...Upfront

FoodReview (ISSN 1056-327X) is published three times a year by the Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture.

Send questions, requests, and editorial comments to *FoodReview*, USDA, Room 2015-South, 1800 M Street, NW, Washington, DC 20036-5831.

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Growing Trade in Processed Foods

A major global shift away from trade in basic commodities toward high-value and processed food products is underway. Globally, processed and semi-processed food and agricultural products now account for two-thirds of total agricultural trade. Likewise, the fastest growing component of U.S. agricultural exports has been processed food products.

In the context of a rapidly evolving global food and agriculture system, rising incomes and changing food consumption patterns around the globe will continue to influence growth in processed food trade. But, the pace of liberalization in food and agricultural trade and the changing nature of investment and competition in the global food system will also be important. This issue of *FoodReview* looks at the myriad factors at play in the growth of processed food trade.

Rising incomes and the globalization of food markets have changed diets and food consumption patterns around the globe. Billions of consumers in developing countries see their incomes growing and their first priority is to improve their diets, both the quantity and variety of food consumed. Many high- and middle-income consumers in other countries, while not increasing their food consumption, are also demanding a wider variety of foods. As a result, there is significant growth in two-way trade of food products, in which the same country both exports and imports products within the same industry. For example, to meet differing consumer tastes and quality preferences, the United States is both a major importer, as well as a major exporter of wine. Two-way trade is an important trade phenomenon, since trade can expand without growth in consumption.

While U.S. exports of processed food products have increased by more than 70 percent over the last 10 years, U.S. imports of processed food products have increased as well. Food imports account for a relatively small share of the total U.S. diet (about 10 percent), but their importance is increasing. Trade provides U.S. consumers with access to a wider variety of foods and beverages—French wines, Canadian seafood, Danish hams, and Jamaican coffees, and the like. Food imports also work to stabilize year-round supplies of many fresh fruits and vegetables and temper overall increases in food prices.

The globalization of food markets is not just about trade. Capital and technology now flow freely across borders. U.S. food processing firms, like Campbell Soup or General Mills, have invested in processing facilities abroad to better serve foreign markets. And, foreign firms, like Nestle and Unilever, are major players in U.S. food sales. Sales generated by foreign direct investment dwarfs trade; estimated sales by foreign affiliates of U.S. food processors totaled nearly $150 billion in 2000, compared with $30 billion worth of processed food and beverage exports. Globalization is behind the increasing trend of mergers, acquisitions, and foreign direct investments that are redefining the nature of competition within the global food system.

Protection for agricultural and food products through high tariffs is now one of the major factors restricting world trade. The global average tariff on food and agricultural products is 62 percent, much higher than tariffs on nonagricultural products. The U.S. processed food sector will fail to reach the billions of consumers in the middle-income countries, where the largest growth in food demand will occur, unless the still high barriers to trade are brought down.

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Inside...

Global Food Trade

Also Inside

Consumer Preferences and Concerns Shape Global Food Trade

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Twenty years ago, bulk commodities that consisted primarily of grains and oilseeds accounted for most agricultural trade; however, in recent years processed and semi-processed products have jointly accounted for two-thirds of total agricultural trade. A number of forces in both developing and developed countries are driving these changes, particularly income growth. As inflation-adjusted per capita incomes increased during the past two decades, more than doubling in many countries, food purchasing power among most consumers also increased. Due to increased caloric intake and population growth, imports of grains and oilseeds by developing countries have increased, while developed country imports of these commodities have remained stagnant.

As incomes rise, wealthier consumers, especially in developed countries, seek out the variety of high-value food imports. High-value food products are nonbulk commodities that either require special handling, such as fresh produce, or are processed, which adds substantial value beyond the farm level. Processed foods are edible foodstuffs that have been transformed from their original post-harvest states to either semi-processed products (flour and meal) or final products (bread and breakfast cereal).

According to United Nations (UN) trade data, high-value food imports increased in the 1990s not only in developed countries but also in developing countries. For example, from 1994 to 1999 the value of Egypt's processed food imports increased 51 percent to $689 million. However, despite trade growth in developing countries, the much larger volume of processed food trade among developed countries has primarily accounted for the shift in world agricultural trade from grains to high-value food products.

While the trade in bulk commodities has decreased in share since 1980 to less than 30 percent of current world agricultural trade, the share of pro-cessed and semi-processed products has increased (fig. 1). Processed high-value products, such as meat, beverages, bakery products, and snack foods, account for about 34 percent of global food trade, up from 18 percent in 1980. Trade in intermediate processed products, which consists of semi-processed commodities,

The spread of urbanization, which often introduces consumers to aggressive marketing techniques and increased supplies of domestic and imported goods, has influenced global food preferences.

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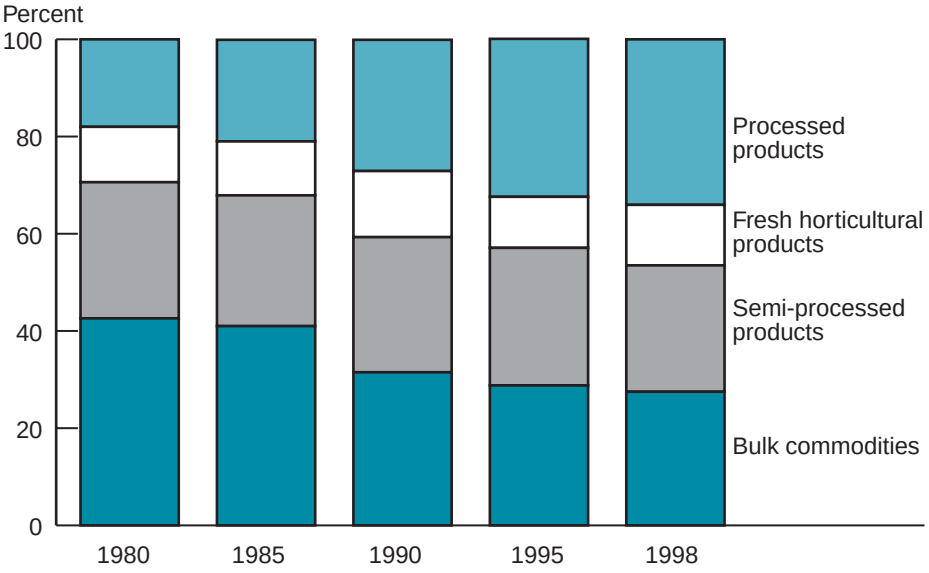
such as vegetable oils, oilseed meals, and flours, has kept pace with world agricultural trade and maintained its share of world trade. The fresh horticultural products group represents the smallest of these aggregate categories and its 12-percent share of world agricultural trade has remained almost unchanged during the past 20 years. The perishable nature of fresh horticultural products constrains trade, although technological advances to extend shelf-life have enhanced the potential for increased produce trade.

The shift in U.S. agricultural exports has been even more pronounced than changes in world trade composition. Bulk exports accounted for nearly 70 percent ($28 billion) of the value of total U.S. agricultural exports in 1980 but declined to less than 40 percent ($19 billion) in 1998 (fig. 2). Lower grain prices and slower volume growth triggered this change. Rising U.S. meat exports in response to growth in world meat demand also represent a key element in the changing composition of U.S. exports. For example, between 1980 and1998, the United States expanded its meat exports fivefold to countries where meat consumption rose, such as Japan and Hong Kong.

Growth in two-way trade of high-value food products—that is, the same country exports and imports products within the same industry—has also helped increase global food trade. In this scenario, trade can expand without growth in consumption as the foreign share of consumption increases. For example, the United States exports higher valued beef to Japan while at the same time it imports a greater volume of lower valued beef from New Zealand. In dairy trade, however, the United States imports higher valued products, mainly cheeses from Europe, but exports lower valued products, such as powder milk and whey products to Mexico.

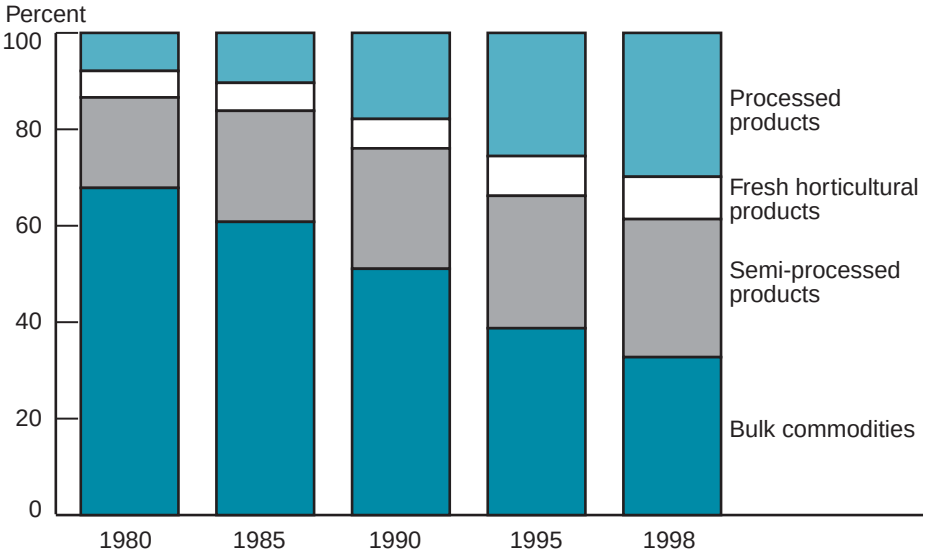
Growth in intra-industry trade is significant, especially among high-income countries, and is partly attributed to foreign direct investment (FDI). FDI is investment in a foreign entity or affiliate in which a parent company holds a substantial, but not necessarily a majority, ownership interest. FDI and trade are often complementary and fuel bilateral trade growth between countries (see "U.S. Food Companies Access Foreign Markets Through Direct Investment" elsewhere in this issue). For example, the United States and Canada have greatly expanded FDI sales and trade in processed fruit and vegetables. Demand for foreign

Figure 1
World Grain Trade Decreased as Processed Food Trade Increased



Source: U.N. COMTRADE, ERS classification.

Figure 2
U.S. Bulk Commodities Export Share Dropped About 30 Percent During 1980-98



Source: USDA's Economic Research Service.

brands also drives increased trade in packaged or bottled products, such as bakery products, beer, and wine.

Finally, advances in transportation technology over the last 30 years have helped increase global trade of high-value food products. Packaging innovations, fruit and vegetable coatings, bioengineering, and other techniques that reduce deterioration of food products have helped extend the marketing reach of perishable products. Perishable products can now be shipped thousands of miles at lower costs with no substantial loss in freshness and quality.

Lower transportation costs have a similar effect on trade as tariff cuts: they reduce transaction costs, or the wedge between the product price in the exporting and importing countries, thus stimulating trade. However, although new developments in ocean shipping have reduced shipping costs and made it possible to preserve the quality of perishable products, trans-ocean transportation costs are still higher for many perishable products than for raw agricultural products, such as cotton, or nonperishable products, such as nuts and raisins.

Income Growth Boosts Food Consumption

Rising incomes and their impact on levels of food consumption have been one of the most important determinants in explaining shifts in global food demand and trade. Real income, as measured by gross national product (GNP) per capita in inflation-adjusted U.S. dollars, grew on average by almost 100 percent globally during the last four decades. Although 1998 inflation-adjusted per capita income levels were just over $500 for low-income countries compared with almost $28,000 for high-income countries, the rate of income growth among low-income countries (221 percent between 1960 and 1998) has generally surpassed that for higher income countries. The World Bank defines low-income countries as those with 1998 GNP per capita below $760, middle-income countries as those with 1998 GNP per capita between $760 and $9,360, and high-income countries as those with 1998 GNP per capita above $9,360. Countries in the low- and middle-income groups are generally considered to be developing countries.

The only available measure of food consumption across countries is the supply, or the availability, of food in a market. Per capita food availability on a global basis has increased from about 2,300 calories per day in 1961 to almost 2,800 in 1998. In addition to changes in food availability, the basic sources of calories have changed, with animal and horticultural products accounting for a growing share of total calories consumed at the expense of root and tuber crops, such as cassava and sweet potatoes. Per capita global availability of meat and fruit and vegetables increased by more than 60 percent between 1961 and 1998, while the supply of roots and tubers decreased by over 21 percent (table 1). During the same period, world cereal supplies increased by almost 17 percent.

Shifts in food consumption patterns tend to vary among countries based on the level of economic development. In high-income countries, per capita consumption (as indicated by food availability) of both cereals and roots and tubers decreased between 1961 and 1998, while that of meat and produce increased substantially. With the exception of roots and tubers, food supplies substantially increased in middle-income countries. In low-income countries, where hunger remains a concern despite recent economic gains, decreases in root and tuber availability were more than offset by dramatic increases in per capita supply of all other food types. Despite these supply gains, per capita availability of meat and fruits and vegetables in low-income countries remains far below that of middle- and high-income countries. Cereal supplies increased almost 32 percent in low-income countries and 12 percent in middle-income countries. These increases can partially be attributed to increased demand for livestock feed, resulting from the increased demand for meat.

Differences in total food availability between developed and developing countries are also reflected in their respective food budget shares (table 2). Low-income countries spend on average 47 percent of their total budget on food compared with high-income countries that on average spend only about 13 percent on food. Staple food products, such as cereals, fats and oils, and fruits and vegetables, account for a larger share of the total food budget in low-income countries than in higher income countries. (Because data for fruit and vegetables include roots and tubers—cereal substitutes in poorer countries—fruits and vegetables are categorized here as staples.) Meat and dairy budget shares are greater for high-income countries.

How countries respond to rises and falls in income helps policymakers assess future food needs, trade, and demand for associated transportation and infrastructure facilities. The income elasticity for food, which is a measure of the responsiveness of the quantity of food demanded to a change in income, is higher for poorer countries. Thus, when incomes fall by 1 percent in both low- and high-income countries, poorer countries make bigger cutbacks in food expenditures than wealthier countries. These cutbacks, however, are not implemented evenly across the different food groups. To meet their basic food needs, low-income countries make smaller expenditure reductions in staple food consumption, such as cereals (0.56 percent), and larger cuts in higher value food

consumption, such as fish (2.77 percent) and dairy (0.93 percent).

Low-income countries may switch to cheaper products within a food group when the price of food in that group increases, such as substituting corn for wheat when overall cereal prices increase. Middle-income countries, with greater purchasing power, are more likely to switch to products outside a food group when prices for a particular food group change, such as substituting meat and horticultural products when cereal prices increase. In high-income countries, food is a small part of total household budgets and food price changes may lead to small or no adjustments in the composition of food consumed.

Table 1
World Supply of Meat and Produce Has Risen

Countries	1961	1970	1980	1990	1998	Change, 1961-98
	Pounds per capita					*Percent*
Cereals:						
Low-income countries	283.3	326.7	346.3	381.6	373.5	31.8
Middle-income countries	275.6	288.8	308.4	313.5	308.2	11.8
High-income countries	269.6	246.3	236.6	238.3	248.9	-7.7
World	298.3	317.0	329.8	352.5	348.8	16.9
Roots and tubers:						
Low-income countries	45.2	47.2	40.1	32.6	35.5	-21.5
Middle-income countries	32.2	31.1	27.3	25.8	28.9	-10.3
High-income countries	38.4	34.0	32.2	32.2	32.6	-14.9
World	41.9	42.1	35.9	30.9	32.8	-21.6
Fruit and vegetables:						
Low-income countries	158.3	133.6	143.3	200.2	240.0	51.7
Middle-income countries	259.0	282.9	332.5	345.9	356.9	37.8
High-income countries	336.6	390.0	411.8	476.6	493.2	46.5
World	223.8	228.8	246.5	218.7	373.0	66.7
Meat:						
Low-income countries	11.7	16.8	22.0	32.4	48.9	318.9
Middle-income countries	50.0	59.3	74.1	83.1	87.7	75.3
High-income countries	119.5	142.9	167.8	177.9	189.2	58.3
World	54.0	62.8	71.0	74.1	86.9	60.8

Note: The world average may not necessarily reflect the average of the three country groupings because many of the former Soviet and Yugoslav countries are excluded in the groups.
Source: FAO Food Supply Data, 2001. Countries are grouped according to the World Bank definition.

Table 2
Low-Income Countries' Budget Share Spent on Food Is More Than Three Times That of High-Income Countries

Consumption category	Countries' budget shares for food			Countries' income elasticity for food		
	Low-income	Middle-income	High-income	Low-income	Middle-income	High-income
	Percent			*Percent change*		
Food as share of household budget	47	29	13	.73	.58	.29
Food groups as share of food budget:						
Cereals	28	20	16	.56	.41	.19
Meat	18	22	25	.82	.65	.33
Fish	5	5	6	2.77	.92	.43
Dairy	9	13	14	.93	.71	.35
Oils and fats	7	5	4	.58	.43	.21
Fruit and vegetables	23	21	20	.66	.53	.27
Other food	11	13	15	.80	.63	.32

Source: Regmi, A., M.S. Deepak, J. Seale, and J. Bernstein, 2001.

Urbanization Fuels Food Consumption Increases

Widespread growth in urbanization has also helped shape global food preferences in recent decades. Urban areas have more effective marketing facilities and a greater supply of products from domestic and foreign producers. Urban areas are also centers of economic opportunity and have a greater percentage of women working outside of the home. Increased opportunity cost of women's time increases the demand for nontraditional fast food in many countries.

The effects of urbanization on diets differ from country to country. For poorer countries, urbanization may initially lead to the substitution of purchased cereals and processed foods for home-grown and prepared staples, such as rice and cassava. Urbanization has resulted in significant increases in wheat consumption in Asian countries, such as China, India, and Indonesia, while the consumption of coarse grains (corn and sorghum) and cassava has declined. Similarly, consumption of cassava and coarse grain has declined in urban areas of western African countries, while consumption of rice has increased. With further increases in income levels, consumption of more expensive sources of nutrients, such as meat, fruit, and vegetables, increases, while the consumption of lower cost staples, such as roots and tubers, decreases.

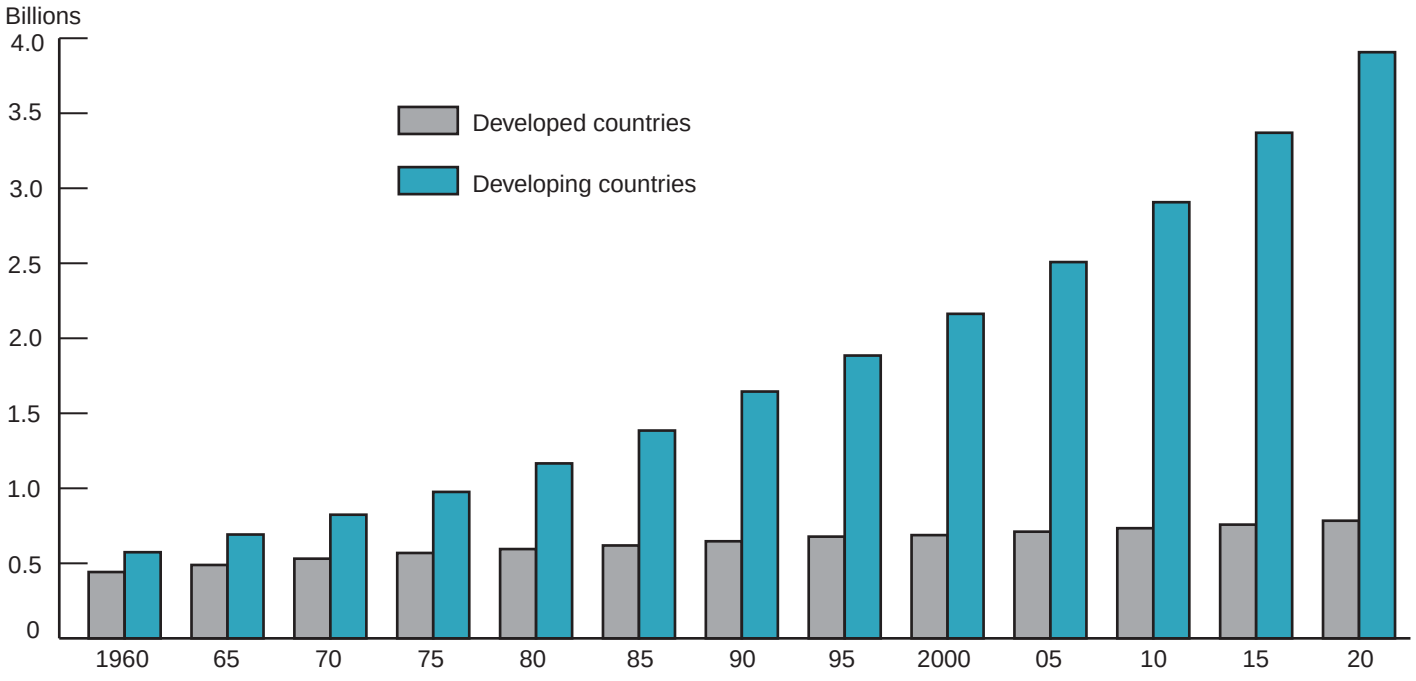
The UN's Food and Agriculture Organization reports significant increases in meat and produce consumption among urban areas of several developing countries. For example, per capita meat consumption in urban Indonesia increased by about 70 percent between 1978-87, while meat consumption in rural areas declined during the same period. Also, dual-income households (occurring mainly in urban areas) have less time for cooking, resulting in increased preferences for more highly processed, convenience foods in many countries.

In the future, urbanization will primarily affect developing countries. In 1960, developed countries accounted for about one-third of the global urban population. By 1998, developed countries accounted for only about one-fourth of the global urban population of 3 billion (fig. 3). Assuming the 1990s' rates of growth continue, the urban populations in developing countries will double to nearly 4 billion by 2020. Therefore, the effect of urbanization on future food consumption changes will be most evident among developing countries.

Health Concerns Influence Food Choices...

Along with growing urbanization and the associated increases in levels of information dissemination and education, health concerns have become an increasingly important factor in consumers' food preferences in recent years. For example, nutritional recommendations devel-

Figure 3
Urban Populations in Developing Countries May Double by 2020



Source: The World Development Indicators, The World Bank, 2000.

oped by the U.S. Departments of Agriculture and Health and Human Services advise Americans to reduce their fat intake and eat five to nine servings of fruits and vegetables per day. Various other public and private campaigns seek to inform consumers of health benefits associated with different food products.

Accordingly, demand for food in the United States has changed considerably in recent years. Partly due to health concerns, red meat's share of total U.S. meat consumption declined from 79 percent in 1970 to 62 percent in 2000, while poultry's share increased from 21 to 38 percent during the same period. Similarly, per capita fruit and vegetable consumption in the United States increased 25 percent between 1977 and 1999.

Awareness of and attitudes toward health issues affect consumers' consumption decisions. Age and education also influence food demand. Studies in Japan and the United States showed that older individuals were more health conscious and consumed greater quantities of produce, while younger consumers consumed more meat and alcohol. Individuals with higher levels of education were found to have more healthful eating habits.

…As Do Concerns About Safety, Ecology, and Animal Welfare

Increased affluence and education not only change consumers' food preferences but also increase the demand for better quality and safer food products among consumers in developed countries. Countries vary in demand for quality and safety in foods. How countries perceive and handle risks from disease-causing organisms is generally based on access to and use of advances in science, detection technology, and mitigation methods. Wealthier countries with more information about food safety risks tend to demand more stringent food safety standards on both domestically produced and imported food.

Major food safety incidents in recent years have resulted in lasting changes in consumer perceptions and food purchasing patterns in certain developed countries. For example, the 1996 announcement in Great Britain of a possible link between bovine spongiform encephalopathy (BSE), or mad cow disease, in cattle and a new strain of Creutzfeldt-Jakob Disease in humans led to dramatic declines in beef consumption in Europe, particularly in the United Kingdom. This incident also resulted in import bans on British beef and products by trading partners, leading to significant economic losses for associated industries. In the first year of the crisis, the United Kingdom's total economic loss from BSE was estimated at $1.2-$1.6 billion.

The rise of organic foods are another example of heightened consumer interest in particular food attributes. Worldwide markets for organic foods are expanding, with annual growth rates of 15-30 percent in Europe, the United States, and Japan for more than 5 years. As many as 20-30 percent of consumers surveyed in Europe, North America, and Japan claim to purchase organic foods regularly. While there is interest in organic foods among higher income, better educated population segments in nearly every country, consumers in the United States, Europe, and Japan are driving the growing demand for these goods.

Consumer concerns regarding the environment and animal welfare have also led to changes in food production and marketing in some countries. Many developed countries have implemented new regulations, some of which, in response to animal welfare concerns, directly affect the raising of farm animals. These new regulations impose restrictions on the conditions under which livestock and dairy producers and processors may raise, feed, and slaughter animals.

Consumer demand for improved food quality has also led public and private sectors to develop and implement mandatory and voluntary quality control, management, and assurance schemes. These schemes are changing the way food products are produced, marketed, and traded in Europe, and, to some extent, the United States.

Quality assurance schemes develop standards for the production, processing, and transport of food and may include standards for environmental management practices. Western European countries employ certification systems that guarantee the traceability of fresh and processed meat back to the originating animal and farm, certification systems aimed at guaranteeing both product quality and environmental management of farms, and labeling and certification systems covering organic and natural production.

Unlike European programs, U.S. quality assurance programs tend to be limited in scope, focusing primarily on health standards and rarely considering animal welfare and environmental issues. U.S. programs also tend to be limited to on-farm quality assurance, rather than entire supply chain quality assurance. For example, the National Cattlemen's Beef Association's Beef Quality Assurance was introduced in 1982 to address concerns of chemical residues in beef.

Assurance schemes, whether voluntary or mandated by law, may increase production costs. For example, providing animals with larger spaces means that producers must either purchase additional land or keep fewer animals. This increase in resources per animal increases production costs, which, in turn, can result in higher prices for consumers.

Although many consumers may value the benefits added to society

by the new production processes and are willing to pay for these benefits, some consumers may prefer to purchase less-expensive foreign products. In general, any policy that imposes costs on a domestic firm rather than a foreign firm has the potential to put domestic firms at a disadvantage. Thus, when a country passes legislation that increases costs for domestic producers, the producers sometimes apply political pressure to block imports from countries that do not have similar regulations, even though such actions may contravene multilateral trade agreement commitments.

Future Prospects for Global Food Consumption and Trade

As food consumption reaches a state of maturity in developed countries, developing countries will be influential in shaping world agricultural trade. This trend is already evident in trade patterns for bulk commodities. Population and income growth will raise demand for food in developing countries. Limited resources may constrain food production in some developing countries. Unless agricultural productivity rises, developing countries will likely rely on imports to partly satisfy their food demands. What is less certain is how the composition of world trade will change. Developing countries will represent a larger share of the world market and will be the driving force behind trade in bulk grains. Growth in bulk trade, however, is unlikely to exceed growth in nonbulk trade.

Economic forces will continue to shape food consumption and trade patterns in developing countries. Meat consumption is likely to grow faster than food grain consumption. According to USDA projections, world wheat trade will grow only 1.4 percent over the next 10 years, while meat and coarse grain (used primarily for feed) imports will expand more than 2 percent per year.

Consumer concerns about food safety, the environment, and animal welfare issues will increasingly affect demand in many developed countries. Differences in food production and processing regulations and whether countries will recognize or accept the standards of their trading partners can create challenges in global food trade. Recognizing these potential challenges, countries are currently working toward multilaterally agreed-upon solutions. Consumer concerns for quality and multilateral rules governing quality issues are likely to play important roles in shaping future agricultural trade.

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Processed Food Trade Deficit Continues in 2000

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U.S. exports of processed food and beverages were up 4 percent in 2000, following 2 years of small declines. In 2000, U.S. farmers, fishermen, meatpackers, and food processors exported $30 billion worth of processed foods and beverages, falling short of the record level of $31.3 billion set in 1997.

U.S. processed food imports grew 8.4 percent in 1999 and 5.9 percent in 2000. Processed food imports in 2000 were a record $36.8 billion, exceeding U.S. exports and resulting in the third year of progressively larger food trade deficits. After posting a $1.1 billion trade surplus in 1997, the United States registered processed food trade deficits of $2.6 billion in 1998, $5.8 billion in 1999, and $6.8 billion in 2000. The U.S. trade deficit widens as American consumers spend more of their food dollars on French wines, Canadian seafood, Danish hams, Jamaican coffees, and other imported foods and beverages.

Processed food trade data take into account processed foods, beverages, and related products that fall under the U.S. Department of Commerce's Standard Industrial Classification Code 20 (SIC-20) for Food and Kindred Products. SIC-20 contains 49 separate food processing industries, including fish and seafood, distilled liquors, and products from fats and oil mills. Production from these industries includes animal feeds, pet food, and inedible animal and plant by-products produced by many of the milling and livestock processing industries. Fresh, unprocessed fruits, vegetables, and nuts do not fall under SIC-20 (see box).

Exports of Processed Foods up in 2000

After declining 1.8 percent in 1999, U.S. processed food exports rebounded by increasing 4 percent in 2000. The rebound was broad-based; only 17 of the 49 processed food industries had lower exports in 2000 than in 1999 (table 1). Only 4 of the top 10 export industries had smaller exports in 2000 than in 1999. Industries with the largest export increases in 2000 were butter (60 percent), sausages (28 percent), and candy (25 percent).

Meatpacking (including hides and skins) retained its top ranking as exports increased 16.1 percent to $6.5 billion in 2000, the second straight year of growth (hides and skins accounted for $1.8 billion). Exports to South Korea (up 54 percent) and China (up 118 percent) increased significantly in 2000. Japan (up 8 percent), South Korea and Mexico (up 22 percent), and Canada (up 13 percent) were the U.S. meatpacking industry's top export markets in 2000. The top four countries imported 81 percent of all U.S. meatpacking exports. In 2000, the industry surpassed the record high exports of 1995. Most of the industry's export declines during 1996-98 came from lower sales of hides and skins.

Poultry exports to Russia, which bottomed out in 1998, rebounded sharply in 2000 and surpassed previous levels. Russia bought $325 million worth of poultry, up 113 percent from 1999.

U.S. exports of fresh and frozen fish, products that are subject to the cyclical nature of fish harvests, also rebounded in 1999 and continued to increase, by 4 percent, in 2000 due to resurgent demand in Japan, where imports totaled $1 billion. Fish and seafood exports to Japan dipped in the mid-1990s because of Japan's weakened economy. Several other Asian countries also increased their imports of U.S. fish in 2000. Japan, Canada, South Korea, and France remain the top four export markets for U.S. fish products. In 1999, fresh and frozen fish exports had the third-largest dollar increase of all processed food industries, increasing $492 million, or 29 percent, over 1998.

The third and sixth largest U.S. processed food export industries—soybean milling and wet corn milling—posted declines in export sales in both 1999 and 2000 over previous years. China's curtailed

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Table 1
U.S. Processed Food Exports Rebounded in 2000 After 2-Year Slump

Industry	Exports		Change	
	1999	2000	1998-99	1999-00
	Million dollars		*Percent*	
Meatpacking	5,617	6,520	8.0	16.1
Fresh or frozen fish and seafood	2,175	2,271	29.2	4.4
Soybean oil mills	2,204	2,070	-26.5	-6.1
Poultry processing	1,888	2,035	-16.3	7.8
Other food preparations	1,377	1,372	13.1	-.4
Wet corn milling (oil and syrup)	1,270	1,237	-14.2	-2.6
Canned fruits and vegetables	1,209	1,212	5.7	.2
Frozen fruits and vegetables	877	859	.6	-2.1
Salted and roasted nuts and seeds	836	857	-14.3	2.5
Dry, condensed, and evaporated milk	778	820	4.2	5.4
Flavorings, extracts, and syrups	725	806	3.6	11.2
Pet food	632	775	-7.3	22.6
Dried fruits and vegetables	681	707	1.6	3.8
Rice milling	820	686	-.2	-16.3
Animal and marine fats and oils	718	610	-19.7	-15.0
Prepared animal feed	514	601	-7.0	16.9
Wines, brandy, and brandy spirits	551	564	1.4	2.4
Distilled and blended spirits	521	563	-4.2	8.1
Chocolate and cocoa products	437	535	12.0	22.4
Sausage and prepared meats	300	385	-16.0	28.3
Processed fishery products	467	384	35.3	-17.8
Vegetable oil milling	472	353	-12.1	-25.2
Sauces and salad dressings	320	345	6.4	7.8
Potato chips	322	299	6.1	-7.1
Flour and grain mill products	335	292	13.3	-12.8
Candy and other confectionery products	222	277	1.5	24.8
Bread and other bakery products	252	257	-8.6	2.0
Malt beverages	282	252	-16.5	-10.6
Soft drinks and carbonated water	264	252	1.7	-4.5
Roasted coffee	237	243	5.3	2.5
Breakfast cereals	225	215	-2.0	-4.4
Shortening and cooking oils	177	188	.4	16.6
Blended and prepared flours	142	153	3.2	7.7
Cookies and crackers	141	143	16.2	1.4
Natural and processed cheese	130	138	11.2	6.2
Canned specialties	89	104	19.9	16.9
Pasta products	112	97	-.7	-13.4
Ice cream and frozen desserts	89	91	2.0	2.2
Chewing gum	70	83	-13.5	18.6
Cane, beet, and processed sugar	153	158	-3.7	3.3
Frozen bakery products, except bread	63	67	.9	6.3
Cottonseed oil	54	51	-26.6	-5.6
Fluid milk	33	36	-24.7	9.1
Malt	39	32	-11.4	-17.9
Other frozen specialties	29	30	-31.8	3.4
Manufactured ice	12	11	51.4	-8.3
Creamery butter	5	8	-68.3	60.0
Total, all industries	28,866	30,044	-1.8	4.1

Note: These industries correspond to the 49 industries classified in the Standard Industrial Classification Code 20 (SIC-20). Three sugar industries, cane, beet, and processed, are combined for ease of presentation in this table.
Source: USDA's Economic Research Service.

purchases of soybean oil, corn oil, and corn syrup led to these declines.

Many highly processed products continued to show strong export performance in 2000. Sausage exports increased 28 percent to $385 million, cocoa products increased 22 percent to $535 million, candy exports increased 25 percent to $277 million, and chewing gum exports jumped 19 percent to $83 million. Pet food exports increased 23 percent, and animal feed exports were up 17 percent in 2000.

Wine and brandy exports continued to grow but slowed considerably following their 28-percent increases in 1998 and 1997, posting gains of 1 percent in 1999 and 2 percent in 2000. Malt beverage exports, however, declined for the fourth straight year, dropping 11 percent in 2000. Distilled spirits exports increased 8 percent.

Asian and European Countries Resume U.S. Purchases

Japan is the largest export market for U.S. processed foods, but its share of U.S. exports fell from 24 percent in 1996 to 19 percent in 1998. In 2000, Japan imported $6.2 billion worth of U.S. processed foods and increased its share to 21 percent (table 2). U.S. exports to

Table 2
Japan and Canada Are the Largest Markets for U.S. Processed Foods

Market	Exports		Share of U.S. processed food exports	Change	
	1999	2000		1998-99	1999-00
	Million dollars		*Percent*		
Japan	6,017.2	6,213.6	20.7	6.1	3.3
Canada	5,443.4	5,746.5	19.1	3.7	5.6
Mexico	2,882.6	3,369.0	11.2	1.0	16.9
South Korea	1,384.6	1,839.6	6.1	46.1	32.9
Hong Kong	930.0	885.3	2.9	-12.3	-4.8
United Kingdom	841.1	741.3	2.5	-1.1	-11.9
Taiwan	731.6	730.2	2.4	4.7	-.2
Netherlands	743.0	704.6	2.3	1.1	-5.2
China	452.0	661.5	2.2	-46.3	46.3
Germany	489.2	497.3	1.7	-20.7	1.7

Source: USDA's Economic Research Service.

Exports of Fresh Fruits, Vegetables, and Nuts up in 2000

The United States exports and imports other foods that are not included in the 49 processed food and beverage industries under Standard Industrial Classification Code 20 (SIC-20), namely, fresh fruits, nuts, and vegetables. In 2000, exports of unprocessed fruits, nuts, and vegetables were strong. Nut exports increased 10 percent in 2000 after declining 13 percent in 1999. U.S. nut exports totaled $1 billion in 2000.

U.S. exports of fresh fruits totaled $1.8 billion in 2000, increasing 17 percent after declining 3 percent in 1999. Fresh vegetable exports declined 5 percent in 1999 but then increased 9 percent in 2000. Fresh vegetable exports totaled $1.5 billion in 2000. The top six importers of U.S. fresh fruits and vegetables are Canada, Japan, Mexico, Taiwan, Hong Kong, and the United Kingdom. Exports of canned and frozen fruits and vegetables were flat in 2000.

The import picture for fresh fruits, nuts, and vegetables in 2000 was decidedly mixed. Imports of fresh fruits into the United States increased only 1 percent in 2000, after a 40-percent increase in 1999. The 1999 increase was due mostly to expanded imports of fresh table grapes from Chile and Mexico; melons from Guatemala, Costa Rica, and Honduras; strawberries from Mexico; and other berries from Chile. The boom in fresh fruit imports leveled off in 2000 and early 2001. U.S. fruit imports totaled $1.7 billion in 2000.

U.S. imports of fresh vegetables declined in 1999 by 4 percent but then rebounded by an equal amount in 2000. In 2000, the top vegetable imports were potatoes from Canada, followed by tomatoes and peppers from Mexico. The United States also imports substantial quantities of fresh vegetables from the Netherlands, Peru, Costa Rica, Guatemala, and the Dominican Republic. Fresh vegetable imports totaled $2.4 billion in 2000.

U.S. nut imports decreased 6 percent in value in 1999 and another 2 percent in 2000. Because the United States is a major producer of nuts, imports were limited to only $121 million worth of unprocessed nuts in 2000, a relatively small value.

The opening of a large pasta plant in Ames, Iowa, by Italian pasta giant Barilla affected U.S. pasta imports, which decreased in 1999 after two straight years of significant growth.

Japan increased 6 percent in 1999 and an additional 3 percent in 2000, following a 12-percent decline in 1998. The top five U.S. processed food exports to Japan are meatpacking products, fresh and frozen fish, frozen fruits and vegetables, pet food, and canned fruit and vegetables.

During 1998-2000, Canada's share of U.S. processed food exports rose slightly from 18 to 19 percent, while Mexico's U.S. export share increased from 10 to 11 percent. The top five U.S. processed food exports to Canada are meatpacking products, canned fruits and vegetables, fresh and frozen fish, food preparations (processed foods not elsewhere classified), and poultry. The top five U.S. processed food exports to Mexico are meatpacking products, poultry, chocolate and cocoa products, vegetable oil, and dried fruit and vegetable products.

From 1996 to early 1999, seven Asian countries (South Korea, Taiwan, the Philippines, Singapore, Thailand, Indonesia, and Malaysia) struggled under weak currencies and floundering economies. The Asian financial crisis appears to be over. After sharp declines in U.S. exports to the entire region in 1997 and 1998, exports to South Korea rebounded strongly by 46 percent in 1999 and 33 percent in 2000. Taiwanese imports of U.S. food products increased 5 percent in 1999 and maintained this level in 2000. Both countries are among the United States top 10 export markets. U.S. processed food exports increased to most of the other recovering Asian countries as well.

U.S. exports of processed foods and beverages to both the United Kingdom (down 12 percent) and its former colony Hong Kong (down 5 percent) decreased in 2000. Exports to Russia, down 30 percent in 1998, dropped another 40 percent in 1999 and 6 percent in 2000. Russia, whose imports totaled $467 million in 2001, slipped from the 6th largest importer of U.S. processed foods in 1997 to the 12th largest in 2000. U.S. exports to the Netherlands increased 1 percent in 1999, but fell 5 percent in 2000. Exports to France decreased 19 percent in 1999 but increased 5 percent in 2000. Total U.S. exports to Europe fell 14 percent in 1999 and 8 percent in 2000. The devaluation of the Euro, which has dropped from approximately 1.72 to U.S. $1 in 1997 to 0.85 to U.S. $1 in 2000, makes U.S. products more expensive for Europeans.

The development of China's vegetable oil processing industry and increasing incomes there have caused U.S. food product exports to China to fluctuate widely in the last 3 years—up 30 percent in 1998, down 47 percent in 1999, and up 47 percent in 2000. Soybean oil imports, which accounted for over $485 million, or more than half of China's processed food imports from the United States in 1998, fell to just over $10 million by 2000. This decline was offset in 2000 by increased U.S. exports to China of meatpacking products, fresh and frozen seafood, and marine and animal oils. The United States also increased exports of raw soybeans and rapeseed to China for the newly on-line Chinese oil mills and crushing plants that likely ac-counted for declines in soybean oil imports.

Import Growth Continues

U.S. imports of processed foods grew 5.9 percent in 2000, down from the 8.4-percent increase in 1999 and similar to the 5.8-percent increase in 1998. Import growth was spread broadly across the food processing sector.

Fresh and frozen fish and seafood remains the United States largest processed food import, up almost 10.5 percent to $7.8 billion (table 3). (Fish is also the United States second-largest food export, moving past soybean oil and poultry in 1998.) Most U.S. fish imports come from Canada, Thailand, China, Mexico, Chile, and India. India has displaced Ecuador as the sixth-largest U.S. fish supplier.

U.S. imports of meatpacking products totaled $3.9 billion in 2000. In addition to being the second-largest U.S. processed food import industry, meatpacking is the largest U.S. processed food export industry. While the United States primarily exports fresh and frozen cuts of beef and pork, it imports mostly frozen ground beef in bulk containers and lamb from Australia and New Zealand.

Alcoholic beverages are the third-, fourth-, and fifth-largest U.S. import industries. In 2000, imports of wines and brandy grew 4 percent, and imports of distilled spirits and malt beverages each grew over 15 percent. Collectively, these three industries account for 20 percent of total U.S. processed food imports. Canada, France, the United King-

Table 3
Twenty-One Processed Food Industries Posted Declines in Imports in 2000

Industry	Imports		Change	
	1999	2000	1998-99	1999-00
	Million dollars		*Percent*	
Fresh or frozen fish and seafood	7,094	7,837	8.6	10.5
Meatpacking	3,423	3,948	13.2	15.3
Wines, brandy, and brandy spirits	2,605	2,706	16.3	3.9
Distilled and blended spirits	2,117	2,441	14.4	15.3
Malt beverages	1,912	2,201	10.4	15.1
Processed fishery products	1,767	1,756	6.1	-.6
Canned fruits and vegetables	1,832	1,748	17.8	-4.6
Other food preparations	1,525	1,526	2.1	.1
Chocolate and cocoa products	1,522	1,404	5.5	-7.8
Vegetable oil milling	1,287	1,274	-10.1	-1.0
Frozen fruits and vegetables	1,004	1,002	13.6	-.2
Dry, condensed, and evaporated milk	648	784	-24.2	21.0
Natural and processed cheese	706	687	5.3	-2.7
Candy and other confectionery products	612	665	-3.6	8.7
Salted and roasted nuts and seeds	658	656	24.1	-.3
Cane and beet sugar	686	610	32.2	-11.1
Soft drinks and carbonated water	543	576	7.7	6.1
Sauces and salad dressings	460	501	20.9	8.9
Dried fruits and vegetables	446	476	19.6	6.7
Cookies and crackers	411	441	13.2	7.3
Bread and other bakery products	368	410	3.7	11.4
Roasted coffee	362	354	5.7	-2.2
Pasta products	307	303	-1.5	-1.3
Wet corn milling (oil and syrup)	283	283	-6.4	0.0
Prepared animal feed	231	264	1.1	14.3
Rice milling	197	190	1.1	-3.6
Frozen bakery products, except bread	143	180	-11.8	25.9
Breakfast cereals	146	149	-2.1	2.1
Chewing gum	127	137	-8.6	7.9
Sausage and prepared meats	138	129	.6	-6.5
Pet food	138	126	23.0	-8.7
Blended and prepared flours	121	123	11.8	1.7
Animal and marine fats and oils	92	103	-14.8	12.0
Flavorings, extracts, and syrups	115	93	13.6	-19.1
Canned specialties	100	92	1.7	-8.0
Manufactured ice	70	89	-20.3	27.1
Flour and grain products	89	85	6.7	-4.5
Shortening and cooking oils	90	79	23.4	-12.2
Poultry processing	63	78	14.3	23.8
Potato chips	57	75	6.3	31.6
Soybean oil milling	69	72	37.0	4.3
Malt	24	40	-43.2	66.7
Creamery butter	48	30	182.1	-37.5
Ice cream and frozen desserts	37	18	146.7	-51.4
Other frozen specialties	11	14	41.6	27.3
Fluid milk	18	13	130.7	-27.8
Cottonseed oil milling	6	3	-8.1	-50.0
Total, all industries	34,708	36,771	8.4	5.9

Note: These industries correspond to the 49 industries classified in the Standard Industrial Classification Code 20 (SIC-20). Three sugar industries, cane, beet, and processed, are combined for ease of presentation in this table.
Source: USDA's Economic Research Service.

Table 4
Canada Is the Largest Source of U.S. Processed Food Imports

Market	Imports 1999	Imports 2000	Share of U.S. processed food imports	Change 1998-99	Change 1999-00
	Million dollars			*Percent*	
Canada	7,749.8	8,400.5	22.8	12.6	8.4
Mexico	2,635.7	2,933.5	8.0	11.6	11.3
Thailand	2,043.7	2,233.9	6.1	11.7	9.3
France	2,035.4	1,964.8	5.3	17.8	-3.5
Italy	1,435.7	1,578.4	4.3	4.4	9.9
Australia	1,101.6	1,398.6	3.8	8.1	27.0
Netherlands	1,034.3	1,221.4	3.3	6.8	18.1
United Kingdom	1,165.8	1,199.8	3.3	15.5	2.9
New Zealand	950.2	1,073.2	2.9	-1.3	12.9
China	874.7	1,025.8	2.8	16.3	17.3

Source: USDA's Economic Research Service.

dom, Italy, the Netherlands, and Mexico are the top sources of alcoholic beverage exports to the United States. Wine and distilled spirits account for three-quarters of all processed food and beverage imports from France, while distilled spirits and malt beverages make up two-thirds of total processed food imports from the United Kingdom. Canned fruits and vegetables, the third-largest U.S. processed food import industry in 1996, is now the seventh largest.

Twenty-one of the 49 processed food industries posted a decline in U.S. imports in 2000. Among the top 10 processed foods imported into the United States, 4 had lower import totals in 2000 than in 1999. Imports of milk, butter, ice cream, and cottonseed oils and meals declined between 27 and 52 percent.

The popularity of imported pasta has subsided, with imports declining over 1 percent in 1999 and 2000 after 7 and 9 percent increases in the previous 2 years. Legislation curbing unfair trading practices has reduced Turkish pasta imports, and declining U.S. pasta consumption may also have contributed to the reversal in pasta imports. However, the opening of a large pasta-manufacturing plant in Ames, Iowa, by Barilla, Italy's largest pasta manufacturer and exporter to the United States, appears to have made the largest impact. Foreign companies use foreign direct investment as both an alternative and a complement to exports to sell products in the U.S. market (see "U.S. Food Companies Access Foreign Markets Through Direct Investment" elsewhere in this issue).

Chocolate and cocoa product imports declined 8 percent in 2000 after 3 years of healthy increases. Candy and confectionery products were up 9 percent in 2000, while imports of cookies and crackers increased 7 percent. Most snack food industries registered import gains between 5 and 10 percent in 2000.

Import Sources Remain Stable

U.S. processed food imports come from a relatively small set of countries. Twenty countries supplied 90 percent of all U.S. food imports from 1996 through 2000. In 2000, the top 10 import countries supplied nearly 65 percent of U.S. processed food and beverage imports. Canada is by far the largest supplier of processed food imports to the United States. Its 23-percent share of the U.S. market is nearly three times that of Mexico, the second largest importer (table 4). Major imports from Canada include meat products, fish, juices, liquors, and vegetable oils.

Imports from Mexico grew in 2000, capturing 8 percent of the U.S processed food import market, after a 7-percent share in 1998. Leading imports from Mexico are fish, beer and distilled spirits, processed fruits and vegetables, and soft drinks. Thailand was the third-largest import supplier in 2000, supplying the U.S. market with $2.2 billion worth of foods, mostly fresh and frozen fish and canned tuna.

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Imports' Share of U.S. Diet Rises in Late 1990s

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Although food imports account for a relatively small share of the total U.S. diet, their importance grew considerably during the late 1990s. USDA's Economic Research Service (ERS) estimates that imports' share of the total quantity of food consumed domestically (including alcoholic beverages) rose from an average of 7.5 percent for 1979-94 and 7.4 percent for 1995 to 9.1 percent for 1998 and 1999. In comparison, imports supply about 60 percent of the calories in the Japanese diet. Among the fastest-growing U.S. imports are high-value products, such as seafood, red meats, cheese, fruits and juices, vegetables, beer, and wine, each increasing significantly since 1995.

U.S. consumers benefit from imports because imports expand food variety, stabilize year-round supplies of fresh fruits and vegetables, and temper increases in food prices. Trade mitigates domestic production shortfalls caused by adverse weather or other disruptions, thereby securing more stable supplies and reducing commodity price volatility. For example, following the almost total destruction of U.S. lime trees by Hurricane Andrew in 1992, a surge in lime imports from Mexico helped maintain domestic supplies and kept retail lime prices from otherwise sharply increasing.

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Strong U.S. Economy Makes Imports More Affordable

The better-than-20 percent rise in imports' share of total domestic food consumption between 1995 and 1999 resulted in part from exceptional U.S. economic expansion during those years. U.S. real (adjusted for inflation) Gross Domestic Product—the output of goods and services produced in the United States—grew an average of 4 percent per year between 1995 and 1999. Inflation-adjusted per capita disposable income in the United States grew 10 percent from 1995 to 1999, compared with 3 percent from 1990 to 1994. Low commodity prices, a strong U.S. dollar, recessions in Asia and Latin America, sluggish growth in Europe, and the effects of trade agreements, particularly in North America, also contributed to the surge in U.S. imports in the last half of the decade.

Low prices from abundant supplies, weak foreign demand, and foreign economic downturns made foreign goods more affordable to U.S. consumers. Prices of U.S. food imports were about 12 percent lower in 1999 than in 1995. Coffee, cocoa, sugar products, and other prepared foods were among imports with the steepest price declines. On average, prices of meat, fruits, and vegetables fell 5-10 percent between 1995 and 1999.

A strong U.S. dollar relative to other currencies also made foreign goods more affordable in the United States. For total U.S. imports from 1995 to early 2000, the dollar increased by 15 percent in real value against currencies of source countries. For noncompetitive imports like cocoa and coffee—products the United States does not produce or produces only in very small quantities—the dollar rose by 24 percent against the currencies of the countries exporting these foods to the United States.

Trade Agreements and Technological Advances Increase Imports

U.S. participation in trade agreements, such as the North American Free Trade Agreement (NAFTA), has increased the availability and affordability of imported foods through reduced trade barriers. NAFTA is a comprehensive trade-liberalization agreement among Canada, Mexico, and the United States. NAFTA progressively eliminates most tariff and nontariff barriers to trade between these countries over a transition period that began on January 1,

1994, and concludes on January 1, 2008. According to ERS, NAFTA has expanded U.S. agricultural trade with Canada and Mexico and has boosted trade of some agricultural commodities substantially above levels that would have occurred without the agreement. Imports from Canada and Mexico rose by more than one-third between 1995 and 1999, from $9.5 billion to $12.9 billion.

Adoption of new production technologies, marketing infrastructures, and other technological improvements by exporting countries has enabled foreign products to meet the quality and safety standards demanded by American consumers and also boosted the comparative advantage of imported foods in the U.S. marketplace. With improvements in shipping, handling, and plant breeding, fruits and vegetables can now be shipped long distances and over greater lengths of time and still maintain appearance and quality. Plant breeding has also produced new varieties of traditional fruit, such as seedless grape and tangerine varieties favored by consumers, increasing demand for these products.

Availability of Out-of-Season Crops and New Crop Varieties Boosts Import Demand

Imports have played a major role in changing consumer demand for fruits and vegetables. Fresh fruit consumption, on a per capita basis, grew 20 percent between 1985 and 1999, partly as a result of the greater availability of out-of-season imports. Traditionally, during the winter months, only citrus, bananas, and apples were available in U.S. supermarkets. Since the mid-1980s, however, improved transportation and increased production in Southern Hemisphere countries has made such fruit as grapes, peaches, and plums, mostly from Chile, available in U.S. grocery stores in the winter. As a result, consumers have substituted imports, especially grapes and pears, for traditional winter fruit, such as oranges and grapefruit. Fresh fruit and vegetable imports are concentrated in the U.S. off-season, thereby providing consumers with year-round availability and affordability (fig. 1).

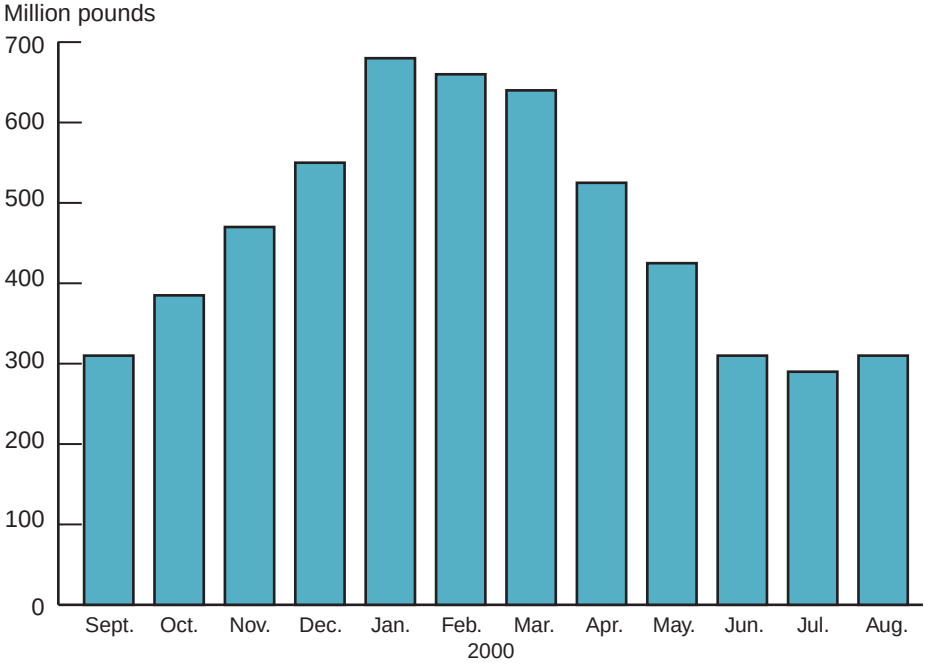
Trade has also enabled new varieties of tropical produce not grown in the United States to become popular with U.S. consumers. Through immigration, the U.S. population has grown increasingly diverse, and many people desire the fruits and vegetables they ate in their native countries. As a result, imports of tropical fruits, such as mangoes and papayas, have increased, especially in the 1990s. As the general population becomes familiar with these products, demand continues to grow and the products become regularly stocked items in the marketplace. Although tropical fruits and vegetables, such as pineapples, avocados, yams, and Japanese eggplants, are grown in Hawaii and Florida, imports will continue to be necessary to meet the growing demand. Similarly, clementine imports, mostly from Spain, increase at the same time the U.S. citrus market is at its peak. Even though clementines, a tangerine variety, are often higher priced than domestic tangerines and oranges, the popularity of the easy-to-peel, seedless clementine continues to rise.

Imports have also increased for commodities already produced in the United States, creating a more stable supply for consumers. For example, Mexican tomato imports have become an important source of winter tomatoes in the domestic market.

Demand for Novel, Nutritious, Convenient Foods Spurs Imports

Other factors underlying the growth in consumption of imported foods include increasing ethnic

Figure 1
Fresh Vegetable Imports Peak in the Off-Season



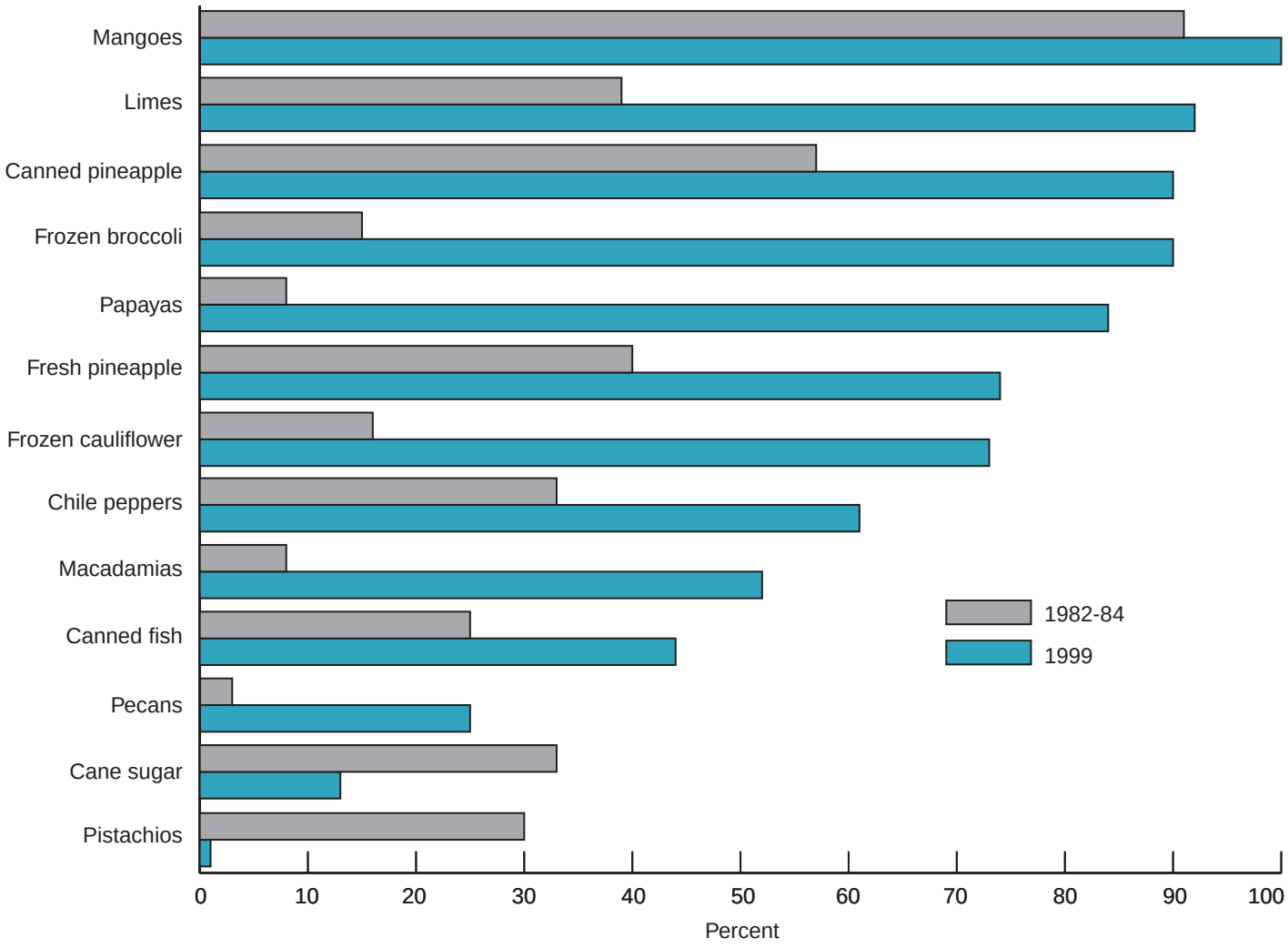
Source: U.S. Department of Commerce, Bureau of the Census.

diversity within the United States, mounting scientific evidence concerning diet and health, and growth in away-from-home eating, fruit and salad bars, and cut-up, packaged produce, which introduce consumers to new foods and cuisines. For example, chili peppers have been one of the fastest growing specialty produce items in the last decade, illustrating the growing influence of the U.S. Hispanic and Latino populations, a taste for alternative flavoring agents (spurred by consumers' desire to cut dietary fat), and the changing American diet. Americans have been eating more chilies via southwestern-style fast foods, innovative new cuisines, and myriad new salsa, hot sauce, and other chili-based products. Imports of chilies grew 171 percent between 1982-84 and 1999 to 742 million pounds in 1999 and accounted for 61 percent of domestic chili consumption in 1999, compared with 33 percent in 1982-84 (fig. 2).

Seafood, Beef, and Cheese Dominate Animal Product Imports

ERS estimates that imports accounted for about 4.5 percent of the animal products in the U.S. diet in 1999, up from 4.0 percent in 1998 and an average of 3.4 percent in 1979-97. In 2000, imports accounted for 10 percent of the total red meat, poultry, and seafood (edible retail weight equivalent) consumed domestically (table 1). Of imports'

Figure 2
U.S. Lime Imports More Than Doubled as a Share of Consumption Between 1982-84 and 1999



Note: Excludes noncompetitive imports—bananas, coffee, tea, cocoa, tropical oils (coconut oil), and coconut—for which imports exceed 99 percent of consumption.
Source: USDA's Economic Research Service and U.S. Department of Commerce, Bureau of the Census.

10 percent-share, fish and shellfish accounted for 50 percent; beef and veal 36 percent; pork 12 percent; and lamb, nearly 2 percent. Chicken and turkey imports were minuscule.

More than two-thirds of the fish and shellfish consumed in the United States in 2000 was imported, up from just under one-half in 1977-79. Imports accounted for 79 percent of the fresh and frozen seafood consumed domestically in 2000, 44 percent of the canned seafood, including canned tuna, and 85 percent of the cured seafood, such as smoked salmon.

The United States is a major exporter of grain-fed beef but a large importer of grass-fed beef for the processing industry, primarily for hamburger. In general, imported beef competes with U.S. cull dairy and beef cows in the production of hamburger. Imports have averaged a 10-percent share of U.S. consumption since the mid-1980s, but the actual level depends on the phase of the U.S. cattle cycle. During the liquidation phase of the cycle, U.S. slaughter of cows from breeding herds increases and imports of beef decline. When the United States enters a cattle-rebuilding phase and retains female stock (heifers and cows) for breeding, imports of beef increase. Most U.S. beef imports come from Canada, Australia, and New Zealand.

Imported dairy products are mainly manufactured foods—cheese, butter, and dry milk products. Imports accounted for nearly 3 percent of total dairy products (milk-equivalent, milkfat basis) consumed in the United States in 2000, 5 percent of the cheese consumed, and 3 percent of the butter consumed. Imports' share of U.S. consumption of "other cheese," which includes Italian cheeses, such as mozzarella, declined from 14 percent of total domestic consumption in 1977-79 to 8 percent in 2000. The growing popularity of pizza over the last two decades has spurred domestic production of mozzarella.

Fruit, Vegetables, Sugar, and Vegetable Oils Top Crop Product Imports

The 12-percent import share of U.S. consumption of crop products in 1999 is relatively unchanged since 1996. This finding reflects offsetting

Table 1
Two-Thirds of the Seafood Americans Ate in 2000 Was Imported, Compared With Less Than Half in 1977-79

Selected commodities	Import quantity				Imports' share of total consumption[1]			
	1977-79	1992-94	1997-99	2000	1977-79	1992-94	1997-99	2000
	Million pounds				*Percent*			
Total meats[2, 3]	3,308	4,272	4,967	5,654	8.3	8.7	9.4	10.3
Red meats[2]	1,905	2,144	2,347	2,818	6.7	7.3	7.6	8.8
Beef and veal	1,545	1,593	1,753	2,028	8.4	9.7	9.9	11.0
Pork	336	518	526	705	3.4	4.1	4.0	5.2
Lamb and mutton	23	33	67	85	10.1	13.7	29.3	36.4
Poultry	0	1	8	10	0.0	—	—	.1
Fish and shellfish[2]	1,404	2,127	2,613	2,826	48.5	55.3	65.1	68.1
Fresh and frozen	1,152	1,635	2,089	2,211	65.8	62.7	76.5	78.5
Canned	189	423	454	546	17.8	36.4	37.8	43.8
Cured	63	69	70	69	75.0	89.2	86.8	85.2
Eggs	12	4	7	8	.2	.1	.1	.1
Total dairy products[4]	2,194	2,736	4,087	4,445	1.8	1.8	2.6	2.7
Cheese[5]	233	312	361	409	6.3	4.6	4.7	4.9
American cheese	17	18	40	45	.8	.6	1.2	1.3
Other cheese	216	294	321	364	13.5	7.6	7.3	7.5
Butter[6]	2	4	38	32	.2	.3	3.1	2.5
Condensed and evaporated milk[6]	1	5	10	15	.1	.6	1.6	2.9
Nonfat dry milk[6]	2	1	10	7	.3	.2	1.2	.9

Note: — = less than 0.05 percent.
[1]Calculated from commodity supply and use balance sheets. Import share is the total quantity imported divided by the quantity available for domestic human food consumption. A portion of the imports of some commodities is exported and a portion of the imports of some products is diverted to nonfood uses; therefore, the ratios presented here may overstate the importance of imports in domestic consumption for some commodity groups.
[2]Totals may not add exactly due to rounding.
[3]Boneless, trimmed weight (retail weight minus the weight of bone or shell, if any, in retail items).
[4]Milk equivalent of all dairy products calculated on a milkfat basis.
[5]Natural equivalent of cheese and cheese products; excludes full-skim American and cottage-type cheeses.
[6]Product weight.
Source: USDA's Economic Research Service.

trends between rising import shares of horticultural products—fruits, vegetables, wine, and beer—and lower import shares of sugar and candy, vegetable oils, grain products, and tree nuts in 1999. The 12-percent import share of crop product consumption in 1996-99 compares with an annual average of 10.4 percent for 1979-95.

U.S. sugar imports have declined significantly over the past 20 years as corn sweeteners displaced cane and beet sugar in the American diet. Sugar imports dropped by nearly three-quarters between 1977-79 and 1999, from 9.9 billion pounds to 2.6 billion pounds, on a refined-weight basis (table 2). Imports accounted for 14 percent of total refined sugar consumption in 1999, down from 49 percent in 1977-79. The United States imports sugar mainly from the Dominican Republic, Brazil, and the Philippines.

Imports' share of U.S. canola oil consumption dropped from 84 percent in 1992-94 to 80 percent in 1999, as a result of increasing domestic production. Olive oil imports increased by 52 percent between 1992-94 and 1999, as many Americans tried to follow nutrition recommendations that emphasize use of monounsaturated fats. During the same period, imports of coconut oil—a highly saturated fat used mainly in crackers, cookies, and confectionery products—dropped by more than a quarter. The United States imports canola oil from Canada, olive oil from Western Europe, and coconut and other tropical oils from Indonesia, the Philippines, and Malaysia.

U.S. imports of wheat flour products consist mainly of pasta and noodles from the European Union, Canada, and Asia, and accounted for only 2 percent of total consumption in 1999. Imports accounted for 14 percent of U.S. rice consumption in 1999, up from less than 0.05 percent in 1977-79. Nearly all U.S. rice

Table 2
One-Seventh of the Refined Sugar in the American Diet Was Imported in 1999, Down From a Half in 1977-79

Selected commodities	Import quantity				Imports' share of total consumption[1]			
	1977-79	1992-94	1997-99	1999	1977-79	1992-94	1997-99	1999
	Million pounds				*Percent*			
Sugar (cane and beet)[2]	9,902	2,557	3,356	2,581	49	15	19	14
Corn sweeteners[3]	1	383	260	292	—	2	1	1
Canola oil[4]	**	900	1,096	1,140	NA	84	85	80
Olive oil	57	275	382	417	95	95	95	95
Coconut oil	364	207	140	153	100	100	100	100
Wheat flour and products	73	650	927	931	—	2	2	2
Rice	7	439	701	730	—	10	14	14
Tree nuts[5, 6]	118	221	253	283	29	35	36	34
Almonds	—	—	—	—	—	—	—	—
Brazil nuts	NA	19	19	20	100	100	100	100
Cashews	70	137	165	191	100	100	100	100
Hazelnuts	8	10	11	13	56	44	56	47
Macadamias	—	4	9	11	—	32	45	52
Pecans	1	29	27	26	1	25	23	25
Pistachios	9	1	—	—	97	2	1	1
Walnuts	1	3	2	—	1	3	2	—
Peanuts[7]	1	26	155	169	—	1	7	7
Coffee[8]	2,381	2,479	2,809	2,987	100	100	100	100
Tea[9]	176	262	259	274	100	100	100	100
Cocoa[10]	766	1,561	1,740	1,880	100	100	100	100

Notes: ** = not applicable. — = Less than 0.5 percent. NA = not available.
[1]Calculated from commodity supply and use balance sheets. Import share is the total quantity imported divided by quantity available for domestic human consumption. A portion of the imports of some commodities is exported and a portion of some commodities is diverted to nonfood uses; therefore, the ratios presented here may overstate the importance of imports in domestic consumption for some commodity groups.
[2]Refined weight.
[3]Dry weight.
[4]Canola oil was not approved for human use by the U.S. Food and Drug Administration until 1985.
[5]Totals may not add exactly due to rounding.
[6]Shelled basis. Includes miscellaneous nuts, not shown separately.
[7]Farmers' stock basis.
[8]Green bean equivalent.
[9]Dry leaf equivalent.
[10]Chocolate liquor equivalent.
Source: USDA's Economic Research Service.

Import levels of certain food products have been augmented by improvements in shipping and transportation technology, which enable products to be shipped greater distances and over longer periods of time while maintaining appearance and quality.

Credit: USDA.

imports are aromatic varieties that cannot currently be grown in the United States. Jasmine rice from Thailand accounts for about 75 percent of U.S. rice imports. Almost 12 percent of U.S. rice imports consist of basmati rice from India and Pakistan. Italy supplies a small amount of arborio rice, typically used in making risotto.

Cashew nuts made up two-thirds (67 percent) of the volume of tree nut imports (excluding coconut meat) in 1999, followed by pecans (9 percent) and brazil nuts (7 percent). More than 65 percent of cashew nut imports were from India, the largest supplier of tree nuts to the United States. Mexico provided 96 percent of all pecan imports, while Brazil and Bolivia each supplied 35 percent of all brazil nut imports.

Fresh Fruit and Juice Imports Show Strong Growth

Of all food groups, import growth has been the strongest in fresh fruit. In 1999, 40 percent of the fresh fruit (including melons) Americans consumed was imported, up from 24 percent in 1977-79 (table 3). Bananas accounted for 60 percent of the volume of fresh fruit imports. Without bananas, fresh fruit imports rose from 6 percent of domestic consumption in 1977-79 to 21 percent in 1999. Sold year round in the domestic market, bananas rank number one in U.S. per capita fresh fruit consumption, followed by apples and oranges. To meet domestic demand, the United States imports virtually all bananas, primarily from Costa Rica, Guatemala, Ecuador, Colombia, and Honduras.

Imports accounted for 29 percent of the processed fruit Americans consumed in 1999, up from 13 percent in 1977-79. Processed fruit accounted for 49 percent of total fruit imports in 1999, compared with 42 percent in 1977-79. Fruit juices—orange, apple, and pineapple—accounted for 85 percent of total processed fruit imports in 1999 and canned fruit accounted for 11 percent. Pineapples accounted for 84 percent of total canned fruit imports, followed by olives at 10 percent.

Mexico is the United States largest supplier of fresh and frozen fruit, accounting for about 35 percent of the total value of fresh and frozen fruit imports. Mexico ships limes, melons, tangerines, pineapples, mangoes, grapes, papayas, avocados, and strawberries. Low transportation costs due to geographic proximity and tariff reductions or eliminations resulting from NAFTA provide Mexico a competitive advantage over other exporting countries.

Chile is also a major supplier of fresh fruit, with a 28 percent share of the U.S. import market. Located in the Southern Hemisphere, Chile can provide fresh fruit during the off-season months when the United States produces little, particularly from November through March.

Other fruit and fruit product suppliers to the United States are Brazil, the largest supplier of orange juice, and Argentina, Chile, and China, the leading suppliers of apple juice. Western Europe is a major supplier of processed fruit products, such as wine and fruit juices. Southeast Asia provides the largest share of canned fruit products, specifically canned pineapple from the Philippines and Thailand.

Fresh Vegetables, Frozen Potatoes, and Canned Tomatoes Top Vegetable Imports

Americans consumed an average of 421 pounds of vegetables per person in 1999, on a fresh-weight basis, compared with 406 pounds per person in 1992-94 and 339 pounds per person in 1977-79. Imports contributed 10 percent of total U.S. vegetable consumption in 1999—compared with 6 percent in 1992-94 and 3 percent in 1977-79.

Imports captured 11 percent of fresh-market vegetable consumption in 1999, compared with 7 percent in 1992-94 and 5.5 percent in 1977-79. Tomatoes accounted for 29 percent

Table 3
Imports' Share of Total U.S. Fruit and Vegetable Consumption Doubled Between 1977-79 and 1999 to 20 Percent

Selected commodities	Import quantity[1]				Imports' share of total consumption[2]			
	1977-79	1992-94	1997-99	1999	1977-79	1992-94	1997-99	1999
	Million pounds				*Percent*			
Total fruit and vegetables[3, 4]	12,522	27,879	36,165	39,766	9.5	15.6	18.6	20.1
Total fruit[3, 4]	10,022	21,775	25,690	28,277	17.6	29.1	31.3	33.6
Fresh	5,492	10,158	13,097	14,333	24.4	31.5	36.7	39.6
Citrus	131	323	623	756	2.3	5.0	9.3	13.4
Limes	20	205	334	342	37.5	80.8	94.1	92.4
Oranges	47	31	127	226	1.6	.9	3.7	9.6
Tangerines	53	41	88	101	10.6	8.1	13.9	16.3
Noncitrus	5,361	9,835	12,475	13,577	31.7	38.2	43.0	44.4
Bananas	4,479	7,052	7,883	8,546	99.9	99.8	99.8	99.7
Melons[5]	413	836	1,661	1,787	9.5	12.8	21.1	21.2
Grapes	85	726	942	1,014	11.3	38.9	43.3	45.0
Pineapples	148	281	544	624	47.1	53.5	72.7	73.7
Mangoes	30	228	436	461	71.2	95.6	97.2	98.3
Other fresh noncitrus	337	1,036	1,650	1,901	2.7	6.5	9.9	12.0
Processing[3, 4]	4,255	11,617	12,593	13,944	13.2	27.3	27.2	29.1
Canning	847	1,457	1,355	1,533	15.8	26.6	26.5	29.0
Freezing	106	73	118	142	15.0	7.4	11.3	13.9
Dehydrating	300	354	455	463	14.0	11.0	14.6	15.0
Juicing	3,277	9,733	10,664	11,806	12.5	29.7	28.8	30.6
Orange juice	2,277	4,758	5,265	5,775	11.9	23.2	21.6	22.9
Apple juice	593	2,984	3,419	3,630	28.3	55.9	60.4	60.8
Pineapple juice	392	1,247	1,049	1,089	46.7	78.0	79.8	80.3
Total vegetables[3]	2,500	6,105	10,475	11,489	3.3	5.9	9.3	10.1
Fresh	1,780	3,266	5,622	5,719	5.5	7.1	11.0	10.9
Tomatoes	774	743	1,713	1,633	27.7	17.8	36.0	33.7
Potatoes	139	586	916	923	1.3	4.6	6.9	6.9
Cucumbers	292	495	714	750	35.3	36.8	39.3	39.7
Onions	158	492	586	584	6.3	11.3	11.6	11.5
Bell peppers	140	242	430	455	22.3	15.3	24.0	24.7
Garlic	35	94	201	263	21.5	21.3	28.4	30.9
Carrots	80	138	196	185	6.5	5.0	5.2	5.0
Asparagus	6	64	114	142	9.7	42.8	54.0	57.0
Broccoli	—	25	84	100	**	2.6	5.7	6.1
Processing[3]	720	2,838	4,853	5,770	1.7	4.9	7.9	9.4
Canning	584	1,462	2,168	2,707	2.6	5.1	7.5	9.5
Tomatoes	397	621	987	1,322	27.7	17.8	36.0	33.7
Chili peppers	NA	484	742	887	NA	28.3	48.4	60.9
Other vegetables	187	357	440	498	2.2	4.7	6.1	6.9
Freezing	63	1,209	2,458	2,772	.5	6.4	11.3	12.7
Potatoes	23	531	1,701	1,965	.2	3.8	10.5	12.1
Broccoli	18	454	497	530	6.2	75.1	83.6	90.4
Other vegetables	21	224	260	276	.7	5.0	5.2	5.5
Dehydrating	13	55	56	88	.4	1.4	1.2	2.0
Pulses	62	104	152	167	4.2	5.0	6.9	7.1

Notes: — = less than 0.5 percent. ** = less than 0.05 percent. NA = not available.
[1]Fresh weight equivalent.
[2]Calculated from commodity supply and use balance sheets. Import share is the total quantity imported divided by quantity available for domestic human consumption (food disappearance). A portion of the imports of some commodities is exported and a portion of some commodities is diverted to nonfood uses; therefore, the ratios presented here may overstate the importance of imports in domestic consumption for some commodity groups.
[3]Totals may not add exactly due to rounding.
[4]Excludes wine.
[5]Watermelons, cantaloups, and honeydews.
Source: USDA's Economic Research Service.

of fresh-market vegetable imports in 1999, followed by potatoes (16 percent), cucumbers (13 percent), onions (10 percent), bell peppers (8 percent), garlic (5 percent), and carrots (3 percent). Imports accounted for 34 percent of fresh tomato consumption in 1999 (up from 18 percent in 1992-94). Imports' share of fresh tomato consumption rose steadily since 1994 until low domestic prices discouraged imports in 1999. In 1995 and 1996, imports surged due to the combined effect of the Mexican peso devaluation, rising demand for improved (extended shelf life) varieties, and adverse weather in Florida, which reduced output. In the past few years, greenhouse, hydroponic products made inroads into the fresh tomato retail market and imports shifted from Mexico to Canada.

Seven percent of the fresh-market potatoes Americans consumed in 1999 were imported. Since the enactment of the United States and Canada Free Trade Agreement (USCFTA) in 1989, fresh potato and seed imports from Canada have averaged 746 million pounds, 116 percent higher than the average for the 11-year period prior to USCFTA. Traditionally, a large percentage of the imported fresh potatoes from Canada have come from Prince Edward Island and have been distributed primarily along the U.S. east coast. More recently, a significant amount of potato imports have come from Manitoba, a province in midwestern Canada. Canadian producers have benefited from the U.S./Canadian exchange rate as well as transportation cost advantages over competing firms in the Pacific Northwest in shipping to east coast and midwest markets.

Imports of fresh cucumbers are highest in January and February, when U.S. production is limited by cool weather, and lowest in summer, the height of the domestic growing season. Imports accounted for 40 percent of U.S. fresh cucumber consumption in 1999. The volume of fresh imports in 1999 was 90 percent larger than in 1990, with the majority shipped from Mexico. Cucumber imports from Canada, which have increased fourfold since 1994 due to the strong U.S. dollar and the growing demand for European-type greenhouse/hydroponic cucumbers, accounted for 5 percent of U.S. imported fresh-market cucumbers in 1999.

Imports accounted for 9.4 percent of U.S. processed vegetable consumption in 1999, up from 4.9 percent in 1992-94 and 1.7 percent in 1977-79. Canned tomatoes, canned chili peppers, frozen potatoes, and frozen broccoli are the major processed vegetable imports.

Imports of most canned vegetables are relatively low due to a highly mechanized and relatively low-cost domestic industry. However, the United States imports significant quantities of canned items not produced domestically, such as bamboo shoots and water chestnuts. Tomato products are the leading canned vegetables, and imports of items like tomato paste and tomato sauce were generally a third less in volume in 2000 than in 1990 due to increasing efficiency (new plants, lower costs) in the domestic industry. Tomato product imports surged temporarily in 1999 due to smaller-than-expected domestic production in 1998-99. Tomato imports then declined significantly in 2000 as a record-large tomato crop brought low domestic prices in 1999-2000.

Frozen vegetable imports continue to increase. Imports of frozen vegetables now account for about 13 percent of consumption—up from 6 percent in 1992-94 and 0.5 percent in 1977-79. Broccoli accounts for 19 percent of the 2.8 billion pounds of frozen vegetable imports. Most frozen broccoli comes from Mexico (with smaller amounts from Guatemala). Frozen broccoli has the highest degree of import penetration among all vegetables, with about 90 percent of consumption coming from imports. Cutting broccoli into florets is a labor-intensive task. To cut costs, the industry basically moved from California to Mexico in the late 1980s and early 1990s.

As U.S. exports of french fries continue to rise—particularly to Japan, China, other Asian countries, and Latin America—so, too, do U.S. imports of french fries from Canada. Since the enactment of USCFTA, imports of french fries from Canada have increased an average of 25 percent per year. Canadian-produced fries currently account for 13 percent of U.S. consumption, up from about 2 percent in 1989. With the processing capacity in Canada continuing to expand, the United States could become a net importer of french fries for the first time in 2001.

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U.S. Food Companies Access Foreign Markets Through Direct Investment

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U.S. food processing firms use exports to reach foreign markets and consumers, but foreign direct investment (FDI) is more effective at generating overseas revenues. FDI by U.S. food processors generated an estimated $150 billion in sales in 2000, compared with $30 billion generated by U.S. processed food exports (fig. 1).

FDI refers to investment in a foreign entity or affiliate in which a parent firm holds a substantial, but not necessarily a majority, ownership interest. Ownership of assets in a foreign affiliate enables the parent firm to exercise control over the use of those assets. The U.S. Department of Commerce defines FDI as ownership of 10 percent or more of a firm by a foreign firm. More than four-fifths of U.S. food processing affiliates in foreign countries were majority owned by U.S. parent firms in 1998.

FDI has created prominent multinational corporations. For example, Campbell Soup, General Mills, Ralston Purina, PepsiCo, and Tyson Foods are U.S. companies with a strong presence abroad. Similarly, foreign-owned multinational food processing companies, such as Nestle, Unilever, Parmalat, and Danone, have invested in the U.S. food processing industry.

FDI is often a cost-effective way to reach foreign markets. For some food products, it is economically advantageous for a firm to invest capital in overseas production rather than ship the product from a domestic source. Companies use FDI to circumvent trade barriers, gain access to less expensive resources, and tailor products to local tastes in other markets. These factors are especially important to the processed food industry.

Trade barriers, such as tariffs (taxes on imports) or import quotas, encourage companies to set up manufacturing plants in the countries whose markets they are trying to reach. For example, Canada has high trade barriers for dairy products, and large European companies, such as Nestle, Danone, and Parmalat, have entered the Canadian dairy product market through Canadian affiliates. Similarly, U.S. trade barriers for foreign wines and dairy products have led European companies to purchase wineries and build dairy plants in the United States.

Lower input costs, whether for raw materials or labor, also attract food companies to FDI. For example, sugar is less expensive in Canada

Well-known U.S. brands produced in other countries must sometimes be tailored to appeal to local tastes and cultural differences.

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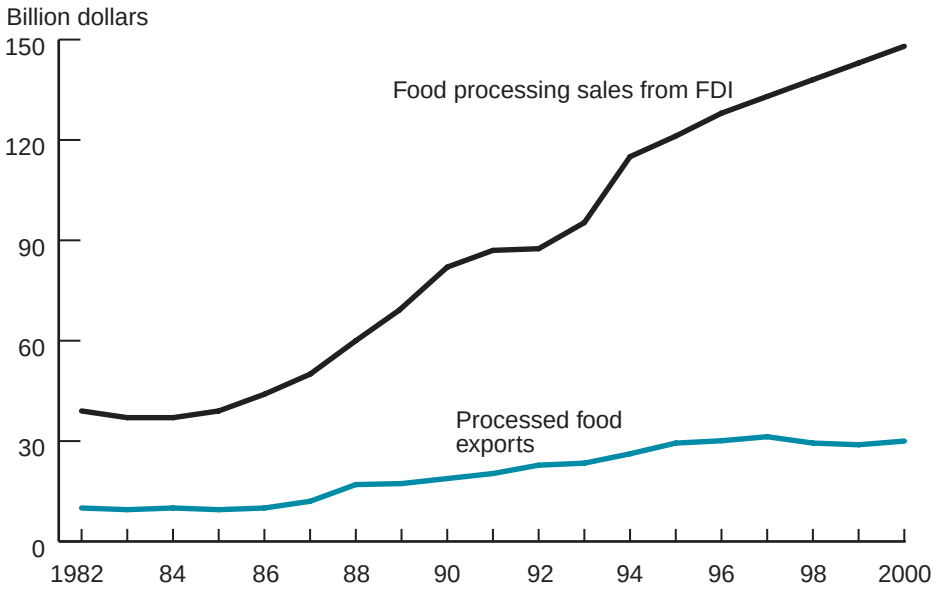
Figure 1
Processed Food Sales From U.S. FDI Exceed U.S. Food Exports



Note: 1999 and 2000 FDI sales are estimates.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

and Mexico than in the United States, making it advantageous to produce confectionery and other bakery products in those countries rather than in the United States. Similarly, low labor costs in Mexico, Argentina, and Brazil have attracted foreign investment. Also, raw materials, such as wheat flour, soybean oil, and tropical products, often cost less in these countries, leading foreign firms to invest in food processing plants.

The need to tailor products to local tastes and cultural differences is another reason to locate manufacturing plants in other countries. For example, in Mexico, Japan, and Korea, recipes for well-known U.S. brands must sometimes be changed to appeal to local consumers.

Trade Agreements Spur Foreign Investment

Foreign food processing affiliates of U.S. companies generated $150 billion in sales in 2000 (table 1). U.S. FDI in foreign food processing companies grew from $9 billion in 1980 to $36 billion in 2000. U.S. companies see FDI as an opportunity to expand their markets beyond the continental United States, and liberalized investment rules that are often included in regional trade agreements allow food companies to expand their markets.

The United Kingdom, Mexico, and Canada had the most sales from U.S. FDI in food processing in 2000 (table 2). In the latter half of the 1990s, sales from FDI were especially strong in Mexico. The 1994 North American Free Trade Agreement (NAFTA), which lowered or eliminated tariffs and promotes market integration between the United States, Canada, and Mexico, boosted investor confidence.

Sales from U.S. FDI in food processing in Brazil and Argentina also increased sharply during the 1990s. These two countries, along with Paraguay and Uruguay, formed MERCOSUR (Mercado Comun del Sur) in 1991. MERCOSUR is a free-trade agreement similar to the European Union and NAFTA. Brazil and Argentina have traditionally been limited markets for U.S. food products because they produce many of the same agricultural and food products as the United States, often at lower costs. U.S. multinationals, however, used FDI as an opportunity to enter the expanded MERCOSUR market.

MERCOSUR and NAFTA have caused U.S. processed food companies to retarget their investments. FDI by U.S. food companies in the European Union grew 124 percent from 1990 to 2000, but U.S. FDI in other Western Hemisphere countries grew 183 percent. U.S. companies also increased FDI in China in the 1990s as that country liberalized foreign investment rules and prepared itself for full membership in the World Trade Organization.

FDI is likely to increase in the near future. The year 2000 was a busy one for mergers and acquisitions by U.S. and foreign multinational food companies. Unilever, jointly headquartered in the United Kingdom and the Netherlands, purchased three U.S. companies: Slim Fast Foods for $2.3 billion, Bestfoods for $8.6 billion, and Ben and Jerry's for $0.4 billion. Fosters Brewing, headquartered in Australia, purchased U.S. Beringer Wines for $1.1 billion, and Cadbury-Schwepps of the United Kingdom purchased Triarc (maker of Snapple) for $0.7 billion. U.S. acquisitions included General Mills' purchase of Pillsbury from Diageo (a United Kingdom food and beverage conglomerate) for $5.1 billion.

Most Output Remains in the Host Country

Although U.S. multinational food processing firms establish affiliates abroad primarily to serve the host markets, there are clear exceptions. In 1998, 74 percent of the sales of U.S. affiliates remained in the host countries, while 22 percent were exported to other countries. Only 4 percent of sales ($4.8 billion) were exported back to the United States.

Of the $4.8 billion in total sales by U.S. food processing affiliates sent back to the United States, Canada accounted for 44 percent, Latin America for 37 percent, and Europe for 15 percent. Interestingly, in the United States and Canada, manufacturing plants of the same multinational firm supply products to two countries. For example, Nabisco in Ontario, Canada, makes cookies sold in both the Eastern United States and Eastern Canada; pasta and confectionery products are marketed the same way. Cargill and IBP in Alberta, Canada, market beef products in Western Canada and the Western United States.

Foreign Firms Also Invest in the U.S. Food Industry

Foreign food companies also invest in the U.S. market, but this inward FDI is at a scale much smaller than U.S. FDI abroad. Following a high of $8 billion in 1996, FDI in the U.S. processed food

Table 1
Sales From FDI by U.S. Food Firms Are Highest in Food Processing

Sector	1982	1987	1992	1997	1998	2000 est.
	Billion dollars					
Food processing	39.2	50.1	89.2	128.3	133	150
Food wholesaling	6.2	9.2	14.4	21.4	24	30
Retail food stores and eating and drinking places	8.7	9.7	21.2	NA	NA	NA
Total, all U.S.-owned affiliates in food marketing	54.1	69.0	124.8	NA	NA	NA

Note: NA = not available. Retail food stores' sales are no longer reported because of the presence of hypermarkets and nonfood retailing.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Table 2
Sales by U.S.-Owned Food Processing Affiliates Abroad Grew 56 Percent Between 1987 and 1997

Country/region	1982	1987	1992	1997	1998	Share of 1998 total affiliate sales	Change, 1987-97
	Million dollars					*Percent*	
Total, all countries	39,023	50,067	82,238	128,274	133,141	100	156
Europe	18,974	29,044	53,752	66,055	67,388	51	127
United Kingdom	5,696	7,124	12,274	15,176	17,485	13	113
Germany	2,660	6,160	8,465	9,132	9,162	7	48
Netherlands	2,706	4,753	7,270	9,382	8,852	7	97
Canada	5,258	5,522	NA	13,181	14,166	11	138
Asia and Pacific	5,432	8,559	13,712	22,598	20,487	15	164
Japan	2,363	4,442	4,055	5,893	5,708	4	32
Australia	1,441	1,438	3,569	4,697	4,392	3	226
China	NA	NA	NA	1,626	1,443	1	NA
South America	5,133	3,911	6,794	14,098	15,149	11	260
Argentina	630	758	2,040	3,604	3,409	3	375
Brazil	2,535	1,869	2,874	6,095	6,862	5	226
Central America	2,951	2,176	5,163	10,070	13,000	10	363
Mexico	2,556	1,596	4,460	9,209	12,305	9	477

Note: NA = not available.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

industry decreased to $1.5 billion in 2000, mostly due to the divestiture of a large, family-owned, Canadian corporation. Japanese multinationals also decreased FDI in U.S. food processing plants. Mexican companies, however, increased their investments to over $1 billion. GIBSA, a large bread-baking company, and Gruma, a corn-processing company, invested in bread-baking, corn-processing, and tortilla companies in the United States. Estimated sales from total FDI in U.S. food processing companies are $65 billion, of which only $3 billion are exported out of the United States, mostly to Japan and the United Kingdom. The largest foreign investments are in grain and oilseed milling, dairy products, bakeries, tortilla-making plants, and beverages.

European companies still dominate FDI in U.S. food manufacturing, with over 70 percent of total sales, mostly from the United Kingdom (table 3). Sales from Japanese-owned affiliates decreased in 1998 after peaking in 1997.

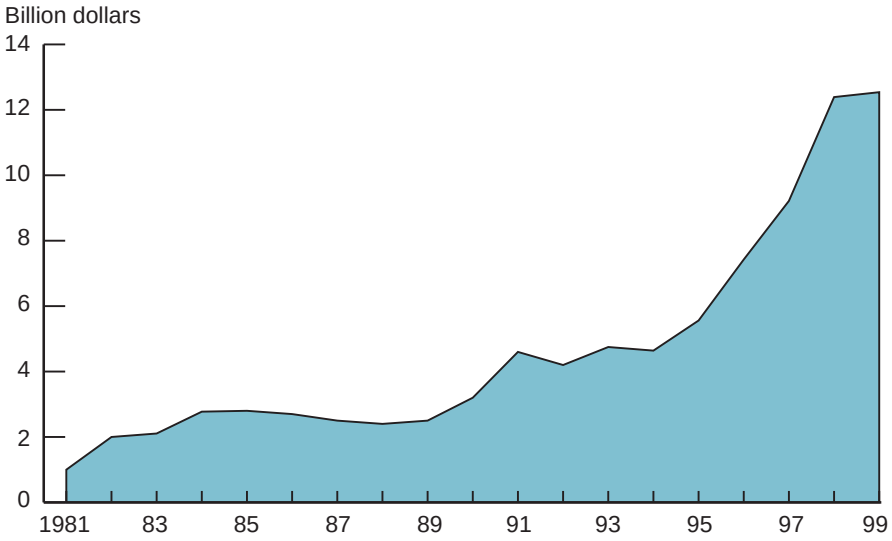
European investments in the United States are broad based. Products of U.S. affiliates of European companies include wine, dairy products, chocolate products, frozen and canned foods, grain products, and bottling plants. European companies with large interests in the United States include Nestle, Unilever, Cadbury-Schwepps, and Danone.

Japanese companies have purchased or built U.S. affiliates that mostly produce ethnic foods, such as noodles, surimi, soy sauce, and dry soup mixes. The Japanese have also invested in livestock and meat processing, and water bottling plants. Mexican companies also mostly invest in U.S. companies that make ethnic foods, but they have added bread-baking companies to

Foreign-Owned Food Stores' Sales Exceed Food Processing Sales

FDI in U.S. food retailing increased rapidly in the second half of the 1990s to nearly $13 billion in 1999 (see figure). Several well-known grocery chains in the United States, including Albertson's, A&P, Food Lion, Ahold (which owns several supermarket chains), and Shaw's Supermarkets, are owned by foreign firms (see table). Four of these food chains are on the list of the 10 largest food retailers in the United States. Their sales increased sharply during the 1990s as some parent companies built new stores and others acquired other U.S. supermarket chains. The $70 billion in sales by foreign-owned food stores in the United States is much larger than the sales of foreign food processing affiliates.

FDI in U.S. Retail Food Stores Took Off in the Mid-1990s



Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Many U.S. Food Retailers Have Foreign Ties

Firm	U.S. grocery stores, 1999 Rank	Sales	Foreign investor	Country
		Billion dollars		
Albertson's/American Stores	2	34.0	Theo Albrecht	Germany
Ahold, U.S.A.	4	23.4	Ahold	Netherlands
Food Lion/Hannaford Bros.	7	13.6	Delhaize, Le Lion	Belgium
A&P	9	10.4	Tengelmann	Germany
Aldi, U.S.A.	19	2.4	Aldi Group	Germany

Source: Kaufman, Phil R., Charles R. Handy et al. *Understanding the Dynamics of Produce Markets: Consumption and Consolidation Grow,* Agricultural Information Bulletin 758, U.S. Department of Agriculture, Economic Research Service, August 2000.

their investments. Canadian investments in U.S. food manufacturing are mostly concentrated in fruit juices and frozen foods. For example, McCain's is a large Canadian company that has investments in frozen potato processing.

Sometimes, ownership itself is unclear. For example, Cargill was one of the original investors in Brazil's orange juice concentrate industry, along with France's Louis Dreyfus and Brazil's Cutrale Citrus and Citrosuco Paulista. During the 1990s, these Brazilian companies invested in Florida citrus groves and processing plants. Brazilian companies are now responsible for about 40 percent of the juice processed in Florida.

Foreign companies also invest in other parts of the U.S. food chain, especially food retailing (see box). Sales from foreign-owned food retailers exceed sales of foreign-owned food processing companies in the United States (table 4).

Has Foreign Investment Displaced Trade?

USDA's Economic Research Service examined the reasons behind the increases in FDI by U.S. food companies and in U.S. exports of processed foods. The levels of consumer incomes largely explain why U.S. processed food exports are highest to Europe, Japan, and Canada (see "Consumer Preferences and Concerns Shape Global Food Trade" elsewhere in this issue).

The strong dollar, which makes it more costly for foreign consumers to import U.S. goods, has largely driven U.S. food companies to invest in firms abroad. A strong dollar also makes the purchase of assets in foreign countries less expensive. When domestic capital sources decline, which is common when a country's currency depreciates, countries often seek foreign capital to spur economic growth. The relationship between a strong dollar and increased U.S. FDI is especially evident in NAFTA countries.

Whether FDI complements or competes with exports depends on the country and the product. Products made by foreign affiliates of U.S. companies often compete with U.S. exports. For example, when beer and soft drink plants open in other countries, U.S. exports of those products to these countries decline. In many cases, however, FDI complements U.S. processed food exports. For example, the United States exports syrups and malt for soft drinks and beer that are manufactured abroad. The United States often exports soybean oil and high-fructose corn syrup that are used as ingredients in

Table 3
Value of Shipments by U.S. Food Manufacturing Affiliates of Foreign Firms More Than Doubled During 1987-97

Country of origin	1982	1987	1992	1997	1998	Share of 1998 total affiliate sales	Change, 1987-97
	Million dollars					*Percent*	
Europe	10,527	17,967	32,994	35,873	38,209	72	100
Canada	2,218	3,174	5,113	3,477	4,570	9	10
Japan	564	612	5,131	5,680	5,308	11	828
Other	1,538	1,109	3,561	5,228	5,417	10	371
Total	14,847	22,862	46,799	50,258	53,405	100	120

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Table 4
Food Retailing Accounts for the Largest Share of FDI in the U.S. Food Marketing System

Sector	1982	1987	1992	1997	1998	2000 est.	Share of 1998 total affiliate sales
	Billion dollars						*Percent*
Food processing	14.8	22.9	46.8	47	49.8	50	29
Food wholesaling	7	14	19	44	40	42	24
Retail foodstores	18.8	24.3	48.2	67.7	70.7	73	42
Eating and drinking places	NA	0.5	4.9	7	9.1	11	5
Total, all foreign-owned U.S. affiliates in food marketing	40.6	61.6	118.8	165.7	169.6	176	100

Note: NA = not available.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

processed foods like bread, bakery products, frozen dinners, and breakfast foods produced by Sara Lee, Kraft Foods, and Kellogg in other countries. Archer-Daniels-Midland, Ralston Purina, and Cargill often use U.S. agricultural products as ingredients in livestock feeds produced in their foreign plants.

As farming technology abroad has improved and U.S agricultural products have become less cost competitive, U.S. food processing affiliates have sought non-U.S. sources of agricultural commodities. Agricultural production in South America grew more than 30 percent during the 1990s, providing an important source of wheat, corn, and soybeans for U.S. manufacturing abroad.

While foreign investment benefits parent companies, it also has important economic consequences for host countries. FDI can result in increases in new employment opportunities, salaries, and gross domestic product. Foreign affiliates of U.S. companies employed 551,500 persons, earning $13.6 billion, in 1998. Likewise, 188,000 persons, earning nearly $7 billion, were employed by foreign-owned food and beverage companies in the United States. The host countries also gain in less quantifiable ways. The country receiving foreign direct investment gains from the investing firm's knowledge of technology, marketing, management, finance, and information services. Even when FDI occurs by acquisition, the parent firm typically upgrades the acquired firm's production processes and equipment, quality and environmental controls, procurement practices, packaging, and distribution systems.

FDI has become an increasingly important strategy for the U.S. food industry to expand abroad. In many instances, FDI has proved to be more economically feasible than exports as a means to access foreign markets. The value of foods produced by U.S. affiliates abroad have exceeded the value of U.S. processed food exports since the 1960s and this trend will continue in the near future.

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U.S. Exports Face High Tariffs in Some Key Markets

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From 1996 to 2000, U.S. food and agricultural exports averaged about $60.6 billion per year. The existence of import tariffs in foreign markets was one of several factors affecting the size of this trade. Tariffs, which are taxes levied by a government on imported goods, drive a wedge between a country's domestic prices and those prevailing in international trade. By altering the relative prices of imported and domestically produced goods, tariffs decrease the volume of imports, as domestic production tends to increase and consumption decreases as a result of higher domestic prices.

Countries impose tariffs for a variety of reasons, the most common being to protect domestic producers from foreign competition. Tariffs are also used as a relatively easy way to generate revenue, particularly by developing countries. Regardless of their purpose, tariffs are the main trade-distorting policy instrument used by governments. In fact, high tariff protection for agricultural products is the major distorting feature of international trade today.

Tariffs imposed on U.S. food and agricultural exports in foreign markets have a dampening effect on the volume and value of this trade. Measuring the trade-restricting effects of tariffs is extremely complicated, however, as it is a function of numerous factors, including the manner in which producers and consumers respond to changes in relative prices. This article focuses on identifying major markets in which U.S. agricultural exports face high tariffs and attempts to compute the average tariff faced by U.S. agricultural exports in these markets. The effects of U.S. tariffs on other countries' exports are not addressed here.

High tariff protection for agricultural products is the major distorting feature of international trade today.

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Food Exports Overtake Bulk Commodity Exports

After achieving a record level of over $67 billion in 1996, U.S. agricultural exports steadily decreased over the next 3 years to $54 billion in 1999. The slowdown in the world economy, particularly in Asia, factored heavily in the decline. Lower prices for agricultural goods and a strong U.S. dollar also contributed to the contraction in the value of U.S. agricultural exports. In 2000, however, exports began to recover and increased to almost $58 billion.

The most striking characteristic of U.S. agricultural trade is the rapid growth in exports of high-value processed foods and beverages. Since 1997, this category has been the largest component of U.S. agricultural exports (fig. 1). In 2000, exports of processed products were valued at $22.5 billion, accounting for 39 percent of total agricultural and food exports, compared with 33 percent in 1996. (Trade data in this article come from the U.S. Department of Commerce (see box). Other agricultural export totals may differ depending on which commodities and foods are included.) Bulk commodities accounted for 32 percent of trade in 2000, followed by semi-processed products at 19 percent and fresh horticultural products at 10 percent. While the drop in bulk commodity exports is largely due to decreased global demand and, correspondingly, decreased global prices, another important factor is that these commodities are increasingly being exported in a more highly processed form.

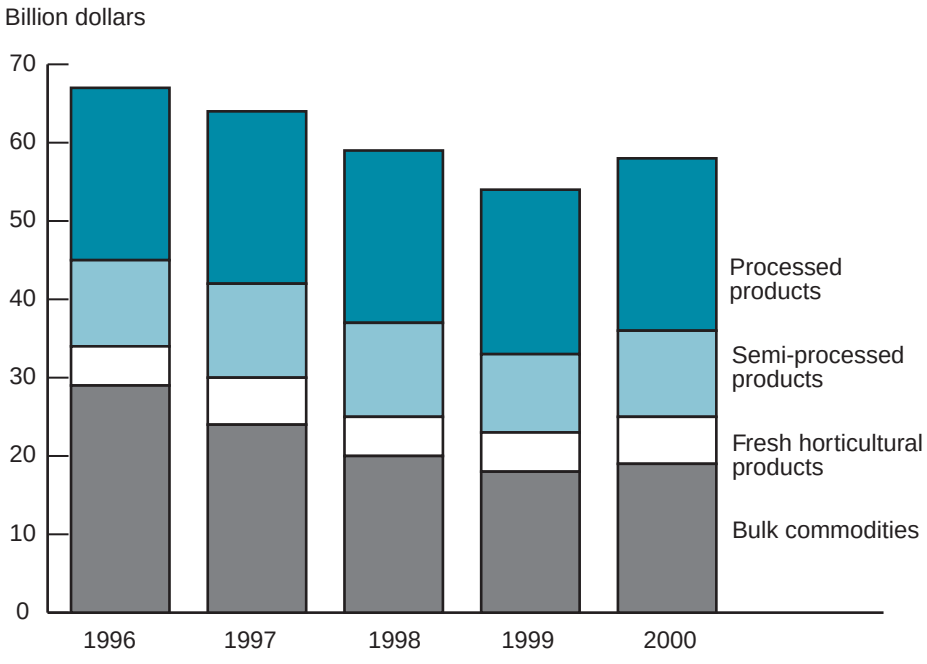
From 1998 to 2000, soybeans were the top U.S. export earner at almost $6 billion per year (table 1). Other billion-dollar products included traditional bulk commodities, such as corn, wheat, cotton, and tobacco, as well as semi-processed goods, such as soymeal and hides and skins. Billion-dollar high-value categories include frozen beef, frozen poultry, fresh or chilled beef, tobacco products, miscellaneous food preparations, and pet foods. Almonds, the highest earning commodity in the fresh horticultural products category, averaged over $700 million in export revenue during the 5-year period.

Wine was the fastest growing export category among the top 50 and grew by almost 15 percent per year. Wine was one of few categories that increased in export value each year. Fresh pork, frozen beef, cocoa products, candy, and frozen potatoes also registered impressive export growth. Beer, wheat, corn, other distilled spirits (liqueurs, cordials, etc.), and animal fats suffered large average yearly decreases in export value.

Twenty countries accounted for 85 percent of total U.S. exports during the 1996-2000 period. Japan was the top export destination, with average annual imports of almost $12 billion (table 2). Nine other destinations—the European Union (EU), Canada, Mexico, Korea, Taiwan, Hong Kong, China, Russia, and Egypt—all averaged over $1 billion in sales per year. Of the top 10 destinations, only 2 showed positive sales growth during the period—Canada, with an annual growth rate of almost 5 percent, and Mexico, which grew at nearly 6 percent per year. Exports to the Dominican Republic, Turkey, and Saudi Arabia also grew during this period. The EU was the only top 10 destination in which sales dropped each year. U.S. agricultural exports to the EU decreased from almost $11 billion in 1996 to $7 billion in 2000, an average annual decline of almost 11 percent.

Among the top 20 export destinations for U.S. agricultural exports, only Mexico, Hong Kong, Indonesia, Colombia, the Dominican Republic, Thailand, and Venezuela imported each of the 215 agricultural categories at least once during the 5 years. Brazil imported the smallest

Figure 1
High-Value Processed Foods Increase Share of U.S. Agricultural Exports



Source: Compiled from official trade statistics of the U.S. Department of Commerce, Bureau of the Census.

assortment of agricultural goods, only 190 of the 215. Egypt imported 205 different agricultural goods from the United States, but 51 percent consisted of a single category, wheat, while another 25 percent consisted of corn. Other countries in which U.S. imports consisted primarily of two or three goods included Indonesia (56 percent in soybeans and raw cotton), Venezuela (55 percent in corn, wheat, and soymeal), Israel (53 percent in soybeans, wheat, and tobacco products), Colombia (52 percent in corn, wheat, and soymeal), and the Dominican Republic (50 percent in tobacco, corn, and soymeal). In general, developing countries displayed a high degree of concentration in their purchases of U.S. food and agricultural goods, with a large share of total import value comprising relatively few bulk or semi-processed commodities. Industrial countries, however, tended to be more diversified in their imports and accounted for the overwhelming share of U.S. high-value product exports.

The most lucrative markets for U.S. food and agricultural exports during 1996-2000 were corn and tobacco products to Japan and soybean and tobacco products to the EU (table 3). In aggregate, these four markets earned an average of over $6 billion per year.

Tariffs Facing U.S. Agricultural Exports in Selected Markets

Though U.S. agricultural exports face tariffs in all countries, this examination of tariffs is limited to 12 of the top 20 destinations. As the tariff database (AMAD) covers only World Trade Organization (WTO) members, four non-WTO members—China, Taiwan, Russia, and Saudi Arabia—are excluded. (China will become a full member on

Data, Methodology, and Definitions

This analysis uses official trade statistics of the U.S. Department of Commerce, Bureau of the Census and tariff data from the Agricultural Market Access Database (AMAD). Commodity coverage was based on the definition of agriculture as specified in the WTO Agreement on Agriculture. The trade database contains trade flows between the United States and 113 countries. It is the same trade reported by the United States to the United Nations for inclusion in the International Bilateral Agricultural Trade (IBAT) database. It was aggregated to conform with the IBAT's 232 agricultural category definitions. These categories are largely composed of aggregations of commodities at the 6-digit Harmonized System (HS) level. The HS provides a nomenclature for classifying internationally traded goods. Up to the 6-digit level, tariff schedules across countries use identical categories for commodity aggregations, with the categories established regularly by the World Customs Organization. Beyond the 6-digit level, however, this correspondence may not exist. Because commodity definitions at an 8-digit or higher level of disaggregation may vary from country to country, specific comparisons across countries are increasingly difficult at progressively higher levels of detail.

The Organization for Economic Cooperation and Development (OECD) maintains the AMAD. This database contains detailed tariff and tariff-rate quota information at the tariff-line level for World Trade Organization (WTO) members. The WTO is the institutional and legal foundation of the multilateral trading system. It provides the principal contractual obligations determining how governments frame and implement domestic trade legislation and regulations. As of July 26, 2001, WTO membership totaled 142 countries or customs territories. The term "tariff-line" refers to the category to which the WTO member's legally established tariff applies. Tariff-lines are bound within the WTO at various levels of specificity. For instance, the tariff schedule for Turkey contains tariffs bound at the 4-, 6-, and 8-digit HS levels.

Tariffs rates used throughout this article are the final bound most-favored-nation (MFN) tariffs established by WTO members. Bound tariffs are the maximum MFN rate (nondiscriminatory tariffs extended among WTO members) that a country can charge on imports. However, countries may choose to apply a tariff below the bound rate, and often do, particularly for imports from trading partners that have been granted preferential rates or exemptions.

In order to match a country's tariffs to the IBAT trade figures, sometimes a number of 6-, 8-, or 10-digit tariffs had to be aggregated to the corresponding IBAT level. This was done through a simple, unweighted average. In cases where the tariff was not in ad valorem form, however, an ad valorem equivalent (AVE) had to first be calculated.

For more information on the tariffs found in the AMAD and the methodology used to calculate AVEs, see Gibson et al., *Profiles of Tariffs in Global Agricultural Markets.*

Table 1
Wine Is Fastest Growing U.S. Agricultural Export But Soybeans Are Top Earner

Product	1996	1998	2000	1996-00		
				Average	Market share	Growth rate
	Million dollars				Percent	
Soybeans	7,458	4,885	5,313	5,943	9.8	-8.1
Corn	8,626	4,619	4,714	5,701	9.4	-14.0
Tobacco products	5,268	4,842	4,035	4,609	7.6	-6.4
Wheat	6,307	3,714	3,388	4,234	7.0	-14.4
Cotton (not carded)	2,742	2,566	1,936	2,188	3.6	-8.3
Food preparations: mixtures	1,724	1,814	1,966	1,873	3.1	3.3
Poultry (frozen)	2,092	1,647	1,521	1,696	2.8	-7.7
Soybean meal	1,430	1,605	1,171	1,428	2.4	-4.9
Tobacco (unmanufactured)	1,396	1,467	1,235	1,396	2.3	-3.0
Beef (fresh or chilled)	1,273	1,300	1,665	1,393	2.3	6.9
Pet food	1,115	1,268	1,404	1,251	2.1	5.9
Hides and skins (bovine)	1,390	1,027	1,376	1,228	2.0	-.3
Beef (frozen)	1,108	958	1,498	1,178	1.9	7.8
Feed: waste and residues	1,120	802	759	883	1.5	-9.3
Crude vegetable material	670	806	833	773	1.3	5.6
Almonds	897	715	631	719	1.2	-8.4
Bakery products	659	701	733	702	1.2	2.7
Edible offal: (fresh or frozen)	721	597	694	650	1.1	-.9
Starches (nonedible)	449	494	723	626	1.0	12.6
Sorghum	758	550	627	620	1.0	-4.6
Rice (milled)	735	612	512	617	1.0	-8.6
Pork (fresh or chilled)	462	475	748	549	.9	12.8
Animal fats	586	642	381	529	.9	-10.2
Soybean oil	323	904	250	501	.8	-6.3
Wine	309	516	538	457	.8	14.9
Pork (frozen)	465	447	504	447	.7	2.1
Hay	418	378	467	418	.7	2.8
Fresh grapes	367	335	455	390	.6	5.5
Fresh apples	409	350	388	388	6	-1.3
Potatoes (preparations)	324	405	357	374	6	2.4
Rice (unmilled)	296	596	324	373	.6	2.2
Crude animal material	378	359	402	366	.6	1.5
Orange juice	340	363	354	360	.6	1.0
Cocoa products	335	315	453	360	6	7.8
Live animals (breeding)	297	356	450	348	6	11.0
Potatoes (frozen)	285	346	376	337	6	7.2
Whiskey	297	311	367	329	.5	5.4
Vegetables (preparations): other	308	337	320	326	.5	1.0
Beans, peas, and lentils (dried)	311	386	286	324	.5	-2.1
Corn oil	272	401	238	307	.5	-3.3
Stone fruit (fresh)	278	261	351	306	.5	6.0
Vegetables (fresh): other	258	290	338	293	.5	6.9
Oranges	289	357	304	292	.5	1.3
Distilled spirits (other)	402	235	237	288	.5	-12.4
Essential oils	267	287	301	288	.5	3.0
Candy	246	275	326	285	.5	7.3
Nonalcoholic beverages	232	289	288	279	.5	5.6
Other nuts and fruit (dried and fresh)	266	279	295	278	.5	2.7
Poultry (fresh or chilled)	219	307	263	275	.5	4.7
Beer	367	256	171	264	.4	-17.3
Subtotal	57,545	48,046	47,264	50,041	NA	-4.8
Share of U.S. total	85%	82%	81%	83%	NA	-1.1
Total U.S. agricultural exports	67,636	58,699	58,117	60,591	NA	-3.7

Note: NA = not applicable.
Souce: Compiled from official trade statistics of the U.S. Department of Commerce, Bureau of the Census.

December 11, 2001; Taiwan will become a full member on January 1, 2002.) Canada, Mexico, Israel, and Hong Kong impose tariffs on U.S. exports that are zero or nearly zero, so these countries are also excluded from the discussion.

U.S. exports to the 50 markets listed in table 4 ranged from $556 million to $8.7 billion during the 1996-2000 period. The market share column in the table shows the percent of total exports of a commodity that went to a particular country. For example, 31 percent of total U.S. corn exports during this period went to Japan. Japan accounted for over 50 percent of the total export value of eight of the commodities found in table 4. Exports of fresh or chilled pork and hay were the most dependent on a single market, relying on the Japanese consumer for 78 and 71 percent of all export sales, respectively. Japan also purchased 56 percent of fresh or chilled beef and 54 percent of frozen beef exports, while the EU bought 59 percent of U.S. almond exports and 52 percent of U.S. wine exports.

Table 4 also displays the average (mean) tariff rate faced by U.S. exports in these markets. In some cases, the average is computed from only 1 rate, while in others it is computed from over 50 rates. For example, the 18.5 percent tariff on corn exported to Japan is the simple average of five tariff rates ranging in size from 0 to 68 percent. Different rates are levied on imports of hybrid seed, other seed, corn for feed, popcorn, and other corn for food. In Japan's case, all tariffs on corn imports are single-tier rates. Tariff-rate quotas (TRQ) are not applied to corn imports in Japan.

A TRQ is a two-tiered tariff under which a limited volume (the quota amount) of goods can be imported at a lower in-quota tariff rate, with any additional imports subject to a higher over-quota tariff. TRQs were established under the 1995 Uruguay Round trade agreement for goods that had previously been subject to highly protectionist nontariff barriers, such as quotas or import licensing. TRQs are designed to provide a limited amount of market access for imports (the greater of 5 percent of domestic consumption or the level that existed before the Uruguay Round) at low or minimal tariff rates.

Tariff averages are calculated using only the single-tier rates and the in-quota rates of the TRQs. The over-quota tariffs are not included in the calculation as it is assumed that very little trade takes place at these higher rates. For example, Korea has a TRQ for feed corn with an in-quota rate of 1.8 percent, under which a significant quantity of imports enter. The high over-

Table 2
Canada and Mexico Continue To Gain as U.S. Export Destinations for Agricultural Products

Country	1996	1998	2000	1996-00		
				Average	Market share	Growth rate
	Million dollars				Percent	
Japan	13,370	10,984	11,785	11,871	19.6	-3.1
European Union	10,892	9,360	6,964	9,000	14.9	-10.6
Canada	7,135	8,150	8,630	7,988	13.2	4.9
Mexico	5,497	6,272	6,826	5,933	9.8	5.6
Korea	4,010	2,257	2,766	2,917	4.8	-8.9
Taiwan	3,045	1,876	2,119	2,356	3.9	-8.7
Hong Kong	1,635	1,588	1,390	1,548	2.6	-4.0
China	2,094	1,354	1,779	1,543	2.5	-4.0
Russia	1,746	1,015	865	1,129	1.9	-16.1
Egypt	1,300	979	1,062	1,090	1.8	-4.9
Philippines	924	716	883	835	1.4	-1.1
Turkey	712	796	805	756	1.2	3.1
Saudi Arabia	746	703	749	741	1.2	.1
Indonesia	854	455	679	660	1.1	-5.6
Israel	686	468	597	580	1.0	-3.4
Colombia	635	595	420	531	.9	-9.8
Dominican Republic	420	507	526	513	.8	5.7
Thailand	616	421	515	503	.8	-4.4
Venezuela	474	510	414	478	.8	-3.3
Brazil	633	483	262	432	.7	-19.8
Subtotal	57,425	49,488	50,036	51,403	NA	-3.4
Share of U.S. total	85%	84%	86%	85%	NA	.3
Total U.S. agricultural exports	67,636	58,699	58,117	60,591	NA	-3.7

Note: NA = not applicable.
Source: Compiled from official trade statistics of the U.S. Department of Commerce, Bureau of the Census.

Table 3
Billion-Dollar Export Markets Include Corn and Tobacco to Japan, Soybeans and Tobacco to EU

Country	Product	1996	1998	2000	Total 1996-00	Average 1996-00
				Million dollars		
Japan	Corn	2,462	1,490	1,427	8,727	1,745
Japan	Tobacco products	1,559	1,659	2,096	8,717	1,743
European Union	Soybeans	2,349	1,555	1,148	8,426	1,685
European Union	Tobacco products	1,576	1,263	473	5,247	1,049
Japan	Soybeans	1,145	874	774	4,712	942
Mexico	Soybeans	859	759	721	3,911	782
Japan	Beef (fresh or chilled)	810	695	869	3,873	775
European Union	Tobacco (unmanufactured)	656	689	550	3,236	647
Japan	Beef (frozen)	683	592	648	3,162	632
Mexico	Corn	1,025	611	541	3,072	614
European Union	Feed: waste and residues	802	540	457	2,981	596
Korea	Corn	1,262	466	210	2,965	593
Taiwan	Corn	962	377	457	2,954	591
Egypt	Wheat	775	523	496	2,797	559
Japan	Wheat	654	472	422	2,590	518
Russia	Poultry (frozen)	858	502	347	2,560	512
Taiwan	Soybeans	777	276	385	2,479	496
China	Soybeans	414	274	1,008	2,454	491
Korea	Hides and skins (bovine)	565	291	504	2,236	447
Japan	Pork (fresh or chilled)	405	354	559	2,136	427
European Union	Almonds	583	437	320	2,127	425
Mexico	Cotton (not carded)	262	616	484	2,008	402
Canada	Food preparations: mixtures	289	392	419	1,865	373
Mexico	Sorghum	310	355	483	1,788	358
Canada	Bakery products	321	355	399	1,777	355
Hong Kong	Poultry (frozen)	383	301	356	1,725	345
Japan	Edible offal: (fresh or frozen)	429	291	342	1,710	342
Canada	Pet food	305	341	355	1,656	331
Korea	Soybeans	439	305	259	1,600	320
Mexico	Beef (fresh or chilled)	113	330	494	1,571	314
China	Cotton (not carded)	730	126	59	1,519	304
Japan	Hay	281	288	318	1,481	296
Korea	Beef (frozen)	212	134	507	1,437	287
Egypt	Corn	312	188	345	1,387	277
Philippines	Wheat	329	223	246	1,344	269
Japan	Pork (frozen)	320	226	234	1,255	251
Japan	Pet food	203	236	319	1,246	249
European Union	Wine	147	264	293	1,183	237
Canada	Beef (fresh or chilled)	273	220	227	1,176	235
Korea	Wheat	328	216	181	1,162	232
Mexico	Wheat	326	215	218	1,154	231
Saudi Arabia	Tobacco products	195	198	268	1,099	220
Japan	Cotton (not carded)	323	254	139	1,063	213
European Union	Pet food	240	233	155	1,046	209
European Union	Corn	413	160	69	1,034	207
Japan	Tobacco (unmanufactured)	231	211	195	1,014	203
Canada	Vegetables (fresh): other	166	196	238	991	198
Canada	Orange juice	183	200	195	975	195
Indonesia	Soybeans	213	139	164	972	194
Japan	Food preparations: mixtures	167	209	167	958	192
Subtotal		29,624	22,122	22,539	120,556	24,111
Share of U.S. total		44%	38%	39%	40%	40%
Total U.S. agricultural exports		67,636	58,699	58,117	302,953	60,591

Source: Compiled from official trade statistics of the U.S. Department of Commerce, Bureau of the Census.

Table 4
Considerable Scope Exists to Reduce Tariffs Even Where Significant Trade Is Already Occurring

Country	Product	Total exports 1996-00	Market share	Tariff average	Tariff range	Type of tariff Single-tier	In-quota
		Million dollars		*Percent*		*Number*	
Japan	Corn	8,727	31	18.5	0-68	5	NA
Japan	Tobacco products	8,717	38	9.1	0-30	8	NA
European Union	Soybeans	8,426	28	0.0	0.0	2	NA
European Union	Tobacco products	5,247	23	37.6	10-75	8	NA
Japan	Soybeans	4,712	16	0.0	0.0	1	NA
Japan	Beef (fresh or chilled)	3,873	56	50.0	50.0	3	NA
European Union	Tobacco (unmanufactured)	3,236	46	14.1	11-18	5	NA
Japan	Beef (frozen)	3,162	54	50.0	50.0	3	NA
European Union	Feed: waste and residues	2,981	68	16.9	0-185	11	NA
Korea	Corn	2,965	10	1.7	0-3	NA	4
Egypt	Wheat	2,797	13	5.0	5.0	2	NA
Japan	Wheat	2,590	12	5.0	0-20	NA	4
Korea	Hides and skins (bovine)	2,236	36	5.0	5.0	27	NA
Japan	Pork (fresh or chilled)	2,136	78	60.1	0-248	9	NA
European Union	Almonds	2,127	59	1.0	0-2	2	2
Japan	Edible offal: (fresh or frozen)	1,710	53	58.9	0-523	21	NA
Korea	Soybeans	1,600	5	5.0	5.0	NA	1
Japan	Hay	1,481	71	0.0	0.0	5	NA
Korea	Beef (frozen)	1,437	24	41.6	41.6	NA	3
Egypt	Corn	1,387	5	5.0	5.0	2	NA
Philippines	Wheat	1,344	6	26.7	20-30	3	NA
Japan	Pork (frozen)	1,255	56	60.4	0-227	9	NA
Japan	Pet food	1,246	20	18.3	0-98	14	NA
European Union	Wine	1,183	52	5.7	0-40	28	NA
Korea	Wheat	1,162	5	4.2	2-9	6	NA
Japan	Cotton (not carded)	1,063	10	0.0	0.0	2	NA
European Union	Pet food	1,046	17	72.6	0-231	23	6
European Union	Corn	1,034	4	24.0	0-38	2	1
Japan	Tobacco (unmanufactured)	1,014	15	0.0	0.0	3	NA
Indonesia	Soybeans	972	3	27.0	27.0	5	NA
Japan	Food preparations: mixtures	958	10	20.3	5-53	44	24
European Union	Wheat	922	4	3.2	0-13	1	3
Korea	Cotton (not carded)	911	8	2.8	2-7	6	NA
Indonesia	Cotton (not carded)	888	8	33.5	27-40	2	NA
European Union	Food preparations: mixtures	885	9	9.6	0-33	22	NA
Japan	Sorghum	882	28	1.0	0-3	3	NA
Japan	Potatoes (frozen)	854	51	10.4	9-14	3	NA
European Union	Crude vegetable matter	800	21	1.5	0-16	54	NA
European Union	Soymeal	795	11	0.0	0.0	1	NA
Colombia	Corn	784	3	137.0	80-194	NA	4
European Union	Whiskey	745	45	0.2	0-0.3	4	NA
Philippines	Soymeal	712	10	5.0	5.0	1	NA
European Union	Live animals (breeding)	693	40	2.3	0-12	5	NA
Japan	Hides and skins (bovine)	625	10	0.0	0.0	5	NA
Turkey	Cotton (not carded)	623	6	5.5	5-6	2	NA
Thailand	Soybeans	615	2	20.0	20.0	NA	2
European Union	Essential oils	613	43	3.2	0-17	40	NA
Japan	Grapefruit	596	53	10.0	10.0	2	NA
Turkey	Tobacco products	580	3	145.1	130-167	6	NA
European Union	Starches (nonedible)	556	18	14.7	0-38	15	NA

Note: NA = not applicable. Does not include markets in non-WTO members (China, Russia, Saudi Arabia, and Taiwan) and countries where the U.S. faces agricultural tariffs that are already zero or near zero (Canada, Mexico, Israel, and Hong Kong).
Sources: Compiled from official trade statistics of the U.S. Department of Commerce, Bureau of the Census and tariff information in the Agricultural Market Database (AMAD).

quota rate of 328 percent, however, inhibits trade in excess of the quota amount. Even without including the over-quota rates in the calculation, the averages for some products are very high.

Although most trade takes place at tariffs under 10 percent, high trade flows take place in some categories subject to high average tariffs. For example, imports of tobacco products by Turkey, corn by Colombia, pet food by the EU, and pork, beef, and edible offal by Japan are subject to average tariffs of over 50 percent and they are among the largest markets for U.S. exports. As shown in table 4, these commodity groupings are subject to a range of tariffs. Thus, high tariffs on some subcategories within a grouping may impede trade, but low tariffs on other subcategories result in significant trade.

Some countries apply tariffs at levels significantly below their bound most-favored-nation (MFN) rates. While bound tariffs are the maximum rates that a country can charge on imports from WTO member countries without incurring a penalty, the importing country may choose to apply a tariff below the bound rate. For example, a country may charge a tariff below the bound level on imports from trading partners that have been granted preferential rates or exemptions (such as under the North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico), or a country may charge lower tariffs during times of domestic production shortfalls.

The agricultural tariffs of many developing countries were bound at high levels, often over 100 percent, as a matter of insurance. This practice allows these countries to apply tariff rates at levels significantly below the bound levels when global prices are high, while preserving the option to increase tariffs, up to the bound level, when prices are low. The tariff averages in table 4 are calculated using bound tariffs and may not reflect the actual rate being charged on imports, particularly in many developing countries.

Tariffs on perishable products may vary throughout the year, with high tariffs during domestic production seasons and low tariffs at other times. While a product's tariff average might appear prohibitively high, a significant amount of trade may occur during times of the year when the tariff is low.

The wide range of tariffs levied on individual commodities within the same category indicates the extent to which countries tailored their tariff schedules to provide protection for specific products. For example, tariffs on tobacco product imports by the EU range from 10 to 75 percent. The low-trade category "cigarettes containing cloves" is assessed the lowest rate of 10 percent, while the categories "other cigarettes" and "smoking tobacco" (primarily pipe tobacco) are levied rates of 58 and 75 percent, respectively. The lowest assessed category may not be produced in the EU, or is produced in small quantities, while imports of the two higher assessed categories are likely competing with domestic production.

How To Compare Tariffs Across Countries?

The furthest one can reduce a set of data, and hopefully still retain any useful information, is to summarize the data with a single measure. With tariff schedules, it is common to calculate an average tariff to reflect the overall restrictiveness of a country's trade policy. Tariff averages, however, should be interpreted with caution, as they can be biased upward by a few high tariffs. Also, different methods of calculating the average can yield significantly different results.

To compare the levels of tariff protection faced by U.S. agricultural exports in the markets of major trading partners, we calculated average tariff measures using three different methods. Table 5 displays averages calculated using single-tier and over-quota tariffs, as opposed to single-tier and in-quota tariffs, as used in table 4. The over-quota rate is used because, in most cases, it represents the marginal, binding constraint on additional trade. As such, this rate gives a more accurate account of the level of protection provided by the tariff schedule. The first tariff measure shown in table 5 is a simple, unweighted average of the tariffs levied by each country on the 215 agricultural categories exported by the United States. A simple average gives an equal weight to all goods, so a tariff on kumquats receives the same weight as a tariff on wheat, even though wheat may be traded in significantly greater quantities.

The second measure uses the country's actual agricultural imports from the United States as weights. Weighted averages are generally calculated to emphasize certain tariffs over others. In this case, the higher the value of U.S. exports to the country, the greater the weight given to the tariff. This method is equivalent to calculating the average duty paid on U.S. agricultural imports in each country. Multiplying these averages by the value of total U.S. exports to each country would give an approximation of the total duties that country collected on imports from the United States, assuming the items were assessed the bound MFN rates. Weighting based on import values frequently biases average tariff estimates downward, because items with the highest tariffs will receive virtually no weight as little or no imports are likely to enter under such tariffs.

The third measure uses total U.S. exports as weights, rather than just exports to the country in question. The advantage of this approach is that it provides equal weights in

doing calculations for each country, thus providing a more consistent way to both measure and compare the relative levels of tariff protection at each border faced by the U.S. agricultural export sector. In this case, the trade-restricting effects of extremely high tariffs in each country are explicitly taken into account, as high tariffs will receive a weight based on the level of total U.S. exports, not exports to that country.

Tariff Averages Reveal Considerable Scope for Reductions

Based on the simple average, the most protected market found in table 5 appears to be Egypt, with an average tariff of well over 100 percent. However, when Egypt's tariffs are weighted by the value of product imported from the United States, its tariff average goes from highest to second lowest within the group. The reasons for this variation are straightforward and are probably linked more to religious or public health concerns than to protection of domestic production. Egypt has tariffs of over 1,000 percent on alcoholic beverages as well as high tariffs on tobacco and tobacco products, live pigs, pork, and pork products. On the other hand, Egypt has tariffs of only 5 percent on its largest imports from the United States, wheat and corn, which accounted for almost 77 percent of total U.S. agricultural exports to Egypt. The high tariffs bias the simple average upward while the high weights given to wheat and corn bias the import-weighted average downward. Under the third approach, the average tariff is higher than the average based on actual imports but lower than the simple average. For the mix of products that the United States exported globally over the 1996-2000 period, the average tariff faced in the Egyptian market was 92 percent, among the highest found in major markets.

Most countries demonstrate the same pattern displayed by Egypt with regard to the difference between the first two tariff measures. The simple average is biased upward by the presence of a few extremely high tariffs, while the average weighted by actual imports is biased downward by the trade-chilling effects of these high tariffs. Some countries, however, do not adhere to the pattern.

In Canada and Mexico, tariffs levied on U.S. agricultural goods are, in most cases, considerably less than the bound MFN rates. For these countries, the averages instead demonstrate the level of tariff protection that U.S. exports would face if NAFTA did not exist and U.S. exports were levied the MFN rates. In Hong Kong and the Dominican Republic, the three tariff measures are all the same. Hong Kong allows all food and agricultural products to enter duty-free and the Dominican Republic levies a straight 40-percent tariff across-the-board for these products.

In Brazil, Colombia, Korea, Thailand, and Venezuela, the simple

Table 5
Country Agricultural Tariff Averages Can Vary Significantly Depending on Method of Calculation

Country	Simple unweighted tariff average	Weighted by imports from U.S.	Weighted by total U.S. exports	Average U.S. imports 1996-00
	Percent			*Million dollars*
Japan	47.2	44.3	56.5	11,871
European Union	25.0	16.2	29.6	9,000
Canada[1]	16.1	17.0	33.9	7,988
Mexico[1]	46.2	53.4	52.1	5,933
Korea	69.4	156.4	128.4	2,917
Hong Kong	0.0	0.0	0.0	1,548
Egypt	136.6	12.6	91.8	1,090
Philippines	36.2	25.7	32.5	835
Turkey	56.4	50.4	67.9	756
Indonesia	49.3	38.3	43.6	660
Israel	86.4	76.3	88.9	580
Colombia	94.8	132.8	107.6	531
Dominican Republic	40.0	40.0	40.0	513
Thailand	38.7	50.9	47.5	503
Venezuela	59.9	93.4	72.4	478
Brazil	36.5	38.6	40.3	432

[1]Tariffs used in calculating these averages are those faced by non-NAFTA countries.
Sources: Compiled from official statistics of the U.S. Department of Commerce, Bureau of the Census and tariff information in the Agricultural Market Access Database (AMAD).

average tariff is also less than the average weighted by U.S. imports. These countries frequently apply tariff rates well below the bound MFN rates. In this case, one might expect the import-weighted tariffs to be below the simple tariffs. This example gives some indication of the trade-creating effect of lowering tariffs. Countries that apply tariffs that are lower than bound levels stimulate imports. This effect, in turn, could give the higher bound rates a larger weight in the second calculation than they would receive in the simple average approach.

When tariffs are weighted by total U.S. exports, one might expect the averages to be higher than when weighting by actual U.S. exports to each country, as the total U.S. exports approach would explicitly take the high tariffs into account. Again, the results are mixed. A comparison of the averages weighted by total U.S. exports and the simple averages is revealing. In this case, one would expect the weighted measures to be higher if the tariffs levied on products important to the U.S. agricultural export sector are higher than the average. With the exception of Egypt, Indonesia, and the Philippines, this is indeed the case.

For example, in Japan, the largest market for U.S. agricultural exports, the simple average tariff equals 47 percent, and the average weighted by U.S. exports equals 57 percent. Thus, the simple, unweighted average, which is generally considered to be biased upward, is actually less than the average calculated using U.S. export weights. For the mix of agricultural products the United States exports, the more important the export category, in terms of value, the greater the chance that the tariff it faces in the Japanese market will be higher than the average. Using total U.S. exports as a weighting scheme shows that many of the United States major trading partners appear to have bound their agricultural tariffs such that the rates on products important to the U.S. agricultural export sector are higher than the simple average tariff would indicate.

Countries have traditionally measured the benefits of negotiating tariff reductions by calculating the extent to which they increased access to partners' markets. Our results indicate that there appears to be considerable scope for negotiating tariff cuts in markets of interest to U.S. agriculture. In many of the largest markets, U.S. agricultural exports already face relatively low or moderate tariffs. The United States could increase its exports by negotiating further reductions in these tariffs.

In other important markets, such as the EU, Japan, and rapidly growing developing countries, however, U.S. exports face high bound tariffs. Exports occur only because TRQs provide some market access or because countries apply tariffs below bound rates. In many of these markets, especially where over-quota tariffs are bound at prohibitively high levels or the applied tariff is significantly below the bound rate, increased trade will probably result only via deep cuts in bound rates. In lieu of this, increasing the quota or negotiating cuts from applied rates, as the United States has proposed, are alternative methods to expand trade in these markets.

Focusing on tariffs where large volumes of trade already take place discounts the amount of potential trade that could occur in markets where no trade currently takes place. It is difficult, however, to determine the level of trade that might result from reducing prohibitively high tariffs when no trade currently takes place. More work is needed in this area. As this analysis demonstrates, one indication of how much trade might be expected in those markets where no trade is currently taking place is suggested by the amount of trade taking place in markets where tariffs are already being applied at rates below the bound MFN rates.

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Food Supply Nutrients and Dietary Guidance, 1970-99

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The variety and the types of food in the U.S. food supply since 1970 paralleled consumer preferences which evolved over the years due to influences such as increased ethnic diversity, more elderly consumers, and effective Federal Government nutrition policy and dietary guidance. Consumer demand for more healthful foods challenged the food industry to evolve as well. By 1999, the available food supply contained two-fifths more grain products, about one-third more fruit, about one-tenth more vegetables, and one-fourth more legumes, nuts, and soy products per capita than in 1970. The availability of lean red meat and low-fat and skim milks also increased between 1970 and 1999 (fig. 1). Such foods enhanced the health benefits of the food supply. However, despite the high interest in nutrition by Americans in the late 1980s and 1990s, and the increased supply of healthful foods, the availability of caloric sweeteners and fats and oils in the food supply also increased by one-third more per capita from 1970 to 1999 to record high amounts. A large proportion of the increase came from sugars and fats added to foods, such as soft drinks, cakes, cookies and pies, fruit ades, salad dressings, and rich dairy desserts.

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USDA Estimates Food Supply and Nutrients

USDA's Economic Research Service (ERS) annually calculates the amount of food available for consumption on a per capita basis in the United States. Food supply data measure national consumption of several hundred basic commodities. For most commodity categories, the available food supply is measured as the sum of annual production, beginning inventories, and imports minus exports, farm and nonfood uses, and end-of-the year inventories. Per capita consumption is calculated by dividing the available food supply by the total U.S. population as of July 1 each year.

Using the ERS per capita consumption data and nutrient composition information from USDA's Agricultural Research Service, USDA's Center for Nutrition Policy and Promotion calculates the nutrient content of the food supply. Per capita consumption for each commodity is multiplied by the amount of food energy and each of 27 nutrients and dietary components in the edible portion of the food. Results for each nutrient from all foods are totaled and converted to amount per capita per day (table 1). Nutrients added to certain commodities commercially through fortification and enrichment are also included in the nutrient content of the food supply. Since food supply data represent the disappearance of food into

The increase in the types and varieties of chili peppers in the marketplace exemplifies the evolution of the U.S. food supply as it reacts to stimuli that influence consumer preference, such as increased ethnic diversity.

Credit: PhotoDisc.

the marketing system, per capita consumption and nutrient estimates typically overstate the amount of food and nutrients people actually ingest.

Food Supply Nutrients and Dietary Guidance, 1970-99

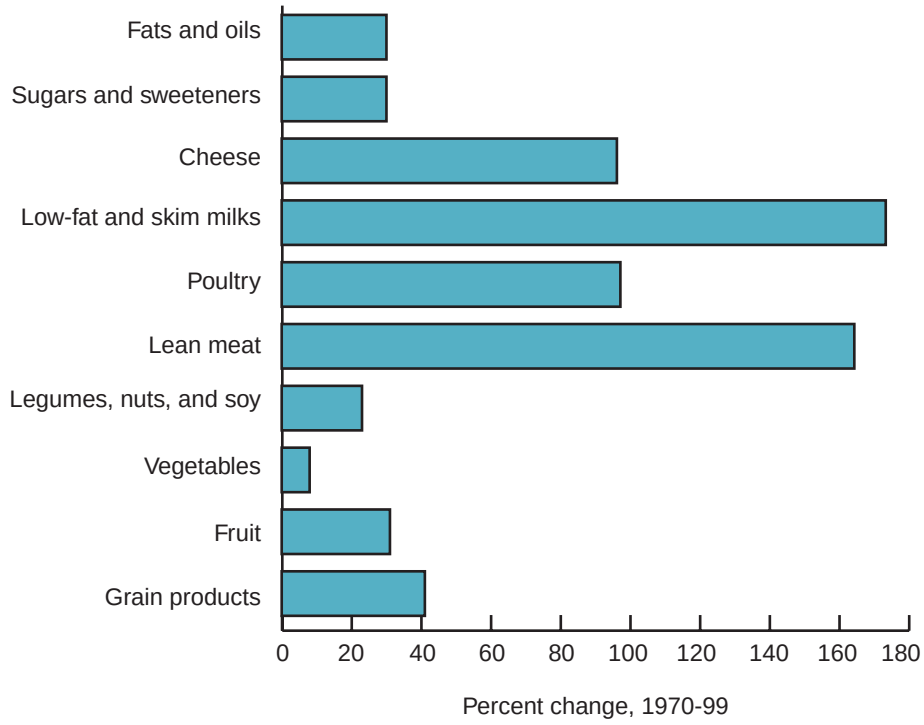
The 2000 edition of the *Dietary Guidelines for Americans*, the most recent Federal nutrition recommendations, places greater emphasis and gives more explicit recommendations for particular nutrients and foods than previous editions. The guidelines differentiate between total fat, saturated fat, and cholesterol and recommend a diet that is low in saturated fat and cholesterol and is moderate in total fat. Other dietary recommendations include daily varieties of fruits and vegetables and grains, particularly whole grains, and foods and beverages that limit intake in sugars.

The *Dietary Guidelines for Americans* also recommends that consumers use the Food Guide Pyramid to guide food choices. Using the pyramid helps ensure that an adequate amount and mix of nutrients are consumed each day, as no single food can supply all the nutrients needed for good health. For example, good sources of calcium are milk, cheeses, dark-green leafy vegetables, and foods with added calcium, such as soy-based beverages and fruit juices. Good sources of iron include lean meats, spinach, and enriched grains.

Since 1941, the Recommended Dietary Allowances (RDA) have been recognized as the most authoritative source of information on nutrient levels for healthy people. The 10th edition of the RDAs in 1989 increased public awareness of the impact of nutrition on chronic disease. In light of new research findings and the public's heightened interest in nutrition and health, a new series of nutrient reference values, the Dietary Reference Intakes (DRI), was developed.

The DRIs replace and expand on the RDAs and thus extend the scope and application of previous guidance. The DRIs provide information on the function of each nutrient, the factors that determine each nutrient's requirements (for example, physical activity), and the relationship of each nutrient to risk of disease. Recommended values are provided for each age group—from birth through childhood, sexual maturity, midlife, and old age—as well as for pregnancy and lactation. Whereas the RDAs provided one nutrient value, the DRIs provide four values: the RDA value as well as three new types of reference values: the Estimated Average Requirement, the Adequate Intake, and the Tolerable Upper Intake Level (see box).

Figure 1
Americans Strive To Meet Food Guide Pyramid Recommendations, But Stumble Along the Way by Eating More Cheese, Sweeteners, and Fats



Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-99*, 2001.

Food Supply Providing More Carbohydrates, Protein, and Fat

Carbohydrates convert to glucose, the main simple sugar used by the body for energy. Grain products, fruits, and vegetables are important sources of carbohydrate in the food supply. The National Research Council suggests that 55 percent or more of calories should come from carbohydrate. In 1999, the food supply provided 500 grams of carbohydrate per capita per day, up from 389 grams in 1970. Sugars and sweeteners provided 39 percent of carbohydrates in 1999 and fruits and vegetables provided 16 percent; both amounts were similar to 1970 levels. Grains provided 38 percent of carbohydrates in 1999, compared with 35 percent in 1970. To best

Table 1
Per Capita Per Day Amounts of Most Nutrients in the U.S. Food Supply Increased During 1970-99

Nutrient	Unit	1970	1999	Change, 1970-99
				Percent
Food energy	Kcal	3,300.0	3,800.0	15
Carbohydrate	g	389.0	500.0	29
Dietary fiber	g	19.0	24.0	26
Protein	g	96.0	111.0	16
Total fat	g	151.0	164.0	9
Saturated fat	g	53.0	52.0	-2
Monounsaturated fat	g	61.0	70.0	15
Polyunsaturated fat	g	26.0	34.0	31
Cholesterol	mg	460.0	430.0	-7
Vitamin A	RE	1,460.0	1,780.0	22
Carotenes	mcg RE	480.0	800.0	67
Vitamin E	mcg aTE	13.5	17.8	32
Vitamin C	mg	104.0	132.0	27
Thiamin	mg	1.9	3.0	58
Riboflavin	mg	2.3	2.9	26
Niacin	mg	21.0	33.0	57
Vitamin B_6	mg	1.9	2.5	32
Folate	mcg	278.0	641.0	131
Vitamin B_{12}	mcg	9.5	8.1	-15
Calcium	mg	930.0	990.0	6
Phosphorus	mg	1,490.0	1,690.0	13
Magnesium	mg	330.0	390.0	18
Iron	mg	15.3	23.6	54
Potassium	mg	3,550.0	3,890.0	10
Zinc	mg	12.3	15.5	26
Selenium	mcg	127.0	178.0	40

Note: Kcal = kilocalories; g = grams; mg = milligrams; mcg = micrograms; RE =retinol equivalent; aTE = alpha-tocopherol equivalent.
Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-99*, 2001.

meet dietary recommendations for carbohydrate, consumers need to offset their intake of sugar and sweeteners with more whole grains, vegetables, and fruit.

Along with the increase in total supply of grains, vegetables, and fruits from 1970 to 1999, the amount of dietary fiber available in the food supply increased by 26 percent from 19 grams per capita per day in 1970 to 24 grams per capita per day in 1999. Dietary guidance recommends including fiber-containing foods in the diet daily and emphasizes fiber's importance to good health. Recommendations for specific levels of dietary fiber are currently under review.

Protein provides amino acids to build and maintain body tissues, form enzymes necessary for body reactions, and combine with fatty acids to transport vitamins and minerals in the body. In 1999, the food supply provided 111 grams of protein per capita per day, 16 percent more than the 96 grams provided in 1970. Over the last 30 years, total protein availability in the U.S. food supply has met the nutrient needs of Americans. During that time, the meat, poultry, fish, and meat alternatives group (eggs, nuts, and legumes) was the major contributor to total protein in the food supply, providing about 40 percent of the total.

Fats are the major source of energy storage, help to hold body organs and nerves in position, protect against injury and shock, insulate and maintain body temperature, and act in the transportation and absorption of fat-soluble vitamins. Current dietary guidance recommends a diet low in saturated fat and cholesterol and moderate in total fat. U.S. food supply fat estimates include levels for saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, and cholesterol. Total fat in the food supply increased about 8 percent between 1970 and 1999 from 151 grams to 164 grams per capita per day, providing about 40 percent of the calories for both 1970 and 1999. This level exceeds the current recommendations of 30 percent or less of total calories.

The types of fat used during this period, however, showed a trend toward decreased use of saturated fats and increased use of unsaturated fats. In 1999, saturated fat use dropped slightly and both monounsaturated and polyunsaturated fat use increased, the latter by almost one-third since 1970. The increase in polyunsaturated fats reflects increases in soybean and corn oils and nuts, whereas the increase in monounsaturated fats reflects an increase in olive, sunflower, and canola oils. Despite a drop in cholesterol levels from 460 mg in 1970 to 430 mg in 1999 (associated with a decrease in egg use), the food supply still exceeded the recommendation of 300 milligrams or less per day.

Vitamins and Minerals Found in Every Major Food Group

Dietary guidance recommends choosing a variety of grains, especially whole grains, and a variety of fruits and vegetables daily. Foods made from grains, especially those made from whole grains, and fruits

and vegetables contain vitamins and minerals that are important for good health and may protect against many chronic diseases. Other food groups provide important vitamins and minerals needed by the body for good health. Milk and milk products are the major source of calcium, and the meat, poultry, and fish group is an important contributor of zinc and iron.

Antioxidant vitamins. Many vitamins act as coenzymes or as parts of enzymes responsible for essential chemical reactions necessary for good health. For example, vitamins A, C, and E act as antioxidants that help protect healthy cells from damage by free radicals. Free radicals are substances produced by normal bodily functions, such as breathing or physical activity, and other lifestyle habits, such as smoking, that attack healthy cells, weakening them. Weakened cells are more susceptible to cardiovascular disease and certain types of cancers.

Vitamin A is a fat-soluble antioxidant vitamin essential for vision, growth, bone development, healthy skin, the immune system, and reproduction. The vitamin A found in vegetables and fruits is known as carotenoid. Good sources of carotenoids are found in deep-yellow fruits and vegetables and dark-leafy vegetables and protect the body against many diseases, including some types of cancer. Both vitamin A and carotenoids are converted to retinol in the body, and retinol equivalents (RE) are used to calculate the vitamin A value of foods. The Estimated Average Requirements (EAR) for vitamin A is 500 micrograms per day for adult females (19 years and older) and 625 micrograms per day for adult males (19 years and older). In the U.S. food supply, total vitamin A increased from 1,460 micrograms RE per capita per day in 1970 to 1,780 micrograms RE per capita per day in 1999. This change reflects an increased use of carrots, broccoli, and cantaloup in 1999.

Vitamin C is a water-soluble antioxidant vitamin that is important in forming collagen, which gives structure to bones, cartilage, muscle, and blood vessels. Vitamin C also helps to maintain capillaries, bones, and teeth and aids in wound healing and iron absorption. The EAR for vitamin C is 60 milligrams per day for adult females and 75 milligrams per day for adult males. In 1999, the level of vitamin C in the

New Nutrient References Under Development

Dietary Reference Intakes (DRI) represent the new approach adopted by the National Academy of Sciences, Food and Nutrition Board, Institute of Medicine to provide reference estimates of nutrient intakes to assess the adequacy of diets of both individuals and groups. The DRIs replace and expand on the Recommended Dietary Allowances (RDA), the acknowledged nutrient standards for the past 50 years. The DRIs provide Americans with guidelines to optimize health and physical functions. Rather than provide one value, DRIs provide four nutrient values: Recommended Dietary Allowances, the Estimated Average Requirement, the Adequate Intake, and the Tolerable Upper Intake Level.

- *Recommended Dietary Allowance (RDA)*

  The average daily intake level that is sufficient to meet the nutrient requirement of 97-98 percent of healthy individuals in a group. RDA is used to set goals for nutrient intakes for individuals.
- *Estimated Average Requirement (EAR)*

  A nutrient intake value that is estimated to meet the requirement of half the healthy individuals in a group. EAR is used to assess adequacy of intakes of population groups. For example, EAR would be used to assess the nutrient status of individuals enrolled in a large dietary survey.
- *Adequate Intake (AI)*

  A recommended daily intake based on observed or experimentally determined approximations of nutrient intake by a group (or groups) of healthy people. AI is used when an RDA cannot be determined.
- *Tolerable Upper Level* (UL)

  The highest level of daily nutrient intake likely to pose no risks of adverse health effects to almost all individuals in the general population.

When estimating food supply nutrients on a per capita basis, the RDAs (or other reference intakes) are not effective as a measurement value. It is unreasonable to assume equitable distribution of nutrients among the population subgroups or among individuals in the population. In the past, the most commonly used approach was to compare the per capita supply of a nutrient with its RDA, with or without a weight adjustment for demographics. This approach was inappropriate. Therefore, this article does not compare food supply per capita nutrients with either the 1989 RDAs or the current DRIs, but instead provides information on a nutrient's availability, its health importance, and food sources. To offer the reader a reference point, the EARs for the nutrients discussed in this article are provided.

food supply was 132 milligrams per person per day, a level nearly 27 percent higher than in 1970. This increase in vitamin C was due to increased use of strawberries, melons, citrus fruits, and kiwi and tropical fruits.

Vitamin E is a fat-soluble antioxidant vitamin that prevents vitamin A and essential fatty acids from breaking down (oxidizing) and protects the body from cell damage that can lead to cancer, heart disease, and cataracts. Vitamin E is found mostly in fats and oils in the food supply. The EAR for vitamin E is 12 milligrams alpha-tocopheral equivalent (aTE) per day for adult males and females. In 1999, the level of vitamin E in the food supply was up about 32 percent, from 13.5 milligrams aTE per capita per day in 1970 to 17.8 milligrams aTE per capita per day in 1999. This change reflects the increased use of soybean, corn, sunflower, olive, and canola oils in the food supply.

B vitamins. Thiamin is a water-soluble vitamin that helps the body release energy from carbohydrates. Riboflavin and niacin, also water-soluble vitamins, help the body release energy from protein, fat, and carbohydrates. The EAR for thiamin is 0.9 milligrams per day for adult males and 1.0 milligram per day for adult females. The EAR for riboflavin is 0.9 milligram per day for adult males and 1.1 milligrams per day for adult females. The EAR for niacin is 12 milligrams per day for adult males and 11 milligrams per day for adult females. Between 1970 and 1999, the food supply levels of thiamin increased from 1.9 to 3.0 milligrams per capita per day, the levels of riboflavin increased from 2.3 to 2.9 milligrams per capita per day, and the levels of niacin increased from 21 to 33 milligrams per capita per day. Enriched-grain products are good sources of these nutrients. The increases in nutrient levels in the past 30 years were mostly due to fortified breakfast cereals.

As a coenzyme, vitamin B_6 aids in the synthesis and breakdown of amino acids, the synthesis of fatty acid, and the conversion of the amino acid tryptophan to niacin. The EAR for vitamin B_6 is 1.1 milligrams per day for females age 19-50, 1.3 milligrams per day for females age 51 and older, 1.1 milligrams per day for males age 19-50, and 1.4 milligrams per day for males age 51 and older. The level of vitamin B_6 in the food supply rose from 1.9 micrograms per capita per day in 1970 to 2.5 micrograms per capita per day in 1999. Vitamin B_6 is found mainly in fortified ready-to-eat breakfast cereals, meat, poultry, fish, potatoes, and noncitrus fruits.

Folate is a water-soluble B vitamin that reduces the risk of some serious birth defects when consumed before and during pregnancy. Studies are underway to clarify whether folate decreases risk of coronary heart disease, stroke, and certain types of cancer. The EAR for folate is 320 micrograms for both adult females and adult males. Mandated folate fortification of flours and cereals in 1998 increased folate levels in the U.S. food supply during the period 1970 to 1999. In 1999, the level of folate in the food supply was 641 micrograms per capita per day, an increase of more than 130 percent from the 1970 level of 278 per capita per day (fig. 2).

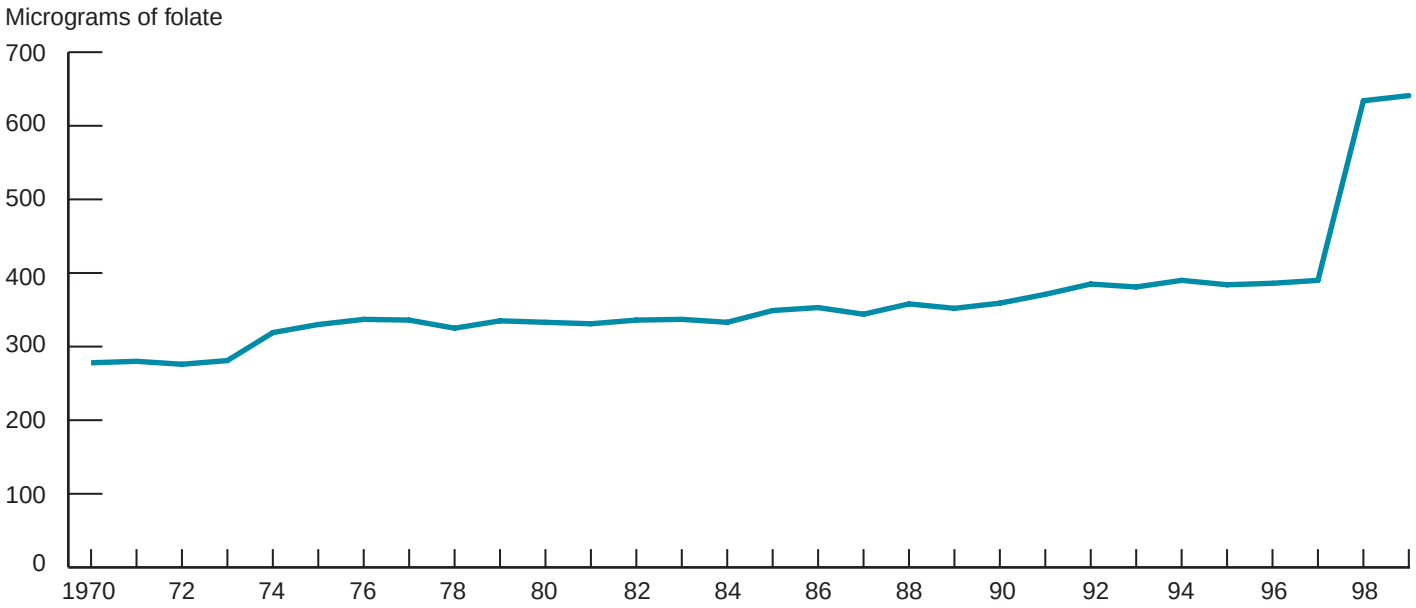
Vitamin B_{12}, another water-soluble B vitamin, aids in the formation of red blood cells and the functioning of the nervous system. The EAR for vitamin B_{12} is 2.0 micrograms per day for both adult males and adult females. The level of vitamin B_{12} in the food supply was lower in 1999 at 8.1 micrograms per capita per day than in 1970 at 9.5 micrograms per capita per day. Unlike the other B vitamins, B_{12} is normally found in animal products. Vitamin B_{12} is also found in some plant foods, such as fortified breakfast cereals. Although the use of fortified breakfast cereals, poultry, and fish increased in the food supply, the decrease of B_{12} levels reflects the decreased use of red meat and eggs during the period 1970 to 1999.

Calcium and Iron Critical for a Healthy Body

Calcium is essential for the formation of bones and teeth, and calcium requirements increase significantly during adolescence, early adulthood, pregnancy, and lactation. The Food Guide Pyramid suggests that women who are pregnant or breastfeeding, teenagers, and young adults consume three servings of milk and milk products daily in order to meet minimum calcium needs. A serving is a cup of milk or yogurt, 1 ½ ounces of natural cheese, or 2 ounces of processed cheese. Calcium is important from a public health perspective because inadequate intake of calcium may increase the risk of osteoporosis, a condition in which decreased bone mass weakens bones.

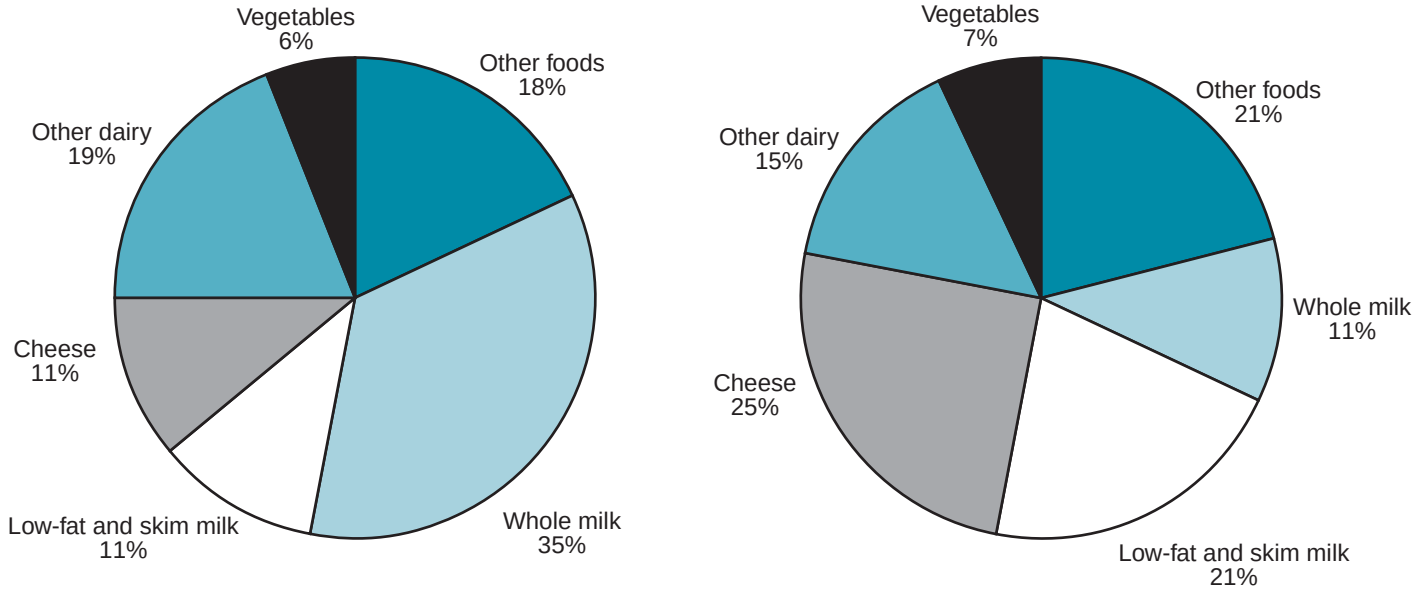
Dairy foods, especially milk and yogurt, are good sources of calcium. Calcium has no established EAR. Calcium levels have generally increased in the food supply, from 930 milligrams in 1970 to 990 milligrams per capita per day in 1999. In 1999, the use of whole milk decreased, but low-fat milk, yogurt, and cheese increased from 1970 amounts (fig. 3). This shift in percent contributions from whole milk to low-fat milk supports dietary guidance that recommends diets low in saturated fats. However, decreased use of fluid milk made it difficult for some individuals to follow pyramid serving recommendations for milk and milk products overall, particularly teenage girls, pregnant women, and breastfeeding mothers, whose calcium needs are higher than other groups.

Figure 2
Per Capita Per Day Levels of Folate Spiked in 1998



Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-99*, 2001.

Figure 3
Whole Milk Decreased But Low-Fat and Skim Milk Increased as Sources of Calcium in the U.S. Food Supply in 1970-99



Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-99*, 2001.

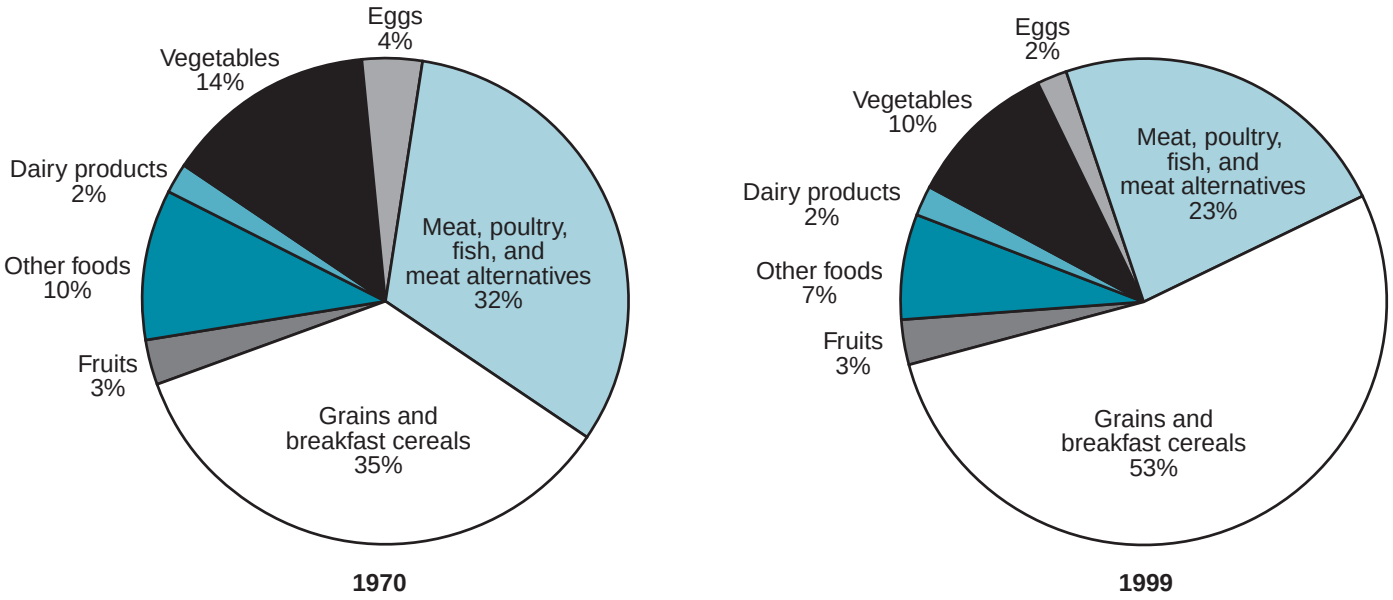
Iron is found in all body cells. As a component of hemoglobin in the blood and myoglobin in the muscles, iron carries oxygen. Iron-deficiency anemia is the most common nutritional deficiency in the United States; symptoms include decreased exercise tolerance, fatigue, and decreased immunity to illnesses and, particularly in children, abnormal growth and cognitive development. Infants, adolescents, and women of childbearing age have the highest risk of developing anemia. These individuals have greater needs for iron due to rapid growth or excessive blood loss during menstruation, and these needs usually cannot be compensated by dietary intake alone.

The EAR for iron increases with age for children and teens, from 3.0 milligrams per day for children age 1-3 to 7.7 milligrams for males age 14-18 and 7.9 milligrams for females age 14-18. For adults, the EAR for iron is 8.1 milligrams for women age 19-50, 5.5 milligrams for women age 51 and older, and 6 milligrams per day for men age 19 and older. Iron levels in the food supply increased from 15.3 milligrams per person per day in 1970 to 23.6 milligrams per person per day in 1999. Red meat and fortified grains are the primary sources of iron in the food supply. Although use of red meat decreased from 1970 to 1999, the increased use of en-riched grains and the fortification of ready-to-eat breakfast cereals more than made up for the decreased iron contributions from meat (fig. 4).

In 1999, the food and nutrients of the U.S. food supply supported dietary guidance for minimum recommended servings of grains, vegetables, and meats and meat alternatives and associated nutrients but fell short of this guidance for whole grains, fruit, and milk and milk products. Also, the industry's response to consumer demand for more cheese and beverages and foods with added sugar and added fat offset some of the positive changes made in the U.S. food supply over the past 30 years. To better balance their diet and health, Americans need to take advantage of the myriad foods available to them in the U.S. food supply and try less familiar, but nutritious, foods to increase variety. For example, the marketplace has seen an increase in the variety of soy products, such as soy milk drinks, soyburgers and tofu, an increase in the variety of tropical fruits, such as mangoes, golden pineapples, and kiwi, and an increase in the variety and types of peppers, especially orange, red, and chili peppers.

Better placement of healthful foods in schools, grocery stores, and restaurants could encourage more nutritious food choices. Recently, some schools have replaced the soft

Figure 4
Fortified Breakfast Cereals and Grains Supplied More Than One-Third of Iron in the U.S. Food Supply in 1970 and More Than One-Half in 1999



Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-99*, 2001.

drinks offered in vending machines with milk and milk-based products. In grocery stores and supermarkets, purchases of more healthful foods might benefit from placement at strategic points throughout the store, such as at the ends of aisles, at eye level, and near fruits and vegetables. Recipe suggestions for healthful menus using these foods would benefit the consumer as well as possibly increase sales of these items. More Americans are eating away from home, and the nutrient value of meals is not keeping pace with the nutritional improvements in home-prepared meals. Some restaurants use menus that feature logos to alert customers of healthful or low-fat menu items; other restaurants respond to customer requests for baked items or salad dressing served on the side. To best serve the nutritional needs of customers, restaurants need to focus more on the nutritional value of the meals and food items offered and less on large food portions, keeping in mind the importance of taste and appearance.

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The Interactive Food Supply, an on-line version of the U.S. Food Supply, allows Internet access to food supply quantity and nutrient information. The user can quickly calculate quantity and nutrient estimates for 350 food commodities and 26 nutrients for a specific year or range of years, fortification estimates, and Food Guide Pyramid serving estimates.

Available at www.cnpp.usda.gov

Food Marketing Costs at a Glance

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U.S. consumers spent $661.1 billion on food in 2000, excluding imports and seafood (table 1). Consumers' preference for quick, easy-to-prepare convenience foods, including more away-from-home eating, translated into an increased demand for food marketing services, such as labor, packaging, transportation, and energy. The estimated bill for marketing domestic farm foods totaled $537.8 billion in 2000 and represented 81 percent of consumer expenditures for farm foods. The remaining 19 percent, or $123.3 billion, represents the gross return paid to farmers.

From 1990 to 2000, consumer expenditures for farm foods rose $211.3 billion (fig. 1). Higher marketing costs were the primary factors contributing to rising consumer food expenditures over the past decade. Between 1990 and 2000, marketing costs rose 57 percent and accounted for most of the 47-percent rise in consumer food spending. In comparison, the farm value of food purchases climbed only 16 percent during this period.

Labor used by manufacturers, wholesalers, retailers, and eating places cost $253 billion in 2000 and accounted for nearly 40 percent of total consumer food expenditures (fig. 2). The total number of food marketing workers in 2000 was about 14.3 million, roughly 17 percent more than in 1990. Nearly 80 percent of the growth in food industry employment occurred in eating places.

Packaging is the second largest component of the marketing bill. At $53.5 billion, packaging costs

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Table 1
Consumers' Demand for Convenience Boosts the Marketing Bill

Expenditures	1980	1990	1995	1999	2000
			Billion dollars		
Labor	81.5	154.0	196.6	241.5	252.9
Packaging	21.0	36.5	48.2	50.9	53.5
Rail and truck transportation	13.0	19.8	22.3	25.2	26.4
Fuels and electricity	9.0	15.2	18.6	22.0	23.1
Pretax corporate profits	9.9	13.2	19.5	29.2	31.1
Advertising	7.3	17.1	19.8	24.8	26.1
Depreciation	7.8	16.3	18.9	23.0	24.2
Net interest	3.4	13.5	11.6	14.4	16.9
Net rent	6.8	13.9	19.8	25.3	26.7
Repairs	3.6	6.2	7.9	9.6	10.1
Business taxes	8.3	15.7	19.1	22.2	23.5
Total marketing bill	182.7	343.6	415.7	503.1	537.8
Farm value	81.7	106.2	113.8	122.2	123.3
Consumer expenditures	264.4	449.8	529.5	625.3	661.1

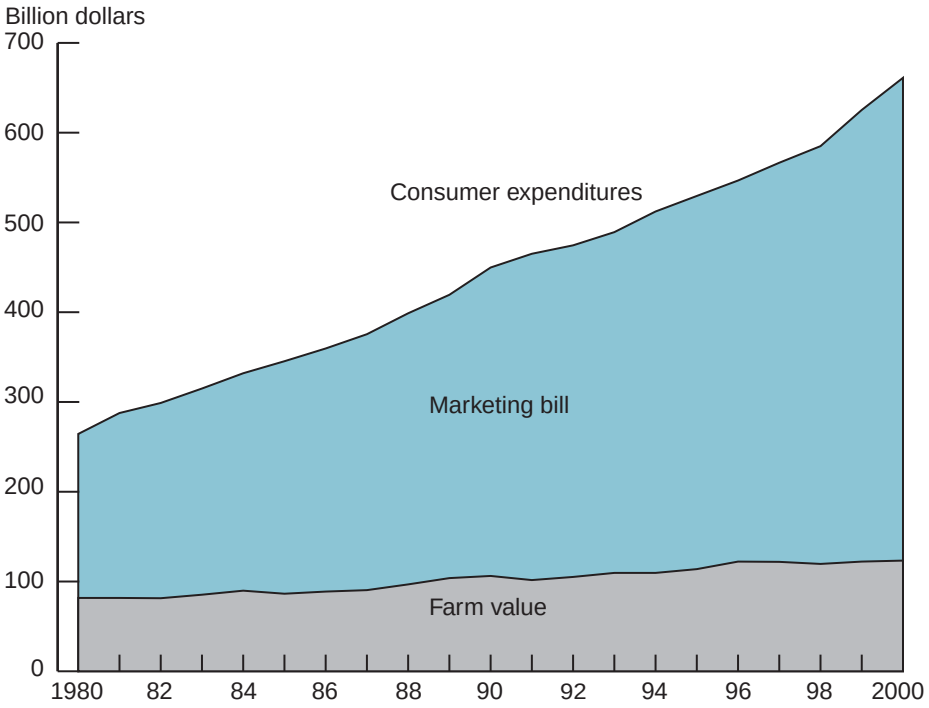
Source: USDA's Economic Research Service.

accounted for 8 percent of the food dollar and were up 47 percent from 1990. Paperboard boxes and containers are the largest packaging cost and constitute approximately 40 percent of total packaging expenses.

The energy bill for food marketing costs totaled $23 billion in 2000, and accounted for 3.5 percent of retail food expenditures. Higher natural gas prices helped boost energy costs in 2000. Eating places incurred nearly 40 percent of the fuel and electricity costs of food marketing.

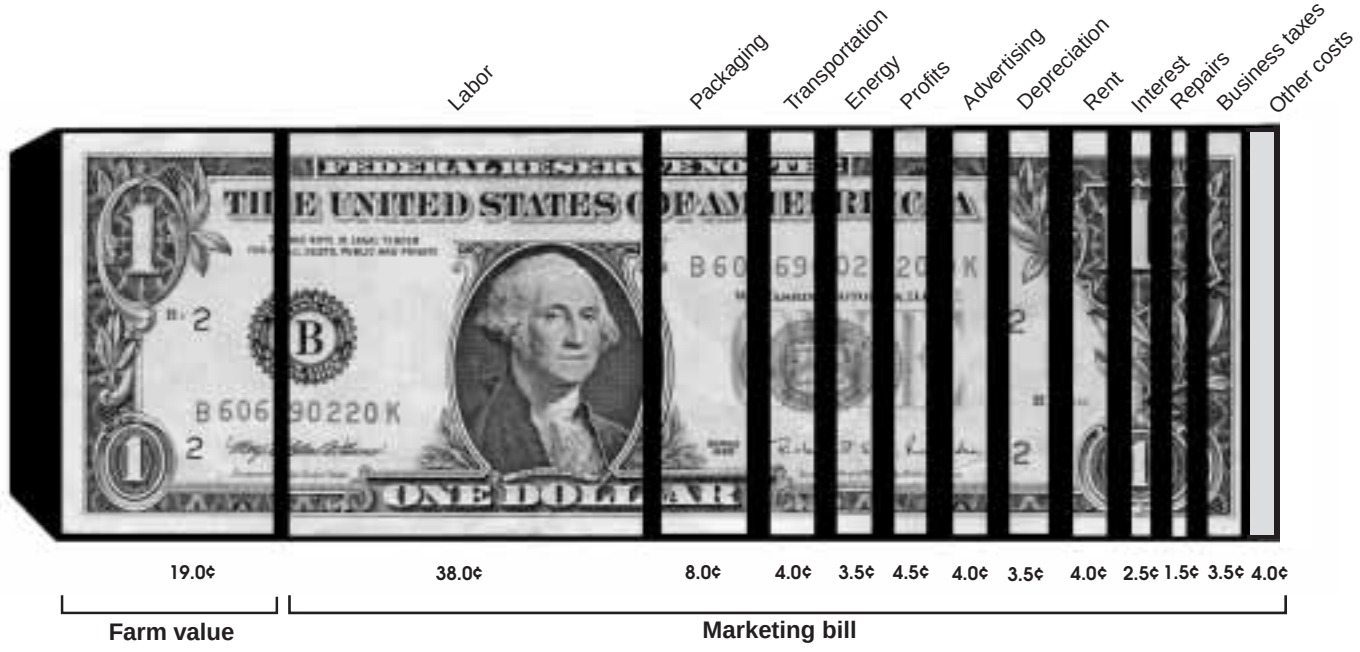
Advertising expenses totaled $26.1 billion and accounted for 4 percent of food expenditures in 2000. Food manufacturing accounts for over 50 percent of total food industry advertising expenditures, with food service contributing another 25 percent, and food retailing about 15 percent. Advertising expenditures have risen 52 percent since 1990, with foodservice firms and food retailers having the largest increases in advertising costs. ■

Figure 1
Consumer Food Spending Rose 47 Percent Between 1990 and 2000



Note: Data for foods of U.S. farm origin purchased by or for consumers for consumption both at home and away from home.
Source: USDA's Economic Research Service.

Figure 2
Labor Took Biggest Chunk of Food Dollar in 2000



Source: USDA's Economic Research Service.