaise to $0.50/month/household for milk. Nevertheless, even with solid factual information such as that listed on the nutrition panel, consumers' purchases do not always reflect rational choices. Circumstances such as hunger, a hectic schedule, and chosen location to obtain food can overcome rational intentions (Mancino and Kinsey, 2002).

Regarding the U.S. COOL, one important question to be answered is whether consumers are willing to pay for COOL (Henneberry and Armbruster, 2003). Umberger et al. (2003), using surveys and experimental auctions, evaluated U.S. consumers' preferences for COOL on beef products. Their results show that the majority of surveyed consumers in Chicago and Denver (73%) were willing to pay a premium of 11% and 24% for COOL on steaks and hamburger, respectively. Using the experimental auction technique, they found that U.S. consumers were willing to pay a premium of 19% for steak labeled "USA Guaranteed: Born and Raised in the U.S." Their results also indicate that those who were willing to pay the most for the label believed the label signified increased food safety and quality.

Food Labels as Non-Tariff Trade Barriers

Regional and multiregional trade agreements have been created with the main objective of reducing or eliminating barriers to trade, including tariffs, quotas, and any other readily identifiable trade barriers. Examples of such multiregional trade agreements are the General Agreement on Tariff and Trade (GATT) and the North American Free Trade Agreement (NAFTA). Recently, changes in product standards resulting in a set of new, non-harmonized labeling requirements have been considered barriers to trade. The major limitation is not in the intent, but in the fact that such labeling requirements are being developed unilaterally by each country. As a result of their individual uniqueness and non-harmonization with trading partner standards, they might create a barrier to international food trade.

The economic and trade impacts of these non-harmonized, unilateral labeling standards are difficult to measure. In general, a labeling requirement becomes a trade barrier when the marginal costs associated with meeting regulations in a potential importing market increase the overall delivered cost of the product to the point that the product is uncompetitive in that market (Worley et al., 1995). In addition to the costs of meeting labeling requirements, exporting firms are faced with certain risks associated with the uncertainties involved in regulatory compliance. These uncertainties can impose a threat to the exporting firms and consequently limit the trade that might have otherwise taken place. A good example of a labeling requirement that has received a considerable amount of attention as a non-tariff trade barrier is U.S. dolphin-safe tuna. An explanation of this case is given in the following section. In addition, the trade impacts of this labeling requirement are illustrated using a graphical analysis.

The U.S. Dolphin-Safe Tuna Label

The U.S. dolphin-safe tuna label might be considered one of the most straightforward examples of using a food label as a non-tariff trade barrier. In the Eastern Tropical Pacific Ocean (ETPO), fishermen have used dolphins as a way of finding and netting tuna. Because dolphins swim above tuna, they have consequently been caught in the nets and either drowned or crushed during the tuna fishing process. In the 1960s, the number of dolphin deaths reached 500,000 (Golan, Keuchler, and Mitchell, 2000). The decline in dolphin population led to the implementation of the

U.S. Marine Mammal Protection Act (MMPA) of 1972, which limited the killing of dolphins by U.S. fishing boats.

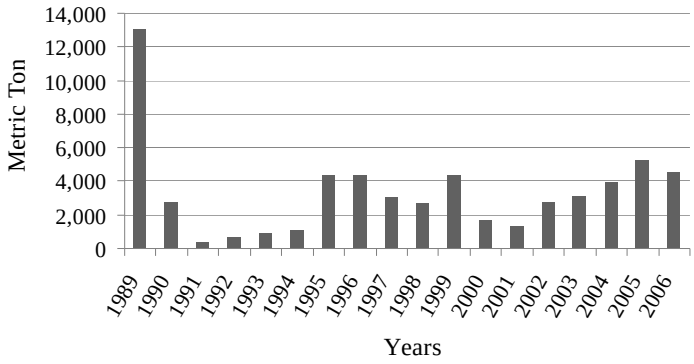
Despite the MMPA of 1972, in the late 1980s, some dolphins were still being killed; consequently, some U.S. consumers boycotted tuna. In April 1990, tuna-canning firms responded by purchasing tuna only from fisherman who demonstrated that they had not killed dolphins; they labeled such tuna "dolphin-safe." To regulate the label and to make it more meaningful, in November 1990, the U.S. congress passed legislation defining the dolphin-safe tuna label. According to the legislation, any tuna caught by a vessel that set its net on dolphins even once during a fishing trip could not be labeled "dolphin-safe," even if the dolphins were not killed (Enriquez-Andrade and Vaca-Rodriguez, 2004). Following the industry's dolphin-safe tuna label, in October 1990, the U.S. government imposed embargoes on Mexican tuna imports and tuna from countries whose fishing fleets killed more dolphins than U.S. fishermen did. Because it resulted in a U.S. ban on tuna imports from those countries, the "dolphin-safe" legislation was viewed by some as a non-tariff trade barrier.

In 1991, Mexico filed a complaint with GATT, alleging that the U.S. embargo and its labeling legislation was illegal. The GATT panel ruled that the U.S. could not embargo imports of tuna products from Mexico simply because Mexican regulations for tuna production did not satisfy U.S. standards. However, the GATT panel found that the labeling regulation did not violate GATT rules. Despite this GAAT ruling against U.S. embargoes on Mexican tuna, the ruling was never adopted; consequently, the U.S. safe-tuna labeling requirements continued to represent a barrier to trade for Mexican tuna exporters (Beaulieu and Gaisford, 2002).

Mexico and the U.S. held their own bilateral consultations aimed at reaching an agreement outside of GATT. In 1995, the U.S. joined Mexico and other countries in an international environmental agreement for dolphin protection. The participating countries agreed to avoid killing dolphins and to accept international observers on their boats. Additionally, the signatories agreed to place caps on dolphin mortality and other non-target species in the Eastern Pacific Ocean. More specifically, the agreement set an annual limit of 5,000 dolphins killed by tuna fishing in the Eastern Pacific Ocean (Enriquez-Andrade and Vaca-Rodriguez, 2004). Following the agreement, in 1997, the U.S. congress lifted the import embargo on tuna caught in nets and revised the compliance requirements for dolphin-safe label. The new requirements allow tuna caught in nets, as long as no dolphins are killed.

Although the U.S. dolphin-safe label has been agreed on by tuna exporters to the U.S., it is still viewed as a non-tariff barrier by some Mexican tuna exporting firms. Figure 8 shows that before the 1990 U.S. dolphin-safe label, U.S. imports of tuna from Mexico were around 13,000 metric tons. Following the labeling policy, U.S. imports of tuna from Mexico decreased 77% to 3,000 metric tons. The lowest quantity of U.S. tuna imports from Mexico occurred during the trade dispute period (1991–1994). Following the 1995 agreement, the quantity of U.S. imports of tuna from Mexico increased, but it has remained less than one half the quantity imported before the adoption of the dolphin-safe label (figure 8). The reduction in the quantity of U.S. imports of tuna from Mexico might be due to the high costs necessary to comply with the U.S. dolphin-safe label. Specifically, the marginal costs associated with meeting the U.S. dolphin-safe label might have led to some Mexican tuna firms to lose their competitive advantage in the U.S. tuna market. Hence, the data

presented in figure 8 might suggest that some Mexican tuna exporters stopped exporting (or reduced their exports of) tuna to the U.S., making the U.S. dolphin-safe label a non-tariff trade barrier.



Source: U.S. National Marine Fisheries Service (USNMFS)

Figure 8. U.S. tuna imports from Mexico (1989–2006)

Trade Impacts of the U.S. Dolphin-Safe Tuna Label: A Graphical Analysis

The economic impacts of a unilateral labeling requirement, such as the U.S. dolphin-safe tuna label described above, is shown in figure 9. This three-panel diagram illustrates the effect of a non-tariff trade barrier imposed by an importing country, such as the U.S. under the dolphin-safe label, on international trade and the welfare of the exporter. Before the implementation of the labeling policy, the exporter exports quantity OQ_1 at the world price P_{W1} (the open economy equilibrium at the intersection of the exporter's excess supply curve ES_1 and importer's excess demand curve ED_1). When the importer (the U.S. in this case) introduces a new labeling requirement, the increased cost associated with labeling compliance is expected to shift the supply curves of both the importing and exporting countries to the left (from S_1 to S_2). These additional costs might result, for example, from the cost of implementing the new fishing technologies that avoid killing dolphins. Obviously, in the case of the exporting country, the supply curve would shift only if the seller continued to be interested in exporting to the market with the labeling requirement. These supply shifts translate into the upward shifts of the excess demand and excess supply curves in the middle diagram to ED_2 and ES_2, respectively. Assuming that both the exporter and importer are large countries in the global market (they impact the world price with their changes in demand and supply), the equilibrium world price and quantity traded will be determined by the intersection of their respective excess demand and supply curves (P_{w2} and OQ_2 in the world market graph).

These upward shifts of the excess demand and supply curves in the world market would put an unambiguous upward pressure on the world price (from PW_1 to PW_2). However, the impact on the quantity traded is ambiguous. Depending on the elasticities and the magnitudes of excess demand and excess supply curve shifts, the quantity traded can increase or decrease. If the impact is a decrease in trade

quantities, then the labeling requirement might be viewed as a non-tariff trade barrier. With the dolphin-safe tuna requirement, the data (figure 8) show that the quantity traded declined after the labeling requirement came into effect; therefore, the dolphin-safe tuna label might have acted as a non-tariff trade barrier.

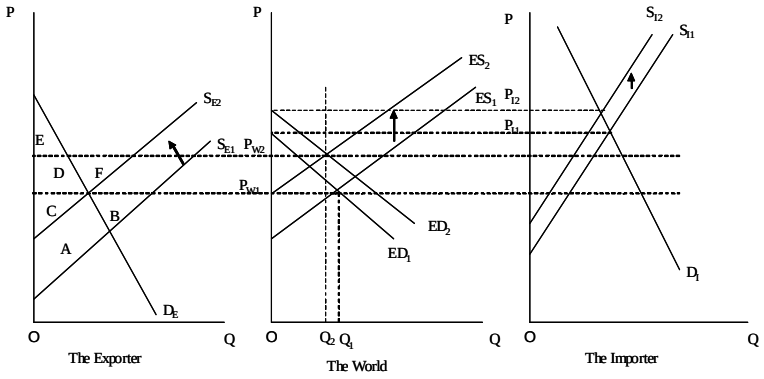


Figure 9. The impacts of importer non-tariff trade barriers on agricultural trade and exporter welfare

Notably, in 1989, Mexico was the largest exporter of tuna in North America, accounting for 91.8% of the North American total volume of tuna exports to the U.S. From 1995 to 2000, Mexico was one of the largest exporters of fresh and frozen tuna in the world, accounting for 2.17% of the world total volume of fresh and frozen tuna exports (U.S. National Marine Fisheries Service, 2007; Food Market Exchange, 2007). From 1995 to 2000, the U.S. was the largest world importer of canned tuna, accounting for 17.5% of the world total volume of canned tuna imports, and third world largest importer of fresh and frozen tuna, accounting for 9.7% of the world total quantity of fresh and frozen tuna imports (Food Market Exchange, 2007). Therefore, given that Mexico and the U.S. are major exporters and importers of tuna in the world tuna market, respectively, the large country assumption considered here is expected to be relevant to the tuna labeling case.

The new labeling policy might have positive or negative impacts on the exporting country's welfare. As shown in figure 9, the data indicate that the exporting country producers lose areas A and B and gain areas D and F while the exporting country consumers lose area D; the net welfare loss is A+B−D (welfare gain if A+B is less than D). It is important to note that if the large country assumptions were changed to Mexico being a small exporter and the U.S. remaining a large importer of tuna, the economic impact analysis would be analogous to what is explained above.

Depending on the magnitude of the importing country domestic demand shift, the quantity traded can increase or decrease. In figure 9, it is assumed that there are no demand shifts. However, in the case of U.S. dolphin-safe label, a zero demand increase might seem an unrealistic assumption because the labeling requirement resulted from a consumer boycott of tuna. Nevertheless, contrary to expectations, available studies have found no changes in U.S. consumer demand following the labeling of tuna as "dolphin safe." Wallstron and Wessells (1994), using data from

scanned grocery store transactions in metropolitan areas, found no significant demand change following the dolphin-safe labeling program. Bockstael and Strand (1995) also found no significant demand effect of the dolphin-safe label program on U.S. tuna imports from Latin America. Based on these studies and the fact that the quantity of Mexican exports of tuna to the U.S. decreased by 77% following the implementation of the dolphin-safe tuna label, figure 9 is a reasonable representation of the Mexico-U.S. dolphin-safe label case.

Summary and Conclusions

With an increase in demand for information about food and agricultural products, the role of labels in the marketing of agricultural-based products has become increasingly important. Food labels, both voluntary and mandatory, have been used to differentiate products and inform consumers about intrinsic and credence product characteristics. Today's consumers face an extensive variety of food labels that address a wide range of information about foods and agricultural products, including information that is hard for non-experts to verify or judge. The various types of food labeling used in the U.S. are indicative of various regulatory agencies: eco-labels, fair trade labels, genetically-modified labels, nutrition labels, promotion labels, and region of origin labels. This study also addressed two important issues related to food labels: (a) consumer preference and WTP for particular labels and (b) the overlooked concept of food labels being used as non-tariff trade barriers.

Past studies have shown that whereas consumers in some developed countries are very concerned and willing to pay a premium for products that have certain desired process-based characteristics, consumers in other countries (especially LDCs) may not be willing to pay that premium. Urgent needs such as food availability and nutritional intake, trust in government, positive perceptions of science, and positive media influences are among the factors that differentiate consumer attitudes towards and WTP for food credence characteristics across the globe. Because of the mixed consumer response to processed-based labeling, caution is appropriate for policymakers, producers, processors, and various interest groups promoting administrative mandates regarding food labels. Whether the costs of labeling and their distribution among various groups in a country outweigh the social benefits that may accrue is an important economic and policy issue to be addressed.

A new labeling requirement, unilaterally undertaken by an importer, might be viewed as a non-tariff trade barrier. According to graphical analysis used in this study, a new labeling requirement imposed by an importing country might be viewed as a trade barrier. The country-specific labeling compliance cost might lead to a loss of competitiveness and comparative advantage for many exporting firms, especially small ones, because their costs of compliance per unit produced/processed are generally higher than larger food firms.

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