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Food Prices

Also Inside

...Upfront

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Toward Understanding Food Prices

Grocery food prices are generally thought to be determined by three factors: prices farmers receive for their commodities, marketing costs incurred in changing these commodities into foods and delivering them to consumers, and consumer demand for food. Farm prices and marketing charges determine how much it costs to produce and market food, and consumer demand determines what consumers are willing to pay.

However, these relationships have become more complex because of significant changes in the ways foods reach our plates and in consumers' eating patterns. USDA's Economic Research Service (ERS) began a vigorous program to understand how food prices are formed. This knowledge helps policymakers anticipate how changes in policies will affect food prices for consumers. This issue of *FoodReview* explains the general determinants of food prices and explores the effects of some important, new developments on food prices.

Over the last three decades, the public's need to maintain a reasonable balance between work, leisure, and family has resulted in a dramatic shift toward consuming convenience foods and eating out. In 1995, almost half of the amount we spent on food (47 percent) went to eating places. Because of this and the fact that farm values are a smaller component of menu and grocery store prices, overall food price changes are determined more and more by general economic conditions—such as inflation, interest rates, and wages—than by movements in farm commodity prices.

Food prices are also affected by structural conditions in industry—such as concentration and integration. Some fear that rapid increases in industrialization or coordination will cause uncompetitive pricing behavior because production is concentrated among a few large plants. However, recently increased coordination of different stages of pork production has enabled companies to supply greater quantities of higher quality pork at competitive prices. This finding helps policymakers decide on the proper policy for dealing with the situation where fewer and fewer suppliers provide the meat we consume.

Changes in tastes and preferences also have been important factors affecting prices. For example, growing demand for organic baby food, as shown by a 2,000-percent increase in sales since 1989, has some consumers paying up to a 21-cents per serving premium. Among other things, this information helps the Government decide if it should establish a national definition for "organic."

Retail food prices are also affected by nonfood costs. Studies suggest that smaller foodstores have 10-percent higher prices than supermarkets. Prices are lower in large supermarkets because costs for labor, utilities, advertising, and other retailing expenses are spread over more units, reducing per unit costs and allowing for lower prices. Low-income households are most affected by this difference in prices levels, since they generally have less access to shopping around. Policymakers need information on whether low-income consumers face higher food prices in the determination of food-assistance benefits.

ERS is currently examining the role of other important factors, such as quality and variety of products. While the price effects of these other factors could be significant, the extent and the mechanics of the impacts are not well understood. What is known is that consumer behavior is central to producers' pricing strategies and food-price determination. Knowledge of such information means that a producer can supply the desired variety and quality and set prices at the highest level that consumers are willing to pay.

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Economic Factors Holding Down Food Price Increases

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Many consumers remember the wild food-price fluctuations in 1973 and 1974, when prices climbed almost 15 percent each year. Several factors led to the sharp increases—high energy prices, a high general inflation rate, and reduced supplies of domestically produced corn and wheat. When tight grain supplies and record-high wheat prices occurred in 1996, some analysts automatically forecasted significantly larger increases in overall food prices.

But today's food price situation is very different from 1973-74, so a spike in food prices due to tight supplies did not occur in 1996. Overall food prices rose a modest 3.3 percent in 1996, continuing the fairly stable trend of 3-percent annual increases since 1992 (fig. 1).

U.S. consumers are probably more alert to changes in food prices than to changes in most other prices, because food prices for some items vary seasonally and we buy food more frequently than most other items. We commit to monthly payments for rent or a house mortgage, a car, or household appliances and view these infrequently purchased items as fixed costs. On the other hand, we purchase food often and generally pay cash, so the changes in food prices are more noticeable.

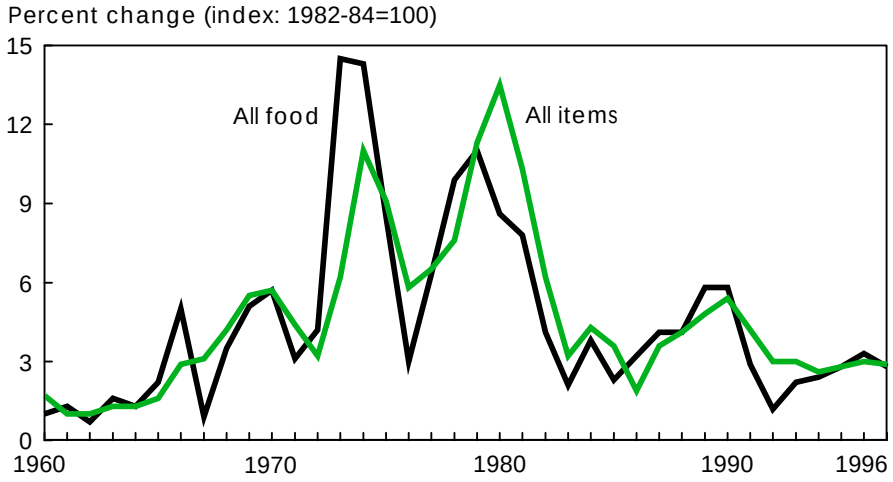
Along with energy prices, food prices are the most volatile consumer good the Government tracks. Retail food price changes are underpinned by general economic factors that influence food prices and the relationship between farm and marketing costs. In recent years, food price increases have been small due to the low general inflation rate, the larger share of the food dollar going to purchases of food away from home, the continued decline in the farm value share of the retail price for most food items, and increasing economies of size in the farm sector.

Index Reflects Changes in Prices and Shopping Habits

The general inflation rate is measured by the Consumer Price Index (CPI), a measure of the average change over time in prices paid by consumers for a fixed market basket of goods and services. The CPI for Food is the Nation's principal indicator of changes in retail food prices. The CPI for Food is calculated by the Bureau of Labor Statistics (BLS) and is constructed in two stages. A monthly CPI is built up from 44 geographic categories (such as the Atlanta metropolitan area) and 207 product categories (such as apples or white bread), which are combined to form 9,108 price indexes, one for each "strata" of an item and geographic category.

In order to aggregate these strata indexes into the overall food CPI and its components (such as Food at Home), BLS uses information on household shopping patterns from the Consumer Expenditure Survey

Figure 1
Consumer Price Index for Food Usually Less Than for All Items



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to develop weights applied to the strata indexes and components. The weights allow prices for an item purchased frequently or by many consumers, such as milk, to have more importance than an item purchased less often, such as star fruit. The current weights were introduced to the food CPI in 1987 and are based on expenditures during 1982-84. New weights from the 1993-95 surveys will be introduced in 1998.

Separate strata indexes are calculated for each product category in each geographic category using item prices and representative samples of outlets for food and beverages. Outlets are selected using a Point of Purchase Survey, in which households are asked where they purchased goods and services. Data collectors then go to the selected outlets and price selected specific items (such as Red Delicious apples, or a 5-pound bag of Gold Medal All-Purpose flour). Specific items are selected randomly, with the probability of selection driven by the item's share of a product category's sales in an outlet. Since this procedure means that different items (Red Delicious versus Rome apples) are priced in different outlets, the index provides relative price changes for a product category (such as apples).

Less Disposable Income Goes for Food

Food price changes are a key variable determining what proportion of income consumers spend for food and what is left for purchases of other goods and services. In 1995, 11.0 percent of household disposable personal income went to pay for food (6.7 percent for food at home, 4.3 percent for food away from home), down from 12-13 percent in the 1980's and 13-14 percent in the 1970's. As income increases, the proportion of income spent on food declines. In 1995, Americans spent about 26 percent of their disposable personal income on housing (including supplies, fuel, and furniture), 16 percent on medical care and drugs, 10 percent on transportation (including cars and gasoline), and 4.5 percent on savings.

Supply, Demand, and Prices

When the demand for a food goes up and supplies are low, retail prices increase. For example, retail pork prices rose 10 percent in 1996, the first significant increase since 1990. The increase was most significant for bacon, with prices up 20 percent or more throughout 1996. A reduction in pork output (down 4 percent), along with a strong export market (up 280 percent in 1996) and high domestic demand by the fast-food industry for bacon on burgers, meant less pork on supermarket shelves, boosting retail prices.

The moderate gains in overall food prices since 1992 can be attributed to several factors dampening increases in domestic food prices, including: a continued decline in the farm value share of retail prices for most food items, low general inflation rate, larger share of the food dollar going to consumption of food away from home, and increasing economies of size in the farm sector slowing rises in production costs.

Lower Share of Food Expenditures Going to Farm Sector

The farm value share of the amount spent on food has continued to shrink, falling from an average of 36 cents for every food dollar in 1974 to only 22 cents in 1995. The decline has been most pronounced for manufactured and highly processed foods, especially cereals and bakery products. The farm value share for most products in this category was less than 10 percent in 1995. In contrast, the farm value share for relatively unprocessed eggs was about 59 percent. The farm value share of the retail price of bread was only 7 percent. When U.S. farm prices for wheat, the principal ingredient in bread, climbed to record levels of over $4.50 per bushel in 1996—an average 25-percent increase over 1995—and Kansas City wholesale wheat flour prices reached highs of $17.80 per hundredweight in May 1996, many bakers passed on to consumers the increased costs in the form of higher bread prices. Average retail bread prices for January-August 1996 were 8.9 percent higher than the same period a year earlier.

However, for some processed foods, competition for market share causes lower prices despite higher ingredient costs. During the same 8-month period when bread prices rose 8.9 percent in 1996, breakfast cereal prices actually fell. Competition for market share among the three leading breakfast cereal manufacturers led to retail price cuts in April and June 1996, with the CPI for cereals falling 4.3 percent during the same period that bread prices rose 8.9 percent.

The farm value share is also smaller today for less processed foods, such as meats, fresh fruits, and fresh vegetables. For meat products, the farm value share dropped from 60 percent in 1973 to 35 percent in 1995; for poultry, from 59 to 42 percent; for fresh fruits, from 33 to 19 percent; and for fresh vegetables, from 35 to 23 percent. Other factors that influence the farm value share include transportation costs, storage, handling, and retailing costs. Higher levels of these costs have contributed to the lower farm value shares.

Low Inflation Moderates Marketing Costs

For products with relatively low farm value shares, retail food prices are determined less by farm commodity prices and more by general market conditions--such as costs for labor, packaging, marketing, and

advertising--as well as competition and general changes in inflation. Costs for labor, packaging, transportation, advertising, and other miscellaneous costs accounted for 37 cents, 8 cents, 4.5 cents, 4 cents, and 4.5 cents of every food dollar in 1995. Labor, packaging, and marketing costs tend to be dampened when the general inflation rate is low or moderate.

The overall CPI has been relatively low since 1992, averaging gains of 3 percent or less annually. The overall CPI increased 2.8 percent in 1995 and 3.0 percent in 1996. In contrast, the overall CPI increase was 11.0 percent in 1974, largely due to energy price increases of 50 to 60 percent. Energy costs, including fuels and other utilities and motor fuel, account for about 9 percent of the overall CPI. The moderate increase in general inflation during the last few years has dampened overall food price increases.

More of the Food Dollar Spent Away From Home

Also holding down retail food price increases is the continued growth in the portion of the food dollar spent on food away from home, as the at-home market competes for the food dollar. Food eaten away from home accounted for over 47 percent of total food dollars in 1995, up from 34 percent in 1970 and 44 percent in 1990. A growing number of two-income households have raised household incomes while reducing the amount of time available to prepare food at home, resulting in purchases of food away from home rising faster than purchases of food at home.

Expanding away-from-home sales tend to lessen the impact of rising farm prices on the overall food price index. Changes in prices for food away from home are more affected by the general inflation rate and competition among restaurants and fast-food establishments than by farm prices. The quantities and types of foods purchased in the at-home market—primarily from grocery stores and supermarkets—fluctuate more because of commodity price changes, while away-from-home purchases—primarily from restaurants and fast-food establishments—depend more on the general economy.

According to U.S. Retail Trade Census data, food sales by restaurants and fast-food establishments increased 32 percent from 1987 to 1992 (the most recent census year), although the number of these eating establishments increased only 14 percent. With only about a third of the food-away-from-home dollar going toward the actual cost of the food, and another third going toward salaries and benefits, food cost increases are slow to be translated into menu price changes. Since 1990, the yearly change in the away-from-home food CPI has remained below the general inflation rate, as menu prices were lowered and "value meals" were introduced at fast-food restaurants to compete for the consumer's food dollar.

In 1997, a higher Federal minimum wage could show up as a rise in the away-from-home food CPI. (The effect on the at-home food CPI, however, is expected to be small, since there are very few minimum wage workers in food manufacturing, processing, grocery stores, or supermarkets.) According to Bureau of the Census data for 1992, payroll expenses accounted for nearly 30 percent of sales in the restaurant and fast-food industry. However, Census data also suggest that less than half of entry-level workers in the restaurant and fast-food industry earn below the new minimum wage. So a rise in the wages of these workers would not have a large increase in the away-from-home CPI.

Larger Farms, Lower Production Costs

Continued economies of size in the farm sector have kept per unit production cost increases relatively low. For example, the number of farms (any establishment from which $1,000 or more agricultural products were sold or would normally be sold during the year) fell from 2.8 million in 1974 to 2.1 million in 1996, while the average farm size increased from 384 to 469 acres. Farms also have become more specialized as the average farm size increased.

Hog farms and dairy operations are examples of how per unit costs decline as the size of the operation increases. According to the 1992 Farm Costs and Returns Survey conducted by USDA, per unit production costs for producing hogs from farrow to finish were higher for smaller operations. The cost per hundredweight (cwt) gained was $69.02 for a hog operation producing fewer than 500 head, while the cost for an operation of 3,000 head or more was $46.43. A 1993 survey on milk production indicates that the cost of producing milk on smaller operations was also higher: $18.96 per cwt of milk sold for dairy operations with fewer than 60 milk cows, and $12.56 per cwt for operations with 300 or more milk cows.

The factors that have kept overall food prices at a fairly stable trend of 3-percent annual increases since 1992 are expected to continue in the next few years. Low inflation, more eating away from home, farm value share staying small, and economies in farm production should maintain increases in overall food prices of 3 to 4 percent in 1997 and the following few years. Food price increases may be larger if production of feed grains, meats, and fresh fruits and vegetables was to be lower than anticipated. Similarly, large supplies could result in smaller food price increases. ■

Spotlight:

Food Price Changes Vary Regionally

Food Price Changes Differ Across Metropolitan Areas and Regions

Across America, food price changes vary from the national trends. Local and regional price changes reflect differences in transportation costs, packaging costs, and wages, as well as different degrees of market competition among retailers and eating establishments.

The CPI for Food rose an average of 6.2 percent each year for the Nation as a whole during 1978-95 (table 1). National food price increases of 9.9 percent in 1978 and 11.0 percent in 1979 boosted the average annual increase for the 17-year period. The largest gains were in the Northeast, where the CPI for Food rose an average of 6.6 percent each year, followed by the West where food prices went up an average of 6.5 percent each year. The North Central had the smallest average annual increase of 5.7 percent. Among particular metropolitan areas, Honolulu, HI, had the largest average annual increase in food prices at 7.5 percent, while the average annual increase for Anchorage, AK, was the smallest at 4.8 percent.

During this time period, prices for food bought when eating out (food away from home) generally increased faster (up 7 percent) than for food bought at retail stores (food at home, up 6 percent). In the South, prices for food away from home increased at an average annual rate of 7.1 percent, while prices for food at home rose 5.8 percent. Food-away-from-home prices increased faster than food-at-home prices for all regions except the Northeast. In the Miami-Fort Lauderdale, FL, metropolitan area, food-away-from-home prices increased an average of 8.9 percent each year—the largest average annual increase among the 28 areas.

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Competition in Away From Home Market Slows CPI Increase For Some Areas

After the 1990-91 recession, competition among eating places in many large markets in east and west coast cities is believed to have held down menu prices there. As a result, for the United States as a whole, prices for food away from home rose more slowly during 1990 to 1995 (2.3 percent annually on average) than they did for food at home (2.5 percent on average each year). This was true in most of the Northeastern metropolitan areas, including Baltimore, MD, and the Washington, DC, areas, and the three California metropolitan areas. For example, in San Diego, prices for food away from home increased an average of only 1.8 percent a year from 1990 to 1995, compared with a 3.4-percent increase for food at home (table 2).

However, 18 of the 28 metropolitan areas surveyed had larger increases in the CPI for Food Away From Home than in the CPI for Food at Home during 1990-95. In some citites, food-away-from-home prices increased at almost double the rate for food-at-home prices. For example, prices for food away from home went up an average of 3.9 percent annually for the Kansas City, MO-KS, metropolitan area, compared with a 1.8-percent increase in prices for food at home.

Table 1
Northeast Region Had the Biggest Annual Food Price Increase for 1978-95

Region and metropolitan area	All food	Food at home	Food away from home
	Average annual percent increase from 1978 to 1995		
U.S. average	6.2	6.0	7.0
Northeast region	6.6	6.3	6.2
Boston-Lawrence-Salem, MA-NH	6.1	5.7	6.9
Buffalo-Niagara Falls, NY	5.9	5.9	6.0
N.Y.-Northern N.J.-Long Island, NY-NJ-CT	7.0	6.6	5.5
Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD	6.1	6.0	6.4
Pittsburgh-Beaver Valley, PA	5.6	5.3	6.4
North Central region	5.7	5.4	6.4
Chicago-Gary-Lake County, IL-IN-WI	5.8	6.0	5.6
Cincinnati-Hamilton, OH-KY-IN	5.5	5.2	6.2
Cleveland-Akron-Lorain, OH	6.4	5.6	8.2
Detroit-Ann Arbor, MI	5.4	5.6	5.1
Kansas City, MO-KS	5.6	5.0	6.7
Milwaukee, WI	6.0	5.8	6.5
Minneapolis-St. Paul, MN-WI	6.4	5.6	7.7
St. Louis-East St. Louis, MO-IL	5.9	5.5	7.0
South region	6.1	5.8	7.1
Atlanta, GA	6.3	5.7	7.4
Baltimore, MD	6.4	6.0	7.2
Dallas-Fort Worth, TX	6.3	5.4	7.9
Houston-Galveston-Brazoria, TX	6.2	6.4	6.3
Miami-Fort Lauderdale, FL	7.4	6.7	8.9
New Orleans, LA	N/A	N/A	N/A
Tampa-St. Petersburg-Clearwater, FL	N/A	N/A	N/A
Washington, DC-MD-VA	6.0	6.6	5.1
West region	6.5	6.5	6.8
Anchorage, AK	4.8	4.9	4.7
Honolulu, HI	7.5	8.0	6.7
Los Angeles-Anaheim-Riverside, CA	6.7	7.0	6.2
Portland-Vancouver, OR-WA	5.5	4.5	7.2
San Diego, CA	7.0	6.5	8.0
San Francisco-Oakland-San Jose, CA	6.8	6.8	7.3
Seattle-Tacoma, WA	6.7	6.1	7.9

Note: N/A = Not available. Source: Average annual calculations by USDA's Economic Research Service, using U.S. Bureau of Labor Statistics data.

In the larger metropolitan areas on the east and west coasts, population, employment, and incomes grew faster than the Nation as a whole after the 1990-91 recession. Away-from-home food sales are strongly correlated with these factors, attracting new chains to growing areas. Larger metropolitan areas are known for their broad spectrum of eating places. Two of the fastest growing chains, Boston Market and

Table 2
In Over a Third of the Metropolitan Areas, Prices for Food at Home Rose Faster Than for Food Away From Home During 1990-95

Region and metropolitan area	All food	Food at home	Food away from home
	Average annual percent increase from 1990 to 1995		
U.S. average	2.4	2.5	2.3
Northeast region	2.5	2.7	2.0
Boston-Lawrence-Salem, MA-NH	2.1	2.4	1.7
Buffalo-Niagara Falls, NY	2.2	1.9	2.8
N.Y.-Northern N.J.-Long Island, NY-NJ-CT	2.3	2.6	1.8
Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD	2.6	2.9	2.0
Pittsburgh-Beaver Valley, PA	3.0	3.1	2.6
North Central region	2.4	2.2	2.7
Chicago-Gary-Lake County, IL-IN-WI	3.1	3.2	2.8
Cincinnati-Hamilton, OH-KY-IN	1.3	0.5	2.6
Cleveland-Akron-Lorain, OH	2.8	2.5	3.4
Detroit-Ann Arbor, MI	2.6	2.4	2.8
Kansas City, MO-KS	2.6	1.8	3.9
Milwaukee, WI	2.7	2.6	3.0
Minneapolis-St. Paul, MN-WI	2.3	1.5	3.5
St. Louis-East St. Louis, MO-IL	1.5	1.4	1.8
South region	2.3	2.2	2.4
Atlanta, GA	2.2	2.1	2.3
Baltimore, MD	2.5	3.0	1.6
Dallas-Fort Worth, TX	1.8	1.2	2.6
Houston-Galveston-Brazoria, TX	1.6	1.5	2.0
Miami-Fort Lauderdale, FL	3.1	3.0	3.1
New Orleans, LA	2.5	1.7	3.6
Tampa-St. Petersburg-Clearwater, FL	2.0	1.8	2.1
Washington, DC-MD-VA	2.2	2.7	1.8
West region	2.6	2.9	2.2
Anchorage, AK	2.3	2.2	2.5
Honolulu, HI	2.7	2.4	3.3
Los Angeles-Anaheim-Riverside, CA	3.3	3.9	2.2
Portland-Vancouver, OR-WA	1.6	1.3	2.0
San Diego, CA	2.7	3.4	1.8
San Francisco-Oakland-San Jose, CA	2.4	2.9	1.8
Seattle-Tacoma, WA	2.8	2.6	2.7

Source: Average annual calculations by USDA's Economic Research Service, using U.S. Bureau of Labor Statistics data.

Kenny Rogers Roasters, continue to introduce new outlets in major metropolitan areas. Eating places are competing for consumers' away-from-home food dollars, contributing to lower average annual price increases for food away from home in these cities during 1990-95. ■

Competing Forces Affect Food Prices for Low-Income Households

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Whether poor households pay more or less for food than other households is a recurring policy question. Many Federal food-assistance programs are designed to provide low-income and other needy people with the financial means to select nutritious diets. For example, the amount of a household's monthly food stamp allotment is based on the cost of USDA's Thrifty Food Plan (TFP), a market basket of suggested amounts of foods that make up a nutritious diet and can be purchased at a relatively low cost. The cost of the TFP is based on the actual food prices paid by low-income households. The food stamp allotment is adjusted annually by the Consumer Price Index for specific foods within the TFP market basket.

At current participation levels, a dollar increase (decrease) in the cost of the TFP for a family of four would result in about a $69 million annual increase (decrease) in the cost of the Food Stamp Program. Given the large budgetary exposure, accurate estimates of food prices and costs for low-income families are needed for informing any decisions that might arise related to the Food Stamp Program's benefit determination formula. Furthermore, improved understanding of food costs for the poor would be helpful to nutrition educators who seek to help low-income households better manage their food budgets.

Information to determine the food prices faced by and paid for by low-income Americans in comparison to the population as a whole is sketchy; no single source of data captures all the elements needed to calculate precise estimates. For example, household surveys, while quite detailed, do not typically distinguish between expenditures for different brands or grades of food products. Supermarket scanner data on food prices can be used to shed some light on the question of price differences between different brands and grades of food products, but no information is collected to establish the income of the person purchasing the products.

The abundance and variety of foods offered for sale exacerbate the problem of identifying food price differences by income level. A typical supermarket may offer more than 25,000 food items, differentiated not only by product category, but also by brand, flavor, and package size. Nationwide, more than 200,000 grocery items (excluding fresh meat and poultry, and produce) are offered by foodstores at any given time.

The definition of low income may differ slightly among data sources, but consumption patterns are generally the same across the sources. Low-income households spend less per person for food than do higher income households because they tend to purchase lower cost items within broad food groups and allocate their budget differently between food groups than wealthier households. However, low-income households face slightly higher prices on average due to the localities where they live and the kinds of foodstores where they generally shop. The extent of these two apparently competing forces on the cost of foods purchased by low-income households depends on the types of foods they purchase and the magnitude of the price differences in the stores where they shop.

We used historical and the most recent surveys on household food consumption and expenditures, foodstore prices, food stamp redemptions, and census estimates to better understand the major factors influencing the prices paid for food by households of different income levels.

Smaller Foodstores Means Higher Prices

Low-income households face higher food prices compared with other households if they shop more in smaller foodstores than in supermarkets. Past research suggests

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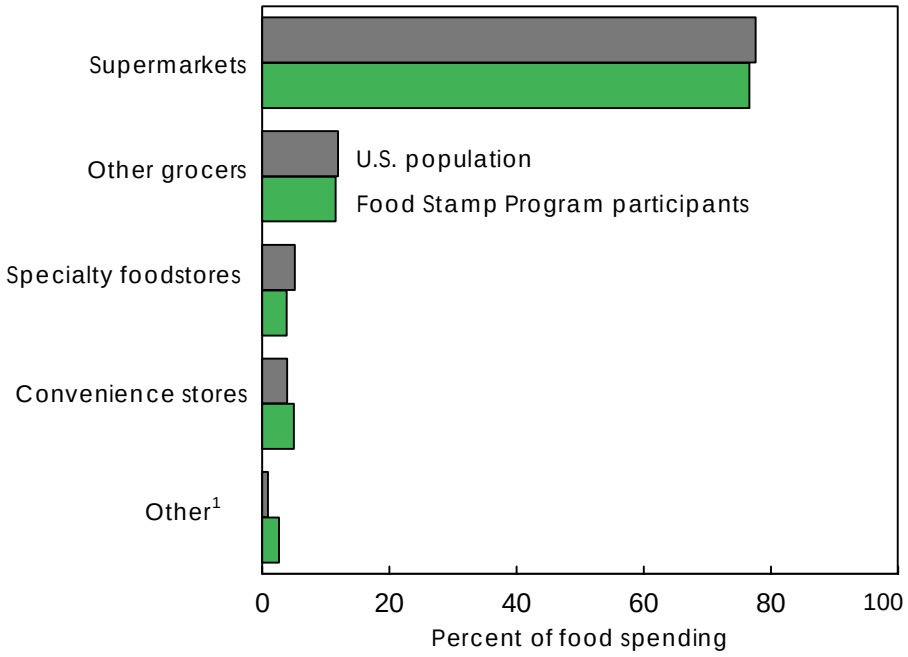
prices at small stores run an average of 10 percent more than at supermarkets. Food prices are lower in supermarkets because they take advantage of economies in procurement and retailing. With higher sales, supermarkets' costs for labor, utilities, advertising, and other retailing expenses are spread over more units, reducing per unit costs. As a result, supermarkets generally have smaller store margins (the markup over cost of goods sold), allowing for lower prices than in smaller outlets. The larger physical size of supermarkets also allows for greater product variety, including many lower cost store label and generic items.

USDA food stamp redemption data show that supermarkets' share of total food spending by low-income households is only slightly less than supermarkets' share of total food spending nationwide (fig. 1). About 76.7 percent of food stamps are redeemed in supermarkets. Data from the Census of Retailing show a similar result, with supermarkets and other large retailers accounting for 77.7 percent of food sales nationwide.

This 1-percentage-point difference in the share of supermarket food spending between food stamp recipients and the general population, multiplied by the 10-percent price difference between store types, suggest that low-income households face prices that are an average of 0.1 percent higher.

Figure 1
Food Shopping Sources Are Similar Among Income Levels



Note: [1]Includes gas stations, drugstores, warehouse clubs, and other retail outlets.
Source: *Authorized Food Retailer Characteristics Study: Technical Report IV*. USDA's Food and Consumer Service, Sept. 1996.

Suburban Stores Have the Lowest Prices

Store prices vary by location, whether urban, suburban, or rural. Prior studies indicate that foodstore prices in urban and rural areas average about 4 percent higher than in suburban areas. Urban areas have fewer and smaller supermarkets than do suburban areas, and the urban stores' operating costs are likely higher due to the lower efficiencies associated with smaller stores, and the higher cost of land, rental rates, insurance, and taxes. Due to lower population density, rural supermarkets are likely to be fewer and smaller, have higher shipment costs, and experience higher costs per unit sold than in suburban supermarkets.

Because a greater proportion of low-income households live in urban areas (42.4 percent) and rural areas (25.8 percent) than that of the U.S. population as a whole, they face an average of 0.63 percent higher food prices than national averages (table 1).

Another potential source of higher food prices facing low-income households arises from "neighborhood income effects" within a geographic area. Researchers have hypothesized that the different security and competitive environment in poverty neighborhoods, especially neighborhoods in central cities, might be associated with a tendency for supermarkets to charge higher prices than those outside poverty areas. Foodstore surveys that examine the prices for a fixed market basket of food items, however, found little evidence for this. However, such surveys may not reflect what an individual household actually buys.

Lower Cost Foods a Factor

Household food consumption and expenditure surveys reveal that the poor tend to allocate their food dollar differently and spend less per pound for nearly all broad food groups than do all households combined. They are able to do this by purchasing lower cost items within the broad food groups. Selecting more economical foods such as store

label and generic items, larger package sizes, and lower priced items helps them realize lower food costs.

The Bureau of Labor Statistics' Consumer Expenditure Survey (CES), which collects household expenditure information on roughly 130 broad food groups, reveals that food purchases made by low-income households differ markedly from purchases by higher income households. In 1992 (USDA's most recently published survey data), households in the poorest 20 percent of the Nation's income distribution (household income averaging $6,669) spent $1,249 per person on food, compared with $1,997 for the wealthiest 20 percent (household income averaging $77,311).

The survey also revealed that higher income households spent more money and a larger share of their food budget on food away from home: 24 percent for the lowest income households, compared with 40 percent for the highest income households.

The CES data are useful in comparing overall spending levels as well as expenditures for specific foods (fig. 2). For example, the CES data reveal that the highest income group bought $48 worth of fish and seafood per person per year, while the lowest income group spent $26. However, the CES does not report any quantity information.

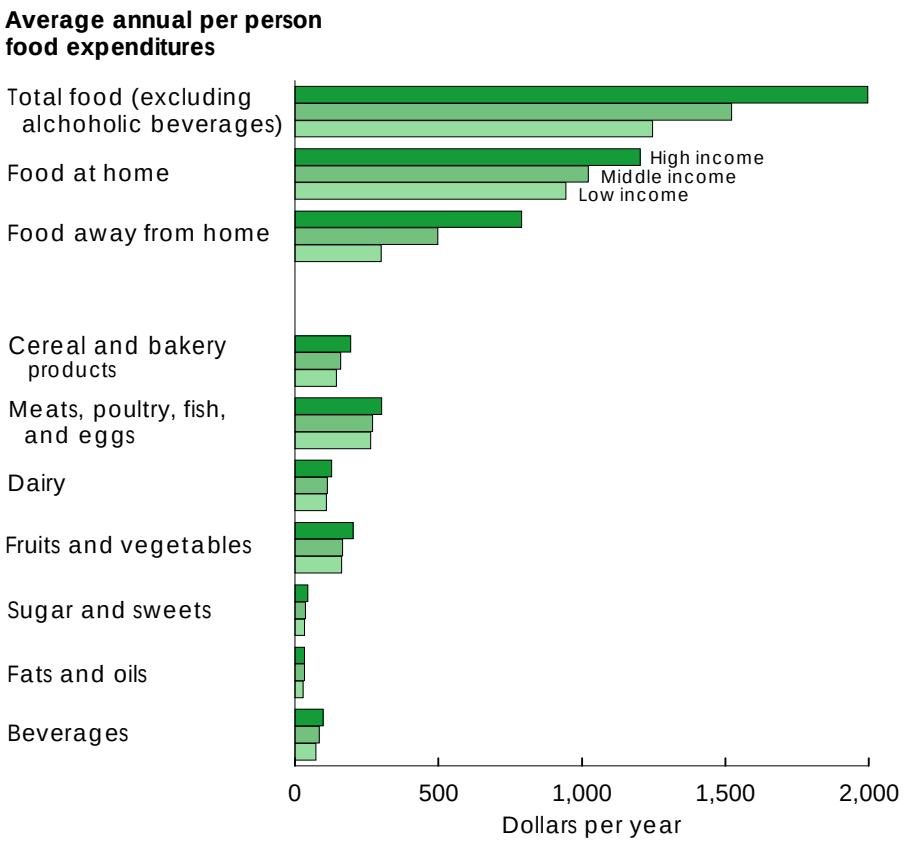
USDA's Nationwide Food Consumption Survey (NFCS) collects information on both food consumption and expenditures of households, as well as their economic and demographic characteristics. In order to make food cost comparisons across income levels, we calculated per unit costs (cost per pound) by dividing food expenditures from the NFCS for broad food groups by the quantities consumed. Costs were compared for all households and low-income households in several broad categories of food for both the 1977-78 and 1987-88 NFCS surveys (fig. 3), the latest survey periods.

Table 1
The Greatest Share of the Low-Income Population Lives in Urban Areas

Geographic area	Low-income population[1]	U.S. population as a whole
	Percent	
Urban[2]	42.4	30.1
Poverty area[3]	20.2	7.5
Suburban[4]	31.8	47.6
Poverty area	4.5	2.1
Rural area[5]	25.8	22.3
Poverty area	9.6	5.1

Notes: [1]Population classified as poverty households by U.S. Census Bureau. [2]Central-city portion of a Census Metropolitan Statistical Area (MSA). [3]Census areas in which poverty households constitute 20 percent or more of all households. [4]Noncentral city portion of a census MSA. [5]Areas not designated as a census MSA. Source: U.S. Census Bureau. *Current Population Reports*, 1992, Series P60-185.

Figure 2
Food Spending Increases with Household Income



Source: Smallwood, David M., Noel Blisard, James R. Blaylock, and Steven M. Lutz. *Food Spending in American Households, 1980-92,* SB-888. USDA's Economic Research Service, Oct. 1994.

Figure 3
Low-Income Households Continue To Spend Below the National Average for Most Foods

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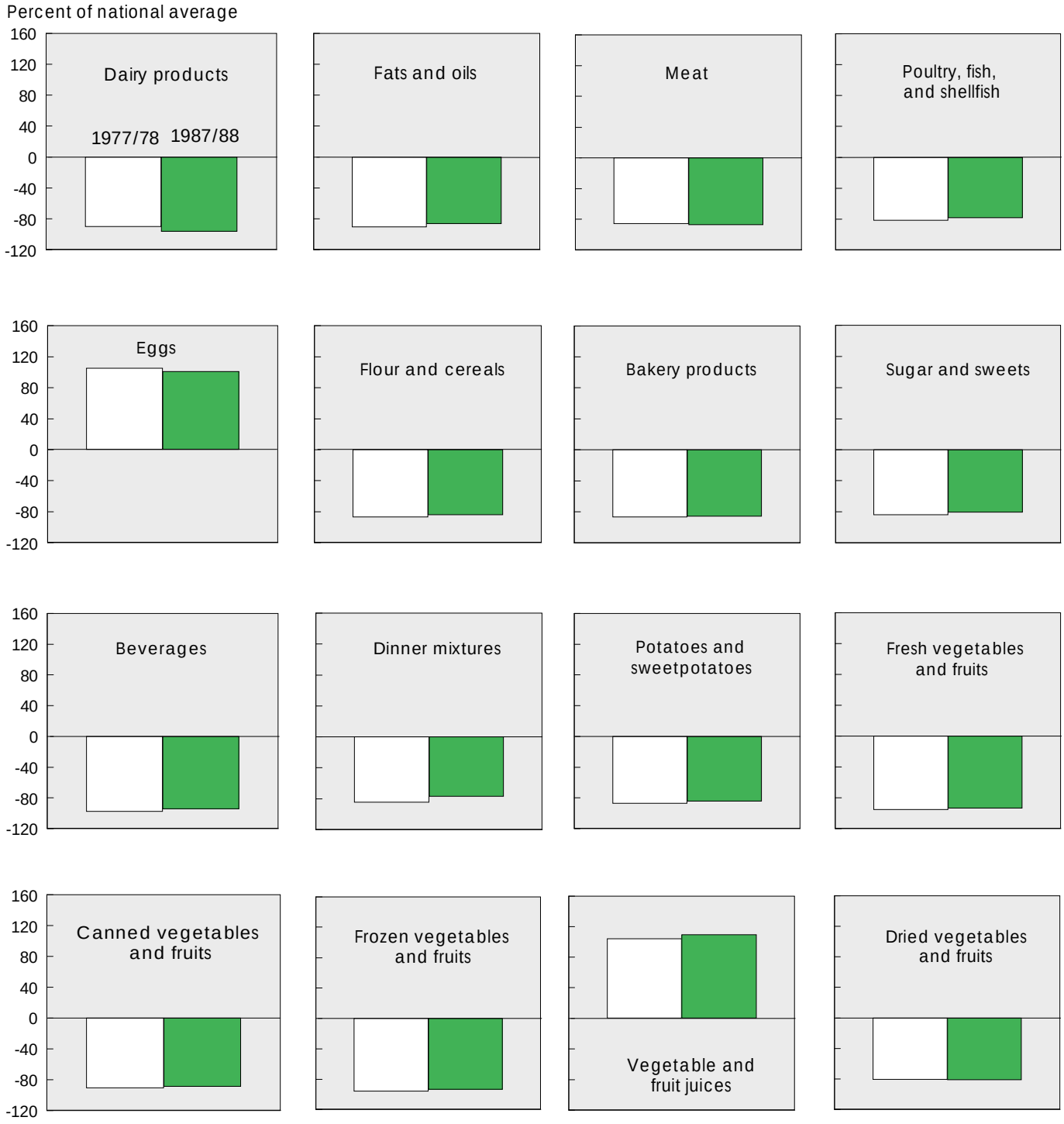
Low-Income Households Continue To Spend Below the National Average for Most Foods



Sources: Lutz, Steven M., David M. Smallwood, James R. Blaylock, and Mary Hama, *Changes in Food Consumption and Expenditures in American Households During the 1980's*, SB-849, USDA, ERS, Dec. 1992; and Lutz, Steven M., David M. Smallwood, James R. Blaylock, and Mary Hama, *Changes in Food Consumption and Expenditures in Low-Income American Households During the 1980's*, SB-870, USDA, ERS, Nov. 1993.

Although low-income consumers tend to have lower per unit food costs than the population as a whole, the differences vary substantially by food category. For example, in the 1987-88 survey, low-income households paid about 78 percent of the average price for poultry, fish, and shellfish, while they paid about 92 percent for fresh vegetables. However, they paid 0.5 percent more for eggs and 9 percent more for vegetable and fruit juices.

Both NFCS data sets suggest that low-income consumers select a different mix of food products and qualities to lower their food costs. One can speculate that low-income households may look for bargains, buy more store label and generic brands, choose foods sold in bulk, and/or buy a lower quality mix of items that tend to lower their food costs.

Accounting for differences in food costs due to quality differences is complex. Quality aspects can include the nutritional content of food, freshness of agricultural products, convenience of preparing food, tenderness of meat products, taste and palatability of a meal, ambiance and uniqueness of food from a gourmet restaurant, or simply the satisfaction of a home-cooked meal. For example, while spending less for food, low-income households usually get more nutrients for their food dollar than do other households. Further research is needed to quantify these effects on consumer decisionmaking.

Food Choices Offset Higher Store Prices

Proximity to different types of stores and the geographic location where low-income households live play much smaller roles in the prices they pay for food than do item selections. The combined effects of the 0.1-percent difference due to store type and the 0.63-percent difference due to geographic location suggests that low-income households, on average, face foodstore prices that are less than 1 percent higher than average prices nationwide.

Some low-income households and specific areas in the country undoubtedly pay higher food prices than does the overall population. For example, in low-income rural areas, only 53 percent of food stamps were spent in supermarkets. If the balance of food stamps were spent in higher-priced, smaller foodstores, these low-income households would face prices about 2.5 percent higher, on average.

Although low-income households face slightly higher store prices, within a food group, they generally select less expensive items than those purchased by higher income households. While the magnitude of this difference varies between food groups, it is clear that low-income households pay a lower per unit cost for most major food groups.

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Consumers Pay a Premium for Organic Baby Foods

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U.S. consumers of all ages are involved in the trend toward eating more healthful foods. The health consciousness has spawned a host of food offerings lower in fat, higher in fiber, and even produced without chemical fertilizers or pesticides. This includes the baby food market, as the health concerns of parents extend to their decisions about what foods to place before the newest family members.

Some consumers perceive organic products as a safe and healthy way to avoid potential risks of exposure to pesticide residues in foods. Sales of organic baby food have been steadily increasing, and in 1995 stood at over $25 million. This was despite a price premium of 21 cents per jar over regular baby food. When it comes to purchasing decisions about baby food, consumers were also willing to pay more for other product characteristics—notably the lack of added fillers, such as modified starches. Consumers placed a positive value on the protein and iron content and a negative value on fat content in baby food.

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These results are drawn from an economic model developed by USDA's Economic Research Service (ERS) to estimate what product characteristics consumers consider most important when they purchase baby food. Economists have developed a characteristics demand model where the price of products in a category such as baby food can be expressed as a mathematical function of the level of different characteristics observable in the purchase decision (for example, fat level, the presence of fillers, and organic.) This mathematical relationship allows researchers to estimate consumer values or preferences for various characteristics using market prices and purchase data. This method provides objective valuation of characteristics because consumers are revealing their preferences through actual purchases, as opposed to focus groups or surveys which provide subjective valuation of characteristics. The model for this analysis used scanner data reflecting baby food purchases in U.S. supermarkets.

The finding that some consumers are willing to pay a premium for organic baby food is especially interesting given that there has been no national definition of organic foods. The lack of national standards and the sporadic certification of organic producers has raised issues regarding the value of the organic label. The premium found in this study can be used as an estimate of the value of the organic label to baby food purchasers.

What is Organic Baby Food?

As yet, there is no national definition of what constitutes an organic food product. The 1990 Organic Food Production Act mandates USDA to establish national standards for producing and marketing organic agricultural products (see "New Law Paves Way for Expanding Organic Market," elsewhere in this issue). Presently, some organic foods are certified under State and private certification programs. USDA expects to publish the proposed regulations for organic crop and livestock production, handling, and certification procedures in the near future.

Earth's Best, the only national brand of organic baby food sold in the United States, uses its own certification program. Earth's Best growers and producers are certified to have not used synthetic pesticides or fertilizers for 3 years.

Earth's Best uses organically grown and processed foods in its product line; that is, crops produced without the use of toxic pesticides and synthetic fertilizers. Growers

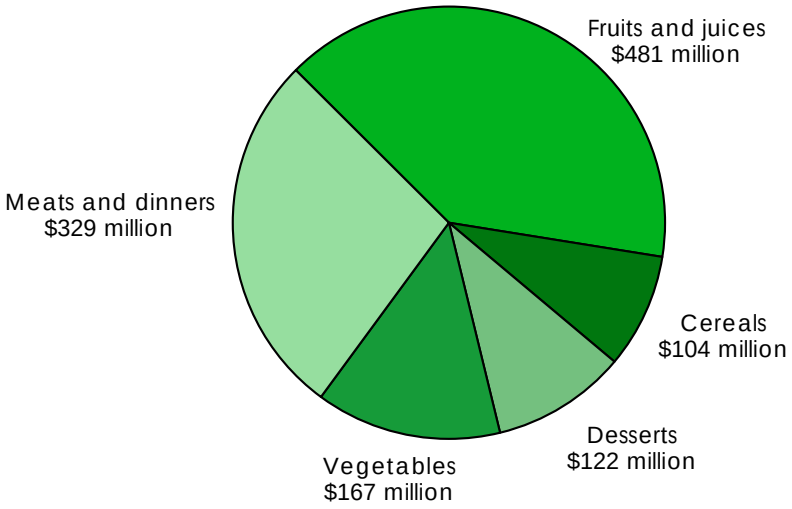
enrich their soil by using cover crops, natural fertilizers, and compost coupled with crop rotation, biological controls, and botanical pest controls. Post-harvest processing is minimal to help maintain the natural flavors. Synthetic fumigants, preservatives, and irradiation are not used in their manufacturing process. Earth's Best states that the meat and dairy products used in their baby foods come from animals which have been given no growth hormones or antibiotics.

Organic Baby Food Market and Outlets Grow

In the United States, retail sales of baby food exceeded $1.2 billion in 1995. Fruits and juices accounted for 40 percent of these sales (fig. 1). Meats and combination meals were second with slightly more than 27 percent of baby food sales, followed by vegetables with nearly 14 percent, desserts with slightly more than 10 percent, and infant cereals with more than 8 percent.

Supermarkets are the primary retail outlet for baby foods in the United States (supermarkets are large grocery stores offering a variety of food and nonfood products with annual sales of $2 million or more). About 60 percent of baby food fruits and juices are sold in supermarkets. Another 25 percent of baby food fruit and juice sales occur in grocery stores (foodstores with less than $2 million in sales, excluding club stores, specialty foodstores, and drug stores). Grocery stores and supermarkets account for about 90 percent of retail sales of baby food fruits and juices. Sales for other baby food product categories range from 59 to 64 percent sold in supermarkets and 24 to 25 percent sold in grocery stores. Desserts have the smallest share of baby food sales in supermarkets and grocery stores—59 percent and 24 percent, respectively.

Figure 1
Fruits and Juices Dominated Baby Food Sales in 1995



Source: *Supermarket Business*, Sept. 1996.

Despite their sales growth, organic baby food sales account for only 2.5 percent of the baby food sold in U.S. supermarkets. However, U.S. supermarket sales of organic baby food increased nearly 2,200 percent between 1989 and 1995—from $1.1 million to $25.1 million (table 1). During this period, supermarket sales of all baby foods increased 20 percent, from $888 million to $1.1 billion.

Outlets for organic baby food have been increasing. Earth's Best started in Vermont in 1988 and was initially sold in health-food stores. In 1991, their production facilities and headquarters moved to Colorado and began expanding into the national market. Heinz acquired the company in 1996. In 1996, Earth's Best baby food was sold in about 45 percent of U.S. supermarkets and in 980 health-food stores in 49 States.

There are numerous smaller regional organic baby food producers in the United States who market their products in local foodstores and food cooperatives. However, they account for a very small portion of organic baby food sales in the United States.

Most organic baby foods are the strained variety—processed to a fine texture to be easier for infants to digest. Organic products can also be found in other baby food categories, including cereal and meat products. Some organic junior baby foods (chunkier food for children approaching their first year) have recently been introduced.

Consumers Pay a 21-Cent Premium for Organic Baby Food

Sales of organic baby food have grown considerably in recent years. Product lines of organic baby food have also continued to expand. Earth's Best added organic junior

baby food to its product line in 1995, while organic strained food, cereals, biscuits, and juice have been on supermarket shelves since 1989 or 1990.

The ERS analysis found that consumers who purchase organic baby food pay a 21-cents per jar premium (a jar of baby food is considered to be one serving) for the organic characteristic over regular baby food. This estimate is based on national supermarket prices.

There are several possible reasons for consumers being willing to pay this type of premium. Consumers may perceive that organic baby food reduces potential health risks from exposure to pesticide residues, or may pay a premium for what they perceive as better taste and nutrition. The higher cost of some organic ingredients may account for a portion of the premium. Organic raw products may cost more to produce, and there is an additional cost involved with the certification of organic foods.

Other Characteristics Important, But to a Lesser Degree

Price differences among baby food products reflect product differences in addition to whether or not it is organic. ERS's economic model also provides values for other characteristics consumers perceive to be important, including the presence or absence of added modified starch fillers and nutrient characteristics such as protein, iron, fat, and carbohydrate levels (table 2).

Most baby food manufacturers originally added sugar and salt to their baby foods.

However, some manufacturers have been reducing added ingredients and others add no fillers. Earth's Best, for example, does not add any fillers to baby foods. Growing Healthy, a frozen baby food product, does not add modified starches, refined sugars, or salt. Gerber removed added ingredients from many of its products in 1996, and Beechnut adds refined sugar and modified starches only to its dessert products.

Some consumers prefer not having added fillers in the strained foods they purchase, paying up to 2.7 cents more per jar for strained baby foods containing no modified starch or fillers. Modified starches or fillers basically include the addition of processed sugars or starches to the food. This finding suggests that the presence of fillers is a significant factor in consumers' purchasing decisions.

Customers in the study valued only three nutrients in strained baby food when they make their purchase decision—iron, protein, and fat. Consumers were willing to pay 0.7 cent per jar for an additional gram

Table 1
Supermarket Sales of Organic Baby Food Soar[1]

Year	Organic baby foods	All baby foods
	Million dollars	
1989	1.1	888
1990	5.5	952
1991	10.8	1,004
1992	14.3	1,036
1993	17.0	1,046
1994	20.9	1,055
1995	25.1	1,069

Note: [1]Supermarkets are foodstores with $2 million or more in annual sales.
Source: Tabulated from supermarket scanner data.

Table 2
Organic Is a Major Characteristic Consumers Value in Baby Food

Characteristic examined	Value to consumer[1]
	Cents
Organic (present)	20.86
Protein (grams)	.71
Iron (percent of RDA)	.10
Fat (grams)	-.71
No fillers	2.71
Calcium (percent of RDA)	NS
Calories (number)	NS
Carbohydrates (grams)	NS
Serving size (ounces)	NS
Sodium (milligrams)	NS
Vitamin A (percent of RDA)	NS
Vitamin C (percent of RDA)	NS

Notes: NS = Not significant. RDA = Recommended Dietary Allowance. [1]The estimated premium or discount consumers place on a unit of the characteristic in a jar of strained baby food.

of protein in baby food. They are also willing to pay 0.1 cent per jar for an additional percentage of the Recommended Daily Allowance (RDA) of iron in baby food.

Fat content was also found to be a statistically significant factor for baby food purchases. Consumers discounted each additional gram of fat in a serving of strained food by 0.7 cent when they purchased baby food.

Other nutrients, including carbohydrates (independent of whether the product does or does not contain fillers), sodium, and vitamins were not significant factors affecting baby food purchases. This result suggests that consumers either did not have sufficient information to include these characteristics in their purchasing decision, or simply that the characteristics were not relevant to their purchase decision. The latter is more plausible since mandatory nutrition labeling on baby food provides information on nutrient content. Also, baby food is not the only source of nutrients for infants. Baby foods are basically used to start infants on solid foods. Breast milk and infant formula provide many nutrients in adequate amounts to sustain infants.

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Changing Pork Business Affects Pork Prices and Quality

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Consumers want high-quality products at reasonable prices. The American pork industry has heard this message loud and clear. Pigs are being selectively bred to produce leaner, higher quality, and competitively priced meat. The entire industry from the farmer to the processor to the grocery store or eating place is undergoing a transformation.

Just 10 years ago, a third of all hogs were found on farms that had more than 1,000 hogs. Today, more than two-thirds of all hogs are produced on farms with more than 1,000 pigs. Many pork packers and processors obtain a steady supply of high-quality hogs by entering into contractual arrangements or by owning production facilities and breeding operations.

In the hog industry, production for the open market is being replaced by long-term contracts and vertical integration. In 1970, 2 percent of hogs slaughtered were obtained through contracts and integrated operations. By 1993, this percentage had increased to 11 percent, and packers expect 29 percent of hogs will be obtained through contracts and integrated operations in 1998.

How the hog industry is organized and how it does business affects consumers' pocketbooks and product selection. Changing methods of acquiring hogs by packers can reduce packing costs and improve the quality of pork products, which affect retail prices and the quantity of pork consumed. We used an economic model of the U.S. pork industry to estimate potential retail price changes that result from new ways of transferring hogs from producers to packers. Under the assumptions of our model, coordinating hog production and processing operations results in 19-percent leaner products. The corresponding production efficiencies and changes in consumer demand result in retail prices of pork falling as much as 1 cent per pound. But the direction and size of price changes depend on the proportion of hogs that are affected by new methods of acquiring hogs, and the value that consumers place on higher quality pork.

Consumer Preferences Encourage Changes in Pork Industry

Gaining greater control over quantity and quality has become very important in the highly competitive U.S. food sector. Households want high-quality, safe, and convenient foods with desirable nutritional qualities. To meet this demand, pork companies are introducing new products, such as Smithfield Foods' *Lean Generation* brand-name line of lean, fresh pork products and Farmland Foods' line of "moisture enhanced" fresh pork. Moisture-enhanced pork, like a deep-basted turkey, does not dry out or toughen if over-cooked. Also, a more ethnically diverse U.S. population is creating niche marketing opportunities for new pork products. For example, the chorizo Mexican-style sausage is being marketed to the growing Hispanic population and eating places that serve Mexican food.

Likewise, more food consumed away from home suggests that suppliers must be able to provide large quantities of consistently high-quality, uniform products to restaurants on a regular schedule. For example, McDonald's requires millions of pounds of high-quality, uniformly sized bacon for its many bacon-topped hamburgers, such as the recently introduced Arch Deluxe sandwich.

Changing Business Arrangements Provide More Control

Technological advances in hog production—such as innovations in genetics, housing, and handling

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equipment—allow firms to expand hog farms and to gain more control over quality. Producers use selective breeding to produce hogs with desirable characteristics—disease resistance, high lean-to-fat ratio, fast growth, and others. These carefully selected hogs are fed to market weight prior to sale to packers. In the first processing stage, packers slaughter the hogs and cut the meat into wholesale pork cuts. Three-fourths of pork is further processed into sausage, hot dogs, bacon, and other products. Finally, pork products are sold to retailers and eating places.

In the hog industry, methods of vertical coordination are changing. Vertical coordination refers to systematic arrangements for product transfer among different stages of production. This can be achieved in many ways, including open-market exchange, vertical integration, and contractual arrangements.

- In open-market exchange, producers make no commitments to sell their hogs before they are ready for slaughter. The grown hog is sold at the prevailing, or "spot," price.
- When a firm vertically integrates, it brings under its ownership two or more successive stages of production, and thus has greater control over production. For example, a processor that buys or builds hog production facilities is vertically integrating, so hog production and processing is now conducted by a single firm. Smithfield Foods, a leading pork processor, obtains about 11 percent of the hogs that it slaughters from farms that Smithfield Foods owns or leases. Packers acquiring hogs from their own facilities may directly control hog quality through genetic selection and management techniques used in production.
- Contractual arrangements give buyers less control over production than integration, but greater control than market exchange. When firms enter into contracts they make commitments, such as delivery times and product quality, before production has been completed. Long-term contracts, usually 4 to 7 years, are typically used by large packers and large hog producers. These contracts specify that an independent hog producer deliver to the packer a certain quality and quantity of hogs on or near a specific date. Packers that obtain hogs through long-term contracts can specify genetic strains of hogs to be delivered. Although less common, packers may own the hogs and establish contracts with producers to feed and house the hogs.

Vertical Integration and Contracting Increases Quality...

In the hog industry, long-term contracts and vertical integration are replacing production for the open market. For example, Smithfield Foods emphasizes the importance of long-term contracts and vertical integration for obtaining consistent supplies of lean, high-quality hogs. The company touts its National Pig Development (NPD) program as an excellent demonstration of the effects of a highly coordinated operation. Through a partnership with Carroll's Foods, a major North Carolina hog producer, Smithfield Foods has long-term contracts with Carroll's Foods and its affiliates to raise hogs. This arrangement, referred to as Smithfield-Carroll's, acquired from the National Pig Development Company, a British firm, the exclusive franchise rights to develop and market the NPD breed of hog in the United States. This breed is said to provide the leanest hog in U.S. commercial production and one of the leanest meats of any kind. Nutritional studies by the Sarah W. Stedman Center for Nutritional Studies at Duke University Medical Center in 1996 indicated that NPD pork was 34 percent to 61 percent leaner than non-NPD pork, depending on the cut.

... And Reduces Costs

The cost of producing pork includes the cost of raising hogs and the cost of marketing services to convert hogs into retail pork products (table 1). Marketing services include the slaughtering and processing of hogs, and the wholesaling and retailing of pork.

Changes in vertical coordination can affect pork production costs in a number of ways. First, by contracting or integrating, packers may obtain a large, stable flow of hogs into the packing plant. This reduces average costs by eliminating variations in the flow of hogs into the packing plant and reducing the under- or overutilization of plant facilities.

Second, changes in vertical coordination can affect the quality of hogs slaughtered, which may lower packing costs. Hogs with excessive fat lead to higher packer costs because more trimming of excess fat is required. Moreover, lean hogs provide a larger amount of salable lean meat, and thereby reduce the number of hogs needed by the packer to produce a given quantity of pork. A 1992 study for the National Pork Producers Council estimated that a leaner hog could reduce packer costs by $6.32 for each hog slaughtered (table 2). These packer savings are controlled by the hog producer through the choice of genetic stock. ERS calculations indicate that the hog associated with these cost savings would be 19 percent leaner than the average.

Table 1
Marketing Costs Account for 68 Percent of Retail Pork Prices

Item	Value, cost, price
	Cents per pound
Farm value	62.9
Marketing costs:	135.1
Slaughtering and processing	32.5
Intercity transportation	3.5
Warehousing and store delivery	9.1
Cutting and merchandising	90.0
Retail price	198.0

Source: Howard Elitzak. *Food Cost Review*, 1995, AER-729. USDA's Economic Research Service, April 1996.

Table 2
Leaner Hogs Save Packer Costs

Packer defect	Reduction in costs[1]
	Dollars per head
Backfat thickness	2.80
Degree of ham and butt trimming	1.87
Excessive seam fat	.63
Bellies too fat or too thin	.14
Weight problems	.88
Total packer costs	6.32

Note: [1]ERS calculations indicate that the hog associated with these cost savings would be 19 percent leaner than the average. Source: National Pork Producers Council. *Pork Chain Quality Audit*, David Meeker and Steve Sonka, eds., Progress Report prepared for the National Pork Producers Council. Des Moines, IA: National Pork Producers Council in cooperation with the National Pork Board, April 6, 1994.

Packers also incur costs because of trimming damaged areas and discarding damaged and unusable areas. Packers and consumers do not want pale, soft pork that has low water-holding capacity. When hogs are stressed by loading and handling, their meat can have an unattractive appearance to consumers and can be less juicy after cooking. These quality problems may cause pork cuts generally suited for fresh pork to be utilized in further processed products, like sausage.

These packer costs are controlled by the hog producer through the choice of genetic stock and through proper management, such as reducing the incidence of improperly injected medication and rough handling of hogs.

The use of long-term contracts and hog ownership by the packer may reduce packers' costs of acquiring hogs, including: operating buying stations (facilities for buying and loading hogs for shipment to packing plants), paying salaried or commissioned buying agents, and transporting hogs to packing facilities. Recently, Thorn Apple Valley, a meat processing company, entered into an agreement with the Michigan Livestock Exchange to manage Thorn Apple Valley's buying stations, and supply the quantity and quality of hogs specified. The cost to Thorn Apple Valley of acquiring hogs in this way was $0.48 per hog (not including transportation or the cost of operating buying stations), plus the cost of the hogs. Packers raising their own hogs or using long-term contracts do not incur this buying station management fee.

Some industry observers argue that packers use contracts or integrate to exercise market power in the pork market and maximize profits by raising the price of their marketing services. Although this is one possible motive for contracting or vertically integrating, strong evidence of this type of behavior in the pork industry does not exist. These arrangements help packers to obtain a steady supply of uniform, high-quality hogs, which lowers costs and improves the quality of pork products.

Retail Prices Reflect Both Production Costs and Food Quality

By lowering the costs of production and increasing the quality, changes in vertical coordination affect retail prices. Changes in retail prices depend on the percentage of hogs affected by changes in vertical coordination, the size of the cost reductions, the degree of quality improvement in pork, and how consumers value the quality improvement.

We used an economic model of the U.S. pork industry to examine the potential effects on pork prices when some hogs are transferred to packers through contracts and vertical integration instead of through the open market. The model allows for simultaneous shifts in supply

and demand, and corresponding adjustments in quantities and prices. The model assumed that there are no costs of differentiating lean pork from standard pork, such as label redesigning. Also, other costs, such as monitoring and enforcing contracts, are assumed to be negligible.

We examined six scenarios to reflect differences in the percentage of hogs obtained through contracts and integration, and different values placed on leaner pork by consumers. For each scenario, we estimated the change in retail pork prices that results from increased coordination.

According to survey information, 11 percent of hogs were obtained from contracts and integration in 1993. This represents the "low-proportion" scenario. The percentage of hogs obtained through contracts and integration is expected to increase to 29 percent by 1998, which represents the "high-proportion" scenario.

In this analysis, those hogs obtained through contracting or vertical integration lead to reduced packer costs in two ways. First, these hogs were assumed to be 19 percent leaner, which results in reduced packer costs of $6.32 per hog due to handling a leaner hog. Second, packers save $0.48 per animal in hog acquisition costs by contracting or vertically integrating.

The amount that consumers are willing to pay for 19-percent leaner pork is uncertain. Therefore, three alternatives are examined for both the low-proportion and high-proportion scenarios. In the "no-value" alternative, consumers place no value on leaner pork. In the "low-value" alternative, consumers are willing to pay an additional 8.2 percent of the retail pork price for the leaner fresh pork products. This is derived from a market survey conducted by researchers at Indiana State University and North Carolina State University regarding consumers' willingness to pay for 10-percent leaner pork produced using a growth hormone. In the "low-value" alternative, willingness to pay for leaner pork is assumed to apply only to fresh pork, because processors can adjust the fat content of processed pork products without relying on changes in hog production.

In the "high-value" alternative, the willingness to pay for leaner pork is also assumed to be 8.2 percent over the retail price. However, under the high-value alternative, the price premium applies to both fresh and processed pork to reflect improvements in pork quality besides leanness which would affect processed products. Also, some processed products, such as reduced-fat bacon, do depend on the leanness of the hogs.

The change in the retail price of pork under each scenario depends on the proportion of hogs obtained by packers through long-term contracts and integration and the value placed on leaner pork by consumers.

- When 11 percent of hogs are obtained by contracting and integration in the low- proportion scenario, price changes range from a reduction of 0.39¢ per pound to an increase of 0.08¢ per pound, depending on how consumers value leaner pork (fig.1).
- If 29 percent of hogs are obtained through contracts and integration, as under the high- proportion scenario, prices change by a larger amount, ranging from a reduction of 1.01¢ per pound to an increase of 0.19¢ per pound.

The largest reductions in retail price in these two examples occur when consumers place no value on leaner pork (no-value scenario). In the low-proportion scenario, retail prices fall by 0.39¢ per pound, whereas in the high-proportion scenario retail prices drop by 1.01¢ per pound.

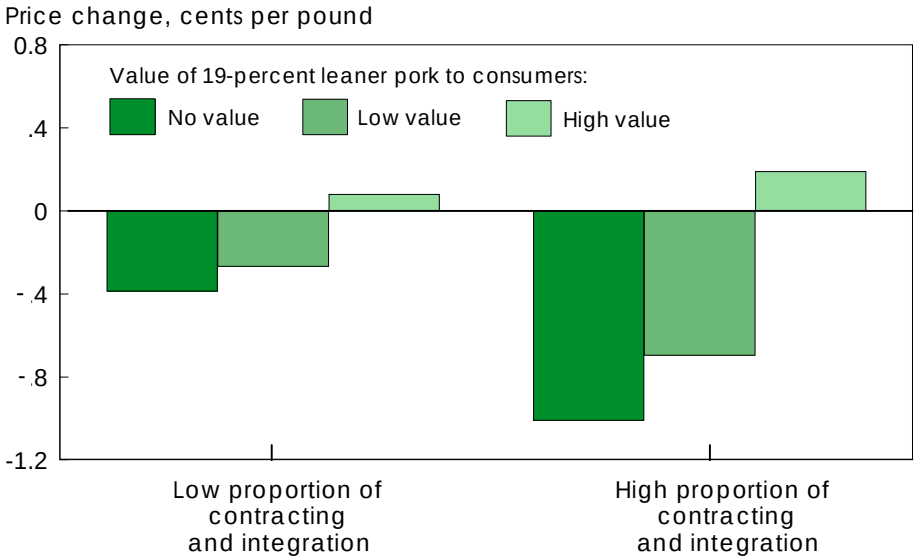
Under the low-value scenarios, where consumers value leaner fresh pork, the reduction in the retail price resulting from lower packer costs is partially offset by consumers' willingness to pay a higher price for leaner fresh pork. Prices still fall by 0.27¢ per pound (low proportion) and 0.7¢ per pound (high proportion) because of lower packer costs, but reductions are less than those in the no-value scenario.

In the high-value scenarios, where consumers value leaner fresh and processed pork, the retail price increases because consumers' willingness to pay a higher price for leaner pork more than offsets price reductions due to lower packer costs. Consumers demand more pork at the current price because it is leaner, so the price increases induce retailers to provide more pork. Without the higher price, consumers would not get the quantities of leaner pork that they demand. So, although the retail price is higher, consumers benefit because there is a larger quantity of higher quality pork. Without the reduction in packer costs, however, prices would increase even more.

These price changes may be underestimated, because other quality attributes besides leanness and possible lower costs resulting from greater plant utilization were not included. In addition, more accurate assessments of health benefits from consuming leaner pork may also lead to larger changes in the retail price. For example, new information that supports or confirms the health benefits of lower fat diets may cause consumers to pay more than the 8.2-percent price premium assumed in this analysis.

Consumers have a significant interest in changes occurring in vertical coordination in the hog industry because of its potential effects on food costs and quality. These changes are reflected in retail prices

Figure 1
Increased Coordination of Hog Production and Packing Affects Retail Prices



and quantities purchased. Consumers have clearly benefited two ways from increased vertical coordination in the pork industry—lower prices and higher quality pork.

Under the six scenarios, the potential "benefits" for consumers range from $60 million to $693 million over a 1-year period from the combined effects of lower costs of pork production and improved pork quality. These benefits are calculated based on an economic measure of consumer wellbeing. The measure of wellbeing represents the quantity of pork consumed multiplied by the difference between the higher price that consumers would be willing to pay for a product and the price actually paid.

Price and product quality are not the only factors affected by vertical coordination in the pork industry. Contracts and vertical integration, as methods of vertical coordination, tend to be used by larger operations. Fewer, larger firms generate both positive and negative issues. Issues include product safety, environmental impacts on neighboring communities spawned by livestock waste, and rural development issues generated by the facilities' size, location, and employment.

Policymakers play a role in the types of vertical coordination arrangements that develop, through antitrust legislation that can directly affect organizational structure, and through publicly supported research and market information services that play an important role in the effectiveness of open-market exchange. The challenge for policymakers is to facilitate coordination across stages of production in the most efficient way, while discouraging anticompetitive behavior that is harmful to consumers and other groups.

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U.S. Meat Slaughter Consolidating Rapidly

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In a remarkably short 15-year period, a few large firms have come to dominate U.S. meat slaughter. In 1977, the four largest beef packers accounted for 25 percent of the industry's output. By 1992, the four largest firms accounted for 71 percent of output. That shift is not only confined to beef. Over the same period, the four largest hog slaughtering firms increased their share of industry output from 36 to 54 percent.

Firms could dominate an industry by operating many small plants. But today, most slaughter is done in much larger plants than those operated in the 1960's and 1970's. According to the most recent 1992 Census Bureau data, large plants (those with more than 400 employees) accounted for nearly 90 percent of all hog slaughter and 72 percent of cattle slaughter. Large plants were far less prevalent 20 years earlier, accounting for a little more than half of hog slaughter and only a third of beef slaughter.

The same strong trend holds if we use different measurement bases. For example, plants that slaughtered more than half a million cattle a year handled only 12 percent of cattle slaughter in 1977 (the earliest year for which we have data), but 61 percent of all cattle slaughter in 1992. By any measurement basis, the industry has shifted dramatically toward reliance on large plants. The most recent U.S. Census Bureau data covers 1992, but related USDA data show that the trend to large plants has continued since 1992.

The major plants specialize in slaughter and fabrication into boxed beef and cut-up pork—operations that large plants can do at a lower per unit cost than smaller plants. While consolidation in the slaughter sector proceeded, suppliers of livestock also consolidated into a network of large cattle feedlots and hog farms that are able to lower costs through economies of scale and locational advantages.

Dramatic industrial changes often raise public policy conflicts. For example, animal producers frequently express concerns that growing concentration has led to less competition and lower prices for their animals. But if the industry remains competitive while moving to fewer but larger slaughterhouses, the concentration that results from scale economies can lead to lower consumer prices and improved choices, without affecting slaughter and animal prices. Consolidation can also have indirect social effects—large production facilities might lead to serious environmental problems, if environmental controls are not adequate to properly handle the new large volumes. Similarly, food and worker safety regulations will need to keep pace with major changes in plant sizes.

Such dramatic changes are newsworthy, and impose strains on public policy, because they occur so rarely in the U.S. economy. Very few industries undergo the large and rapid increases in concentration and large plant consolidation that we have seen in cattle and hog slaughter. This article focuses on explaining how and why the cattle and hog slaughter industry changed, and provides a context for assessing current public policy conflicts. We use data from USDA and from the U.S. Bureau of the Census (see box on data sources) to describe how the organization of products and production processes has changed from 1963 to 1992, particularly specialization, products, and the role of small plants.

Product Mixes Shifted Rapidly, Especially in Large Plants

Most cattle slaughter plants 25 years ago were "carcass" plants—many were still located near major

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stockyards or close to consumers. They sold whole or half carcasses to other meat processors or to retailers who then separated the carcasses into retail cuts of meat. Of course, the whole animal was used, then as now. Slaughter plants shipped large volumes of hides, blood, bonemeal, internal organs, and trimmings that were separated from carcasses during slaughter. These byproducts were used to make clothing, pharmaceuticals, sporting goods, animal feeds, and food products. But since the 1970's, slaughter plants have also moved into the further fabrication of carcasses, cutting them up into "boxed beef" and ground beef products (see box on today's cattle industry).

Hog slaughter plants performed several related functions 25 years ago. They slaughtered hogs, cut up the carcasses, and sold fresh pork in addition to processing the meat into bacon, hams, sausages, and other products. More recently, these processing functions have become separated. New large slaughter facilities now specialize mainly in hog slaughter and carcass cutting. Some traditional brand-name pork processors no longer slaughter hogs. Instead, they purchase cut-up carcasses from slaughter plants for processing into bacon, hams, and other brand-name products.

Boxed beef production, particularly in the large plants that now account for most cattle slaughter, has grown dramatically, from 7.9 percent of large plant output in 1963 to 21.3 percent in 1972 and 67.2 percent in 1992 (table 1). (In this article, output refers to the dollar value of shipments from slaughter plants.) Large plants in hog slaughter always performed more fabrication than cattle plants, but hog plants also shifted sharply to cut-up pork production during the 1980's and 1990's. Increased sales of boxed products mirrored declines in carcass sales. Carcasses accounted for less than 5 percent of output from large cattle and hog plants by 1992.

Boxed beef production is carried out primarily in large plants (table 1). Boxed beef accounted for more than two-thirds of the output in large plants, but less than 15 percent of output in plants with fewer than 400 employees, as smaller cattle slaughterhouses continued to ship whole carcasses and ground beef products. Larger fabrication lines have significantly lower average costs of producing boxed beef and cut-up pork. Economies of size in fabrication, therefore, may be a principal source of the shift to larger plants and a more concentrated slaughter industry.

Meat processors, wholesalers, and retailers purchase boxed beef and cut-up pork because slaughter plants can fabricate carcasses at lower costs per pound and can then ship specific meat cuts to areas of greatest demand. For example, USDA data track the farm to wholesale price spread for Choice beef (the difference between farm prices and wholesale meat prices, which reflects slaughter and fabrication costs as well as transportation). Between 1970 and 1982, a period of high inflation in the United States, the farm to wholesale price spread for Choice beef rose by 5.8 percent per year, while overall inflation was 7.2 percent per year. During the rapid consolidation of the slaughter industry after 1982, overall inflation was lower—3 percent per year through 1996. But the farm to

Data Sources

The primary source of data used in this article is the U.S. Census Bureau's Longitudinal Research Database (LRD). The LRD details the records of individual establishments reported in the Census of Manufactures. Since 1967, these economic censuses have been taken in every year ending in "2"or "7" (for example, the most recent was in 1992, and the next will cover data for 1997). The file also includes establishment records from a census taken in 1963.

The data provide detailed information on the mix of products, quantities and prices of material inputs, employment and average wages, and ownership and location for each establishment. Because the LRD contains data on individual plants over several census periods, researchers can make comparisons across plants at a point in time, and can also trace changes in product and input mixes, costs, and concentration over time. While researchers have access to individual establishment records for research purposes, they may not divulge information on any individual plant or firm, and may only publish aggregated information.

The concentration data reported in the article are based on LRD records, and have a different measurement basis than concentration data reported by USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA). GIPSA reports concentration information based on animal inputs—the share of all cattle or hogs slaughtered by the largest four firms. Our reported numbers are based on an LRD output measure—the four largest firms' share of the dollar value of shipments from all cattle or hog slaughter plants. The LRD measure for cattle slaughter in 1992 (71 percent) should be higher than the corresponding GIPSA measure (64 percent) because the largest plants slaughtered a higher proportion of higher valued cattle (steers and heifers), and because larger plants tended to add more value through boxed beef production. The two sources show the same sharp increase in cattle and hog slaughter concentration after 1977.

Table 1
Product Mix Has Shifted Toward Boxed Products, Especially in Large Plants

Industry and size of plant	1963	1972	1982	1992
	Percent of boxed and cut-up products in output			
Beef:				
0-24 employees	10.9	11.0	16.8	d
25-99 employees	7.7	11.4	15.8	19.1
100-399 employees	10.1	12.6	12.7	11.7
Over 399 employees	7.9	21.3	47.5	67.2
Pork:				
0-24 employees	33.4	27.5	d	d
25-99 employees	36.0	34.5	47.9	45.3
100-399 employees	37.7	50.4	63.9	67.2
Over 399 employees	43.1	46.0	50.8	71.8

Note: Entries labeled 'd' could not be disclosed because of confidentiality restrictions. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

wholesale price spread for Choice beef actually fell by about 0.5 percent per year, even as wages in slaughter plants rose along with increases in prices for packaging materials, equipment, transportation services, and other inputs that slaughter plants use. The increased efficiencies of the larger plants allowed total slaughter costs per pound to fall slightly between 1982 and 1996. If slaughter costs had not fallen, but had instead risen as rapidly as overall inflation, then consumer beef prices would be about 6 percent higher today.

Trimmings from fabrication lines in steer and heifer slaughter plants are often combined with leaner meat from imports and from cow slaughter plants to produce ground beef. Historically, slaughter plants shipped the trimmings to retailers, who processed the ground beef. Today, the ground beef market is an opportunity for large slaughter plants. The largest plants, which account for only one-quarter of total ground beef sales, are adding grinding operations and attempting to expand in that market. Ground beef accounted for 9 percent of large slaughter plant output in 1992, up from 3 percent 30 years earlier. But small slaughterhouses and specialty processors still handle the most ground beef, and the product is increasingly important for small plants. By 1992, ground beef production accounted for 22 percent of small plant output, up from 6 percent in the 1960's.

Many processed pork products (bacon, hams, sausage, and cold cuts) are sold under well-known brand names. When large slaughter firms, such as IBP, began to build hog slaughter plants, they focused on slaughter and carcass cutting. Since they avoided the development of brand names needed to sell processed products, they sold their cut-up pork to producers of brand products, such as Oscar Mayer, who had left slaughter to specialize in processing. This current separation may not be permanent, as some large slaughter firms are now exploring moves into further processing of pork.

Slaughter Plants Now Specialize in Single-Species Operations

In 1963, the largest cattle slaughter plants also slaughtered other animals—primarily hogs. In that year, cattle accounted for only a little more than half of all dollars spent on animal purchases at the large plants. But by 1982, cattle accounted for 92 percent, and 100 percent by 1992. Moreover, that shift does not account for shifts within species. The largest cattle slaughter plants today do steers and heifers only, while cow slaughter is done in smaller plants.

Large hog slaughter plants were more specialized than cattle plants in the 1960's, but they also often slaughtered other animals. Today, those large plants specialize almost exclusively in hogs, and often specialize in hogs of a particular shape and size. Large hog farms produce enormous weekly flows of hogs with standard sizes, shapes, and meat characteristics for slaughter facilities nearby. Large farms and slaughter plants are frequently linked through common ownership or long-term contractual relation-

ships (see "Changing Pork Business Affects Pork Prices and Quality," elsewhere in this issue).

Modern large plants handle large volumes of production quickly—often up to 350 cattle an hour, while modern hog plants can handle 1,000 hogs an hour. In order to achieve those speeds, slaughter and fabrication lines are designed to operate on quite specific animal species and shapes. Lines would have to be reconfigured to handle different species or differently sized animals in a species. Reconfiguration adds costs and slows production speeds. As a result, specialized plants are the least-cost way to produce large volumes of popular meat cuts.

Some small plants maintain market niches by slaughtering a variety of different species and different animal types within a species, thereby meeting special or local demands. Typical small plants slaughtering cattle still apply 15-20 percent of their animal purchase dollars to other species.

Concentration Seen in Industry Turnover

In many industries, such sharp changes in specialization, concentration, or industrialization would be brought about as new plants replaced old ones. The new processes would be embodied in new plants, rather than introduced into redesigned older plants. On the surface, this pattern appears to have occurred in cattle and hog slaughter, too, as many new plants have opened and many old ones have closed (table 2). But that surface appearance is not entirely true—many important changes in product mix, plant size, and specialization have been brought about within existing redesigned plants.

After 1977, large plants came to dominate production, and concentration increased sharply. (Table 2 combines hog and cattle slaughter in order to preserve confidentiality, but the message would not change if the data were disaggregated.) Economic censuses are taken every 5 years, and the data show that a large fraction of the industry's plants exited during each 5-year period between censuses. For example, more then half of the plants in the industry in 1977 exited by 1982. Most closed, although a few facilities were

Table 2
Frequent Entry and Exit by Slaughter Plants

Item and type of plant	1977-82	1982-87	1987-92
		Percent	
Share of all plants:			
Entering plants	9.3	20.6	15.7
Exiting plants	51.3	39.9	36.6
Acquired plants	13.1	10.5	18.2
Share of industry output:			
Entering plants	5.4	12.3	6.0
Acquired plants	33.1	22.7	31.0
		Number	
Number of plants:			
Start of period	1,002	716	479
End of period	716	479	397

Note: Hog and cattle slaughter categories are combined in order to preserve confidentiality. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

Table 3
But New Plants Do Not Survive for Long

Size of plant and year of entry	Percent of entry plants surviving 5 years	10 years	15 years
		Percent	
0-24 employees:			
1967	36.2	11.6	10.1
1972	15.4	12.8	10.3
1977	9.1	7.3	d
1982	d	d	NA
1987	13.5	NA	NA
Over 24 employees:			
1967	33.3	17.4	10.1
1972	53.8	21.8	12.8
1977	18.2	9.1	7.2
1982	34.3	18.7	NA
1987	24.3	NA	NA

Notes: NA = Not applicable. Entries labelled 'd' could not be disclosed because of confidentiality restrictions. Year of entry refers to year of first appearance in the census. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

The Cattle Industry Today

Over the last 25 years, a closely connected network of large cattle feedlots, high-volume slaughter plants, and efficient transportation links has been developed for the cattle industry. By 1992, 13 large slaughter plants, owned by four different firms, accounted for more than half of all steer and heifer slaughter in the United States (the leading firms also operate a dozen smaller plants in dispersed locations). The plants have similar design and operations. Each is designed to slaughter 4,000 to 5,000 cattle a day, in two 8-hour shifts. The day after slaughter, chilled carcasses are moved to "fabrication" lines to be cut into wholesale and retail cuts of meat, and then vacuum-packed. The wrapped cuts are packed in boxes of 40 to 60 pounds, and the boxed beef is then shipped in 20-ton containers to wholesalers, processors, and retailers across the United States.

Increasing volumes of boxed beef are exported, usually to Asia. The beef bound for Asian markets is usually shipped by truck or rail from the plants to west coast ports for shipment.

Each large plant provides employment for between 1,500 and 2,500 workers, who receive compensation, including fringe benefits, averaging $12 to $15 an hour. Most of the workers perform repetitive routine tasks in either the slaughter or the fabrication department. Typically, the plants assign 2 hours of labor to fabrication lines for every hour on slaughter lines. The largest plants are located in a limited geographic area—Nebraska, Kansas, eastern Colorado, and the Texas Panhandle. They were built there in order to operate among the network of large cattle feedlots that purchase feeder cattle and feed from around the country and then supply the plants with a steady flow of high-quality grain-fed steers and heifers.

In the 1960's and early 1970's, many small cattle feedlots were located in the Corn Belt and west coast as well as in the Great Plains. Since then, feedlots have concentrated along with the slaughter industry. Today, there are a little over 200 large feedlots (those selling more than 16,000 head of cattle a year) that together sell over 13 million steers and heifers—or more than half of the total slaughter. Two decades earlier, large feedlots sold just over 5 million head—less than a quarter of the total. Most of the gain in large feedlot marketings has come at the expense of small seasonal feedlots (less than 1,000 head sold in a year). The number of these feedlots has shrunk rapidly in the last two decades, as farms that had mixed seasonal feedlot operations with crop production and sales have since shifted to specialize in grain grown for cash sale rather than for feeding.

Most large feedlots are located in the Great Plains. The arid conditions lead to less snow and mud than in the Corn Belt. Bad weather can limit cattle feeding efficiency by diverting the effects of feeding to body maintenance and by increasing the energy needed to move around the feedlot. Animals are also more likely to injure themselves in bad weather. Effective truck transportation allows for long distance movements of grain and feeder cattle into the region and meat products out, while the more difficult and costly transport of fed cattle from feedlot to slaughter goes in short moves within the region.

adapted to produce other products. Forty percent of the plants surveyed in 1982 closed by 1987, and more than a third of the plants surveyed in 1987 closed by 1992.

But many new slaughter plants started operations, even in the face of huge numbers of exits. For example, over 20 percent of the plants in operation in 1987 were not in the industry in 1982, while 15.7 percent of the industry's 1992 plants were new since 1987. These two bits of evidence, high and simultaneous rates of entry and of exit, are typical of modern manufacturing industries—similar patterns have been found in Canadian, Japanese, and Western European economies. Moreover, the much higher rates of exit relative to entry match the changes in concentration. Much of the change was brought about as a few new large plants replaced many older and smaller plants.

But that evidence captures only part of the story. Most of the entries and exits were among small plants. The shares of industry output accounted for by new entrants and by exiting plants is quite small. For example, new entrants accounted for only 6 percent of industry output in 1992, even though they accounted for 15.7 percent of all plants. In each census period, "new entry" includes a few of the large plants that now dominate slaughter, but it also includes many small plants, which appear to face distinct disadvantages in an industry that is consolidating rapidly.

New small entrants rarely last long (table 3). (Table 3 orders new plants according to the year in which they first appeared in Census data. It also divides them into two size classes—very small plants with 24 employees or fewer, which constitutes about a seventh of all plants, and all others. Confidentiality concerns preclude a finer size breakdown.) Most new slaughter plants

do not last 5 years. Only about 10 percent of the very small firms and 20 percent of all others last 10 years. Although the table does not separately display them, large new plants (often with 1,000 to 2,500 employees) do last for long periods. Rapid exit occurs among the many small plants that enter the industry. These results suggest that many of the exiting plants in table 2 were small plants that only recently entered the industry, and then closed.

Entry and exit are not the only vehicles for turnover in industry. Ownership change, through the sale of existing plants to new owners, is also important, particularly among large plants in cattle and hog slaughter (table 2). For example, plants that changed owners between 1987 and 1992 accounted for a third of combined output from cattle and hog slaughter plants in 1992. Similarly, plants that changed owners between 1977 and 1982 accounted for a third of 1982 cattle and hog slaughter output, and plants responsible for over a fifth of 1987 output changed owners between 1982 and 1987. Ownership changes were frequently followed by major changes in plant operations—through investment and expansion, changes in product mix, or both.

How Do Smaller Plants Survive?

Not many of them do. The number of small plants and their share of the market has declined precipitously. In 1972, 573 cattle slaughter plants had fewer than 100 employees, and they accounted for 23 percent of industry output. In 1992, 124 firms were in that size class, and they accounted for 5 percent of industry output. Smaller slaughter plants, new and reopened, frequently attempt to enter the business, but rarely survive for long.

Those small plants that do survive do not attempt to mimic large plants. While large plants are easy to characterize in terms of a small number of processes and outputs, small plants cover a bewilderingly wide variety of products and processes (many quite different from slaughtering livestock and processing meat). They produce a different mix of meat products, such as carcasses and sometimes ground beef. Many avoid the large plants' reliance on standardized animals; they will instead slaughter a variety of species for local demands, or they may specialize in slaughtering cows or unusual cattle types. Successful small plants often cultivate a particular clientele. Some may aim to provide particularly high-quality beef to the local and regional restaurant trade, while others may provide slaughtering and processing services to a network of producers and consumers of specialized products, such as organically produced meat. Others may combine purchased trimmings with their own cow slaughter to provide fresh ground beef products for nearby clients.

New Law Paves Way for Expanding Organic Market

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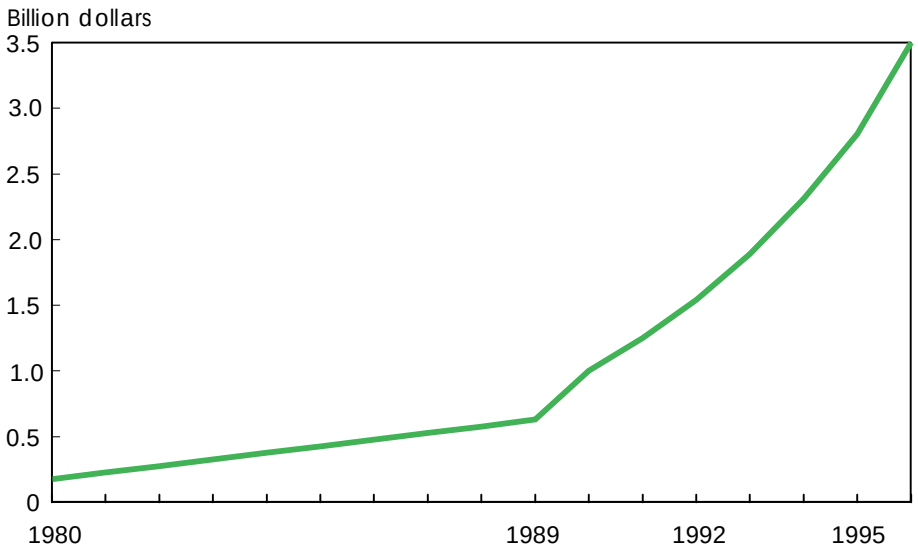
The demand for organic foods, though small, has grown tremendously in recent years. Total retail organic food sales rose from $178 million in 1980 to $1 billion in 1990 and reached $3.5 billion by 1996. A greater number and variety of retail outlets are offering organic foods, and interest in producing organic products is also on the rise. Continued industry growth may be hampered, however, without agreement among organic producers, processors, and certifiers on how to define and implement organic standards.

The Organic Foods Production Act (OFPA), passed by Congress in 1990, and the regulations to implement the Act are intended to establish national standards for organic foods and a system of mandatory certification and Federal oversight to ensure truth in labeling of organic products (see box on a national definition of organic as outlined in the OFPA). Regulations will be proposed in the near future. A final rule will be published after a period of public review and comment, and implementation of the rule will follow.

Implementation of OFPA will create the conditions for a well-functioning market in organic food. Consumers will benefit from greater confidence in the organic label, a wider selection of organic products, and the potential for lower prices as markets expand and become more efficient. Producers will benefit from increased assurance in the quality of certification, protection from fraudulently labeled products, access to international markets, the ability to market organic meat and poultry as organic, and the economies of scale and production efficiencies that may accompany market expansion.

Organic foods are distinguished from conventionally produced foods, not by features that are detectible in the product itself, but rather by production and processing principles developed originally in Europe in the late 19th and early 20th century, and later in the United States. These principles stress production and processing without the use of synthetic chemicals, and soil fertility management using techniques that enhance biological activity in the soil such as composting, green manuring, and rotating crops.

Figure 1
Organic Sales Take Off in the 1990's



Source: Monica Emerich. "Industry Growth: 22.6%," *Natural Foods Merchandiser*, June 1996, pp.1-39.

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If a product has a characteristic that consumers value, then in general market forces will establish a price for it and producers will supply it. Organic can be thought of as such a product characteristic. But organic and conventionally produced products look the same. Market forces cannot signal producers to supply organic products without some other means, such as labeling, for consumers to distinguish these products. Without a common definition for organic and without enforcement of truth in labeling, the integrity of an organic label cannot be ensured and the market for organic products cannot operate efficiently. When conventionally produced products are mislabeled organic, both the producers and the consumers of organic products pay a cost. Consumers lose by not getting what they pay for, and organic producers lose when sales of their genuine products have to compete with mislabeled products in the market.

A National Definition for Organic Food

The OFPA provides some clear guidance on the necessary components of organic standards. The law:

- Requires producers and handlers to develop an organic plan of management, approved by the certifier, that contains provisions for soil fertility management through proper tillage, crop rotation, and manuring.
- Prohibits, with some exceptions, use of synthetic chemicals in production and handling.
- Prohibits use of naturally occurring toxic materials such as arsenic or lead salts that have long-term effects and persist in the environment, plastic mulches (unless removed at the end of each growing or harvest season), and transplants treated with synthetic or prohibited substances.
- Requires a period of 3 years during which prohibited synthetic materials cannot be used before a crop can be certified as organic. A 1-year transition period is required for dairy animals. Certified organic poultry must be raised organic from 1 day after hatching.
- Provides for requiring defined boundaries and buffer zones separating land in organic production from other cultivated land, and physical separation of organic and nonorganic products in processing and handling facilities.
- Requires livestock to be fed organically produced feed.
- Prohibits use of plastic pellets for roughage, manure refeeding, feed formulas containing urea, growth promoters, hormones, subtherapeutic doses of antibiotics, synthetic internal paraciticides on a routine basis, or medication other than vaccinations in the absence of illness.
- Limits nonorganic ingredients to no more than 5 percent of the weight of the total finished processed product bearing an organic label.
- Prohibits use of packing or storage materials containing synthetic fungicides, preservatives, or fumigants.

Lack of Consistent Standards Limits Growth

The organic industry organized itself to provide protection for producers and consumers against mislabeled organic products through organic certification. Organic certification is currently voluntary in most States. According to the most complete data available to USDA's Agricultural Marketing Service (AMS), 33 private and 11 State agencies certify approximately 3,900 farms and 480 handlers in the United States. The 11 States that run their own certifying agencies are Colorado, Idaho, Kentucky, Louisiana, Maryland, New Hampshire, New Mexico, Oklahoma, Rhode Island, Texas, and Washington. In California, organic producers are required to register their farms as organic with the State, but private agencies conduct certifications. Still, not all producers and handlers choose to have their operations certified and many organically labeled fresh and processed products do not carry a certifier's seal.

Over half of the 44 agencies certify both farms and handlers, while the others certify only farms. Most certifying agencies are small, measured in terms of both the number of farms and handlers they certify and the total amount of certification fees they collect (table 1). Over three-fourths of the agencies certify fewer than 150 farms and 20 handlers each, and over half collect less than $25,000 in certification fees annually.

Each certifying agency determines its own definition of organic and certifies organic products according to its own rules. This system may be impeding growth in the production and sale of organic foods. While there is general agreement within the industry on the principles of organic production, without a uniform standard and consistent over-

Table 1
Most Certifying Agencies Certify Fewer Than 50 Farms as Organic

Size of certifying agencies	State agencies	Private agencies
	Percent of certifying agencies	
Number of handlers certified:		
No handlers	45	50
Fewer than 20	36	34
20 or more	18	16
Number of producers certified:		
Fewer than 50	45	66
50-150	37	19
More than 150	18	16
Certification fees collected:		
Fewer than $25,000	NA	55
$25,000-$200,000	NA	0
More than $200,000	NA	45

Note: NA = Not available. Source: Tabulated from USDA's Agricultural Marketing Service data.

sight organic means different things in different parts of the country. There is no one source that consumers can go to for complete information about what constitutes organic. The high cost of obtaining this information, in terms of time and effort, may be keeping some consumers, retailers, and processors out of the market. In addition, recognition and acceptance of certification standards have been a matter of dispute in some cases among certifiers in the United States. These disputes can restrict interstate and international trade in organic products, and disrupt production of organic foods. Convincing certifiers to accept each other's standards can be a costly and time-consuming process. In the case of processed organic foods, production schedules can be interrupted and product losses can result when an end-product certifier refuses to accept another certifier's seal on product ingredients.

Further growth in markets for organic food products is also limited by current labeling restrictions. USDA prohibits the sale of meat and poultry labeled organic because the term is undefined. This meat and poultry product exclusion prevents the development of markets for these products and restricts the development of new organic processed foods such as nonvegetarian soups and entrees.

International Trade Hindered Without Consistent Standards

Among the areas for potential expansion in the U.S. organic industry, international trade is perhaps the most significant. The European Union (EU), for example, where the principles of organic production originated, is the largest market for organic food outside the United States—valued at approximately $1.7 billion in 1990. Organic food sales grew by 25 percent per year in the early 1990's in France and Germany—the two largest EU member states in terms of organic sales. In 1994, these two countries alone had organic retail food sales of approximately $2 billion, equal in size to the entire U.S. organic food market.

In 1991, the EU adopted standards defining organic produce and a system to enforce standards for the EU member states. Many EU countries also operate under their own nationally mandated standards of production and inspection for both crops and livestock. The EU is expected to adopt livestock standards in the future. Under the EU rules, imports from non-EU countries are allowed to enter the EU only when the non-EU country's national standards have been determined to be equivalent to the EU standards.

The EU has opted to withhold blanket approval for importation of certified organic products from the United States until national U.S. organic standards are in place. Thus, currently U.S. organic producers and handlers can access European markets only by obtaining specific product permissions granted to individual importers by organic regulatory authorities in an EU member state, or by using a certifier accredited by EU-recognized authorities. Obtaining EU permissions is a time-consuming and expensive process, requiring the importer to satisfy the authorities through documentation and possible site inspection that the product in question has been certified under standards equivalent to EU standards. As of early 1995, 110 import authorizations (24 percent of all the authorizations issued by EU member states) had been granted for U.S. products.

OFPA Implementation Removes Barriers to Market Expansion

Regulations implementing the OFPA will create market conditions under which the problems discussed above can be overcome. Once the final rule is published, it will establish a uniform, national definition of organic products, including live-

stock products. National standards will facilitate the opening of export markets in Europe and elsewhere, and facilitate trade between individual certifiers, thereby lowering their costs of operation. Further, the new regulations are expected to impose little additional cost on the producers of certified organic products. Certified organic producers and handlers are currently following the standards imposed by their certifiers and paying fees for certification.

Consumers of Organic Food Will Benefit

Common requirements for and accreditation of U.S. certifying agencies will create a basis for consumer confidence in the organic label. The national organic standards enforced by accredited certifiers will correct an information gap and provide buyers and sellers with consistent terminology so that the market for organic products can operate more efficiently. The uniform national standard proposed in OFPA will reduce confusion over the meaning of organic and raise confidence in the organic label by providing additional assurance of the authenticity of organic claims. The standard will allow the U.S. Food and Drug Administration, which regulates most food labeling, and the USDA, which has responsibility for meat and poultry labeling, to recognize the definition of organic as a common and usual term with a specific meaning. The OFPA regulations will allow enforcement of the standard by various government agencies for all products labeled organic, including the requirement that imported organic foods meet equivalent standards.

Consumers will also benefit from OFPA implementation through the availability of greater amounts and varieties of organic foods and through the potential for lower retail prices. Implementation of OFPA may help overcome the reluctance of many conventional foodstores, evident from industry sales data and wholesaler surveys, to carry organic products. For example, following the Alar scare in 1989, many conventional stores hurried to stock organic produce. They just as quickly turned away from these products the following year, frustrated over the shortage of reliable supplies of high-quality organic produce. Improved marketing and handling resulting in more consistent supplies already appear to be encouraging conventional foodstores to re-enter the organic market, according to industry reports.

The appearance of organic foods in conventional foodstores will likely improve sales, as the unavailability of organic food products in these stores has been shown to be a major reason that more consumers do not buy organic food—at times more important than price. In other words, consumers are less likely to buy organic products when they have to make a special trip to another store, such as a natural foodstore or health foodstore, to find the products. Thus, consumers stand to benefit from the greater supplies of organic products in a wider selection of stores. Consumers will also benefit as more competition between conventional supermarkets and natural foodstores creates the potential for lower prices for organic foods.

Organic Producers Will Benefit From Expanding Markets

We have argued that the lack of a nationally recognized definition of organic poses a barrier to marketing organic food products in the United States and abroad. At the same time, producers who have successfully made the transition from conventional to organic production practices in the United States and elsewhere have demonstrated that production problems, such as tackling pest and nutrient management problems without the use of synthetic chemicals, can be overcome. Thus, in the absence of barriers to increasing production, removing barriers to marketing organic products by adopting a national standard could sharply increase growth in the organic industry instead of simply enabling the current growth trend to continue. This may be true particularly for increasing exports and for sales of organic meat and poultry where no national market currently exists.

Industry data reported in the *Natural Foods Merchandiser* on meat sales in natural foodstores provide one indicator of the potential size of the organic meat market. At $32 million in 1995, these sales represent less than 1 percent of current meat consumption. Another measure is 1994 AMS data showing that two States—New Mexico and Washington—and about a dozen private agencies certified the organic production of 3,300 beef cattle and 110,500 chickens and turkeys. Other States, Maryland and Texas for example, have moved in the direction of establishing organic livestock certification programs, also indicating a growing level of interest in this market segment.

Implementation of OFPA will help open up international markets to U.S. organic producers. The demand for U.S. organic products abroad may be substantial and may offer price premiums for organic producers. Austria, for example, expects its organic market to equal one-third of all food sales by the year 2000. Japan and EU countries report price premiums of 10 to 30 percent for organic milk and fresh produce.

According to industry sources, U.S. exports of organic products totaled $203 million in 1994 (9 percent of total U.S. organic output), the last year for which data are

available. This figure represents a near doubling over 1993 levels, possibly as a result of import authorizations granted by EU member states for some U.S. products. Despite restricted access to the European market, the United States is still the most important non-EU supplier of organic products to EU countries. Larger growth is anticipated upon recognition of U.S. equivalency by the EU and the removal of trade restrictions on organic products.

If national standards contribute to increased domestic demand and help to open international markets to U.S. organic products, they would provide opportunities for current producers to expand the scale of their operations as well as incentives for more producers to enter the market. Greater organic production would also provide an incentive for input industries to develop new technologies which would lower costs for organic producers. Input industries producing for the organic market could achieve economies of scale which could also reduce input costs.

Along with industry growth we can expect the demand for better information about the production and marketing of organic products to also increase. Currently, the retail food industry does not keep separate data on organic and conventional processed food product sales, making it very difficult to track organic food sales, especially in conventional foodstores. Instead, organic products are lumped together with conventional products of the same type, such as frozen vegetables or baked goods. For example, grocery scanner data often do not include information on whether a product is organic in the item descriptions. With nationally recognized, uniform organic labeling, processed organic products will acquire commercial, standardized item descriptions similar to those used by the food industry to identify conventional products. These descriptions will make sales information more accurate and accessible and improve the efficiency of marketing organic products.

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Nutritional Quality of Foods At and Away From Home

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Americans are eating out more than ever as their incomes rise, time for cooking becomes scarce, and dining out becomes more affordable. These factors that have favored dining out are expected to continue boosting consumer demand for food away from home.

Although Americans have become increasingly conscientious about nutrition, they seem to be less attentive to the importance of nutrition when they eat out. One reason may be that information on the nutritional content of foods away from home is not readily apparent or available to consumers. Another reason may be that consumers could pay more attention to taste, price, or entertainment value than nutrition when eating out.

The nonprofit consumer advocacy group, Center for Science in the Public Interest, has called attention to the high fat, saturated fat, and sodium contents of many menu items in popular restaurants, fast-food establishments, and movie theaters. But their study captures only part of a wide range of food choices facing consumers when they eat out.

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This study analyzes data from the USDA's 1995 Continuing Survey of Food Intakes by Individuals (CSFII). The results show that away-from-home foods are generally higher in fat, saturated fat, cholesterol, and sodium, and lower in fiber and calcium than home foods. Consequently, the increasing popularity in dining out may be a barrier for Americans to improve the nutritional quality of their diets.

A major advantage of the CSFII survey is that the data represent what Americans typically eat, at or away from home. The CSFII collects information on what, when, where, and how much Americans eat. USDA's Agricultural Research Service (ARS) maintains a nutrient database, which is used to calculate the amount of nutrients in each food eaten. This article analyzes the 2-day individual intakes for Americans age 2 years and older. The 1995 CSFII represents 63 million children (age 2-17) and 191 million adults (age 18 and older) in the United States.

Away-from-home and home foods are defined here according to where the foods are obtained, not where they are eaten. Food at home consists of foods purchased at retail stores, such as the grocery store or supermarket. Food away from home consists of foods obtained from foodservice and entertainment establishments. Away-from-home foods are classified into four groups: "restaurants," or places with waiter service; "fast food," those self-service and carry-out eating places and cafeterias; "schools," including day-care centers and summer camps; and "others," which include vending machines, community feeding programs, and someone else's home (for adults, eating occasions at school are included in the "others" category). Meals and snacks consisting of a combination of away-from-home and home foods are classified according to the component that contributes the most calories to that particular eating occasion.

Americans Favor Fast Food When Eating Out

During 1995, Americans ate an average of 2.7 meals and 1.6 snacks each day (table 1). The number of meals eaten by Americans exhibits a U-shape pattern (drops and then increases) with respect to age, declining from 2.9 meals a day among preschoolers (age 2-5) to 2.5 meals among adolescent females, and then rising to 2.7 meals among adults age 40 and older. Preschoolers also snacked most frequently, averaging 2.1 snacks a day. Seniors age 60 and older snacked least frequently with 1.4 snacks consumed by senior males and 1.2 snacks by senior females.

Table 1
Americans Favor Fast Foods When Eating Out

Item	All, from ages 2+	2-5	6-11	Age 12-17 Male	Female	Age 18-39 Male	Female	Age 40-59 Male	Female	Age 60+ Male	Female
					Number						
Meals per day	2.7	2.9	2.8	2.7	2.5	2.6	2.6	2.7	2.7	2.7	2.7
Snacks per day	1.6	2.1	1.6	1.6	1.7	1.5	1.5	1.6	1.5	1.4	1.2
					Percent						
Meals:											
At home	71	77	68	66	70	61	68	70	75	82	84
Away-from-home	29	23	32	34	30	39	32	30	25	18	16
Fast food[1]	43	40	27	40	32	54	49	44	44	34	31
Schools[1]	9	24	42	33	32	NA	NA	NA	NA	NA	NA
Restaurants[1]	26	9	9	9	15	26	30	36	30	40	37
Others[1]	23	28	21	18	21	20	22	20	26	26	32
Snacks:											
At home	78	80	78	79	77	70	72	75	83	87	86
Away from home	22	20	22	21	23	30	28	25	17	13	14
Fast food[1]	25	15	18	20	28	33	26	29	27	21	17
Schools[1]	4	31	14	10	3	NA	NA	NA	NA	NA	NA
Restaurants[1]	8	4	3	2	0	9	11	8	10	11	11
Others[1]	63	50	66	68	68	59	63	63	63	68	72
Calorie distribution:											
Home	66	76	67	63	69	55	63	68	71	78	80
Away om home	34	24	33	37	31	45	37	32	29	22	20
Fast food[2]	14	8	9	13	12	23	15	13	11	7	5
Schools[2]	2	7	11	8	6	NA	NA	NA	NA	NA	NA
Restaurants[2]	8	2	3	5	5	10	11	11	9	9	7
Others[2]	9	8	9	10	9	11	11	8	8	7	8

Note: NA = Not applicable. [1]Percent of away-from-home meals or snacks. [2]Percent of total calories. Source: Compiled by USDA's Economic Research Service from the 1995 CSFII, individuals providing 2 days of intake.

On average, Americans ate out more than once for every four meals (29 percent) and more than once for every five snacks (22 percent) during 1995. Adult males age 18-39 consumed the largest share of their meals and snacks away from home. Seniors ate the fewest share of their meals and snacks away from home.

Fast foods were by far the most common source of meals away from home, accounting for 43 percent of all meals away from home (table 1). However, its relative importance varied, depending on the age group. Fast-food places were particularly popular among adults age 18-39, accounting for more than half of all away-from-home meals. Schools provided 42 percent of the away-from-home meals for children (age 6-11), but adolescents (age 12-17) consumed more meals from fast-food places than from schools.

As Americans get older, they more often eat at restaurants when dining out. Restaurants accounted for 10 percent of away-from-home meals among children, but captured more than one-third of those meals among seniors.

Although fast-food establishments provided one-quarter of all snacks away from home, "others" (which include snacks given as gifts or eaten at someone else's home) were the most popular source of away-from-home snacks, accounting for 63 percent of away-from-home snacks. Daycare centers provided about one in every three away-from-home snacks (31 percent) eaten by preschoolers. Fast-food establishments increase in popularity as a source of away-from-home snacks as children age, accounting for 18 percent of away-from-home snacks eaten by children age 6-11, 20 percent for adolescent males, and 28 percent for

adolescent females. As adults age, fast-food places become the less popular source of away-from-home snacks, and "others" are the most popular source of away-from-home snacks.

Overall, 27 percent of meals and snacks (eating occasions) were away from home, and they provided 34 percent of total calories (table 1). This suggests that people either eat larger amounts when they eat out or they eat higher calorie foods—or both. Fast-food outlets accounted for 10 percent of all eating occasions, and provided 14 percent of total dietary calories and 41 percent of the away-from-home calories. Restaurants followed with 5 percent of all eating occasions, 8 percent of total calories, and 24 percent of away-from-home calories.

The away-from-home share of total calories initially increases with age. Preschoolers obtained 24 percent of their total calories away from home, while adult males age 18-39 obtained 45 percent of their calories away from home—the highest among Americans. As adults get older, however, they eat at home more often and obtain a smaller share of calories away from home. For example, senior females obtained only 20 percent of their calories away from home and senior males obtained 22 percent.

Children age 6-11 obtained more of their away-from-home calories from schools than from fast-food outlets, restaurants, or other places, whereas adolescents obtained more of their away-from-home calories from fast-food places than schools (table 1). Fast foods provided 15 to 23 percent of total calories consumed by adults age 18-39—the highest among Americans. Fast-food places provided adults age 40-59 with 12 percent of total calories, more than the 10 percent provided by restaurants. But restaurants provided 8 percent of calories for seniors—a greater portion than fast-food places.

Higher Fat and Cholesterol in Away-From-Home Foods

Because the amounts and types of foods consumed tend to differ depending on the source of food (home, fast food, and restaurant), we control for these differences by comparing nutrient densities—the amount of nutrients provided on the basis of 1,000 calories.

Compared with home foods, away-from-home foods had, on average, higher fat, saturated fat, and cholesterol densities (table 2). Home foods provided average fat and saturated fat densities of 34.7 grams and 12.0 grams per 1,000 calories, respectively, compared with 41.8 grams and 14.3 grams per 1,000 calories for away-from-home foods. The higher fat and saturated fat densities for away-from-home foods occur for all age groups and both genders (tables 3 and 4).

On average, restaurant foods had higher fat and lower saturated fat densities than fast foods, although fast foods consumed by children had a slightly higher fat density than restaurant foods consumed by children (tables 2 and 3). School meals and school snacks eaten by children had the highest saturated fat density of all, higher than the saturated fat density of fast foods consumed by children and adults. In June 1994, USDA put forth the School Meals Initiative for Healthy

Table 2
Americans' Diets High in Fat, Saturated Fat, and Sodium, and Low in Fiber and Calcium

Food outlets for Americans	– – Nutrient-to-calorie density[1] – – Total fat	Saturated fat	Cholesterol	Sodium	Fiber	Calcium
	grams	*grams*	*mg*	*mg*	*grams*	*mg*
Age 2 and above:						
Home foods	34.7	12.0	127	1,651	8.2	422
Away-from-home foods[2]	41.8	14.3	136	1,703	6.1	352
Fast food	42.7	14.8	123	1,722	5.6	362
Schools[3]	39.7	15.7	105	1,595	7.2	672
Restaurants	44.6	14.0	182	1,927	6.8	299
Others[3]	38.6	13.3	120	1,496	6.2	314
All foods[4]	37.2	12.7	130	1,669	7.5	398
Benchmark nutrient density	33.3	11.1	150	1,199	10.5	441

Notes: [1]Densities are measured per 1,000 calories. [2]Away from home presents the aggregate of fast foods, restaurants, schools, and others. [3]Schools are classified as a separate category for children and are combined into "others" for adults. [4]Nutrient densities for all foods are weighted averages of densities of home foods and away from home foods. Source: Compiled by USDA's Economic Research Service from the 1995 CSFII, individuals providing 2 days of intake.

Table 3
Too Much Fat, Saturated Fat, and Sodium, and Insufficient Fiber and Calcium in Children's Diets

Food outlets for Americans	– – Nutrient-to-calorie density[1] – – Total fat	Saturated fat	Choles-terol	Sodium	Fiber	Calcium
	grams	*grams*	*mg*	*mg*	*grams*	*mg*
Children age 2-17:						
Home foods	34.5	12.5	118	1,590	6.9	473
Away-from-home foods[2]	39.2	14.3	107	1,569	6.1	432
Fast food	41.7	14.8	101	1,602	5.5	358
Schools[3]	39.7	15.7	105	1,595	7.2	672
Restaurants	41.4	14.3	135	1,714	6.3	355
Others[3]	35.2	12.4	103	1,451	5.7	317
All foods[4]	36.0	13.0	114	1,583	6.6	460
Benchmark nutrient density	33.3	11.1	157	1,255	7.5	509
Children age 2-5:						
Home foods	34.9	13.2	124	1,527	7.1	547
Away-from-home foods[2]	39.2	14.4	112	1,566	6.6	447
Fast food	42.4	14.6	103	1,543	5.5	307
Schools[3]	36.7	14.4	119	1,584	7.8	678
Restaurants	44.7	16.5	152	1,799	7.0	419
Others[3]	36.9	13.5	106	1,515	6.5	383
All foods[4]	36.0	13.5	121	1,536	7.0	522
Benchmark nutrient density	33.3	11.1	200	1,602	5.7	534
Children age 6-11:						
Home foods	34.2	12.3	117	1,570	7.1	462
Away-from-home foods[2]	39.1	14.5	106	1,589	6.3	478
Fast food	41.7	14.8	103	1,640	5.7	356
Schools[3]	39.4	16.0	106	1,588	7.5	741
Restaurants	38.8	13.4	142	1,541	5.2	349
Others[3]	36.4	12.9	97	1,558	5.9	334
All foods[4]	35.8	13.0	114	1,576	6.8	467
Benchmark nutrient density	33.3	11.1	158	1,262	7.1	457
Adolescent males age 12-17:						
Home foods	35.3	12.5	108	1,675	6.3	465
Away-from-home foods[2]	39.5	14.3	111	1,574	5.7	397
Fast food	41.2	14.6	103	1,657	5.1	370
Schools[3]	41.4	15.9	96	1,601	6.6	610
Restaurants	44.3	15.3	127	1,764	7.3	340
Others[3]	33.7	12.2	124	1,358	5.1	287
All foods[4]	36.8	13.2	109	1,638	6.1	440
Benchmark nutrient density	33.3	11.1	116	929	7.5	464
Adolescent females age 12-17:						
Home foods	33.6	11.7	124	1,598	6.8	413
Away-from-home foods[2]	39.0	13.6	96	1,523	5.9	375
Fast food	41.9	15.1	93	1,498	5.8	382
Schools[3]	40.9	15.8	101	1,619	6.2	530
Restaurants	39.3	13.4	128	1,866	6.0	360
Others[3]	33.5	10.2	77	1,301	5.6	262
All foods[4]	35.3	12.3	115	1,575	6.5	401
Benchmark nutrient density	33.3	11.1	163	1,307	10.5	653

Notes: [1]Densities are measured per 1,000 calories. [2]Away from home presents the aggregate of fast foods, restaurants, schools, and others. [3]Schools are classified as a separate category for children and are combined into "others" for adults. [4]Nutrient densities for all foods are weighted averages of densities of home foods and away from home foods. Source: Compiled by USDA's Economic Research Service from the 1995 CSFII, individuals providing 2 days of intake.

Children to address the high fat levels and other nutritional problems in school meals and in children's diets. But since implementation began during the 1996-97 school year, the 1995 CSFII data do not yet reflect changes in school meals.

According to the *Dietary Guidelines for Americans*, fat intake should be limited to no more than 30 percent of total dietary calories, and saturated fat intake should be below 10 percent of total calories. Because each gram of fat generates an average of 9 calories, the recommendations can be expressed as 33.3 grams of fat and 11.1 grams of saturated fat per 1,000 calories—a measure termed "benchmark" density in this study. By comparing the nutrient density with this benchmark, we can evaluate the nutritional quality of foods against recommended intakes. (Tables 2, 3, and 4 also report nutrient densities for all foods consumed, which are weighted averages of densities for home and away-from-home foods. Thus the nutrient densities for all foods measure the nutritional quality of overall diet.) It is known that energy and nutrient intakes from dietary recall surveys are subject to underreporting. Consequently, the benchmark density calculated from reported intakes tends to be smaller than the actual density.

All of the food outlets had higher average fat densities than the benchmark densities (table 2). While many Americans have made substantial progress in reducing the fat content in their diets over the past few decades, many individuals in all age groups need to continue reducing the fat content in all food sources—particularly from away-from-home foods—in order to meet recommended levels.

Away-from-home foods had a higher average cholesterol density than home foods (136 mg versus 127 mg per 1,000 calories), mainly because of the high cholesterol density of restaurant foods (182 mg per 1,000 calories—almost 50 percent higher than the cholesterol density of home foods and fast foods). Restaurant foods eaten by children had a cholesterol density 16 percent higher than that of home foods (table 3). Among adults, the cholesterol density of restaurant foods, at 187 mg per 1,000 calories, is almost 50 percent higher than home foods or fast foods (table 4).

Many health authorities recommend that daily cholesterol intake should not exceed 300 mg—regardless of age and gender. The benchmark cholesterol density, 300 mg of cholesterol divided by a person's reported caloric intake, varies from person to person because individual caloric intake varies from person to person. We calculate a benchmark density for specific groups of individuals by summing the recommended intakes of a nutrient for all individuals in the group and dividing by the sum of those individuals' reported caloric intakes.

Based on 1995 reported caloric intakes, the benchmark cholesterol density for all Americans age 2 and older was 150 mg for each 1,000 calories consumed (table 2). The average cholesterol density of home foods in the survey was 127 mg per 1,000 calories, and away-from-home foods was 136 mg per 1,000 calories (table 2). Adult males age 18-39, however, had a much lower benchmark density of 107 mg of cholesterol per 1,000 calories because they tend to eat more than others do (table 4). Yet their cholesterol density was 123 mg per 1,000 calories for home foods and 170 mg per 1,000 calories for restaurant foods (table 4). To meet their recommended cholesterol intake, adult males need to choose foods low in cholesterol, especially considering the fact that nutrient intakes are likely to be underreported in dietary recalls.

Restaurant Foods High in Sodium

The sodium density of home foods was lower than the levels in fast foods and restaurant foods, but higher than the level in school meals (table 2). These estimates include sodium occurring naturally in foods and sodium added in food processing and preparation, but not salt added at the table. Restaurant foods had the highest sodium density of all food sources. For example, restaurant foods eaten by adults had a sodium density of 1,952 mg per 1,000 calories, which is 17 percent higher than home foods and 12 percent higher than fast foods (table 4).

According to *Diets and Health*, daily sodium intake should be limited to 2,400 mg or less. As with cholesterol, this results in individuals who eat more having lower values of benchmark density. Using reported caloric intakes, benchmark sodium densities range from a low of 859 mg per 1,000 calories for adult males age 18-39 and 929 mg per 1,000 calories for adolescent males to a high of 1,602 mg per 1,000 calories for preschoolers, averaging 1,255 mg per 1,000 calories for children and 1,181 mg per 1,000 calories for adults (tables 3 and 4).

With the exception of preschoolers, average sodium densities of most food outlets exceed benchmark densities, resulting in average sodium consumption levels that substantially exceed the recommended level. Most Americans could reduce sodium intake by careful choice of the foods they eat away from home.

School Meals Are Rich in Fiber and Calcium

School meals provided the richest source of calcium and fiber for children in 1995. The calcium density in school meals was 672 mg per 1,000 calories—42 percent higher than the calcium density in home foods eaten

Table 4
Dietary Problems Start in Childhood and Continue Into Adulthood

Food outlets for Americans	Total fat	Saturated fat	Cholesterol	Sodium	Fiber	Calcium
	– – Nutrient-to-calorie density[1] – –					
	grams	*grams*	*mg*	*mg*	*grams*	*mg*
Adults age 18 and above:						
Home foods	34.8	11.8	129	1,671	8.6	406
Away-from-home foods[2]	42.6	14.3	144	1,741	6.2	329
Fast food	42.9	14.8	128	1,747	5.6	362
Restaurants	44.9	14.0	187	1,952	6.8	293
Others[3]	39.6	13.6	126	1,509	6.4	313
All foods[4]	37.5	12.6	135	1,695	7.7	379
Benchmark nutrient density	33.3	11.1	148	1,181	11.4	420
Adult males age 18-39:						
Home foods	35.2	12.4	123	1,707	7.3	386
Away-from-home foods[2]	41.7	14.6	134	1,704	5.7	337
Fast food	42.0	15.2	119	1,739	5.2	374
Restaurants	42.8	13.4	170	1,867	6.7	281
Others[3]	40.3	14.6	132	1,477	5.8	311
All foods[4]	38.2	13.4	128	1,705	6.6	364
Benchmark nutrient density	33.3	11.1	107	859	11.1	330
Adult females age 18-39:						
Home foods	33.7	11.4	122	1,630	8.0	415
Away-from-home foods[2]	42.3	13.9	140	1,695	6.1	331
Fast food	43.6	14.8	125	1,708	5.9	366
Restaurants	43.8	13.1	176	2,038	6.4	291
Others[3]	38.8	13.3	123	1,314	6.3	322
All foods[4]	36.8	12.3	128	1,654	7.3	384
Benchmark nutrient density	33.3	11.1	173	1,384	11.7	528
Adult males age 40-59:						
Home foods	35.3	11.7	134	1,668	8.5	388
Away-from-home foods[2]	43.3	14.1	161	1,791	6.2	307
Fast food	42.5	14.0	144	1,778	5.7	329
Restaurants	47.3	14.9	217	1,944	6.4	293
Others[3]	39.4	13.3	117	1,613	6.8	288
All foods[4]	37.8	12.5	143	1,707	7.8	362
Benchmark nutrient density	33.3	11.1	131	1,046	11.5	349

Continued—

by children. The fiber density in school meals was 7.2 grams per 1,000 calories—4 percent higher than that in home foods eaten by children (table 3). Among adults, home foods had the highest calcium and fiber densities of all food sources (table 4). Restaurant foods had a fiber density 21 percent higher than fast foods, but fast foods had a calcium density 24 percent higher than restaurant foods.

Estimated benchmark calcium densities (based on the Recommended Daily Allowance—RDA—for calcium of 1,200 mg for those age 11-24 and 800 mg for all others) range from a low of 330 mg per 1,000 calories for adult males age 18-39 to a high of 653 mg per 1,000 calories for female adolescents (table 3). The average benchmark calcium densities were 509 mg per 1,000 calories for children and 420 mg per 1,000 calories for adults.

Because adolescent females and adult females typically eat fewer calories but have the same calcium RDA as their male counterparts, they need to eat more calcium-dense

Table 4
Dietary Problems Start in Childhood and Continue Into Adulthood—*Continued*

Food outlets for Americans	– – Nutrient-to-calorie density[1] – – Total fat	Saturated fat	Cholesterol	Sodium	Fiber	Calcium
	grams	*grams*	*mg*	*mg*	*grams*	*mg*
Adult females age 40-59:						
Home foods	34.8	11.6	129	1,652	9.2	402
Away-from-home foods[2]	44.7	14.4	141	1,817	7.0	340
Fast food	45.8	15.0	130	1,762	6.1	365
Restaurants	47.7	14.9	181	2,009	8.0	322
Others[3]	40.1	13.1	113	1,677	7.1	327
All foods[4]	37.6	12.4	133	1,699	8.6	385
Benchmark nutrient density	33.3	11.1	185	1,481	11.5	494
Senior males age 60 and above:						
Home foods	35.6	12.0	143	1,683	9.8	428
Away-from-home foods[2]	44.1	14.0	177	1,825	6.4	299
Fast food	45.6	14.9	167	1,842	5.9	343
Restaurants	46.3	14.6	216	1,959	6.9	270
Others[3]	40.0	12.3	138	1,642	6.4	293
All foods[4]	37.5	12.4	151	1,714	9.1	399
Benchmark nutrient density	33.3	11.1	154	1,236	11.5	412
Senior females age 60 and above:						
Home foods	34.2	11.2	137	1,675	10.8	453
Away-from-home foods[2]	42.1	13.3	168	1,817	7.5	339
Fast food	42.9	13.0	170	1,796	7.0	340
Restaurants	45.8	14.5	211	2,010	7.5	330
Others[3]	38.3	12.3	130	1,661	7.9	345
All foods[4]	35.7	11.6	144	1,703	10.1	430
Benchmark nutrient density	33.3	11.1	211	1,689	11.5	563

Notes: [1]Densities are measured per 1,000 calories. [2]Away from home presents the aggregate of fast foods, restaurants, schools, and others. [3]Schools are classified as a separate category for children and are combined into "others" for adults. [4]Nutrient densities for all foods are weighted averages of densities of home foods and away from home foods. Source: Compiled by USDA's Economic Research Service from the 1995 CSFII, individuals providing 2 days of intake.

foods if they are to meet the recommendations. The 1995 data show that none of the food outlets for females (adolescents and adults) had sufficient calcium to meet their recommended intakes.

Even though school meals had a higher calcium density than foods from all other sources, school meals eaten by female adolescents had a calcium density of 530 mg per 1,000 calories (table 3)—81 percent of the group's benchmark density of 653 mg per 1,000 calories. As a result, adolescent females, on average, reached only 61 percent of their calcium RDA, and only 10 percent of them met the calcium RDA. Compared with other children, adolescent females have the highest tendency to eat foods lower in calcium when eating out, skip morning meals (typically high in calcium), eat the smallest number of meals and snacks (hence consume less of all nutrients), and drink the least amount of fluid milk (an important source of calcium in the American diet).

The American Health Foundation recommends a dietary fiber intake of "age plus five" for those age 2-20, and the Food and Drug Administration uses 11.5 grams of fiber per 1,000 calories as its Daily Value for nutrition labeling. Dividing recommended fiber intakes by reported caloric intakes, estimated average benchmark fiber densities increase with age, from 5.7 grams per 1,000 calories among preschoolers to 11.5 grams per 1,000 calories among those age 20 and above (tables 3 and 4).

The fiber density in both home and away-from-home foods eaten by children and adults fell substantially short of the benchmark densi-

ties. For example, the benchmark fiber density for adults is 33 percent higher than the fiber density in home foods and 84 percent higher than the level in away-from-home foods. Consequently, only about one in six adults met the recommended intake for dietary fiber. With away-from-home foods (excluding school meals) providing lower fiber density than home foods, the increased tendency to eat out could reduce fiber intake among children and adults.

Wiser Food Choices Needed, Especially When Eating Out

The most recent data on national food consumption patterns, the 1995 CSFII, indicate that away-from-home foods are generally higher in fat, saturated fat, cholesterol, and sodium, and lower in fiber and calcium than home foods. Furthermore, people tend to consume more calories when eating away from home than when eating at home. In 1995, food away from home accounted for 27 percent of eating occasions but 34 percent of total calories. More than 40 percent of those away-from-home calories were obtained from fast foods. Food away from home is especially popular among adult males age 18-39, who obtained 45 percent of their calories from away-from-home sources. Fast foods alone contributed 23 percent of the group's total caloric intake.

The benchmark measure of nutrient density allows us to evaluate the quality of foods with respect to recommended intakes of particular nutrients. The CSFII 1995 data show that fat, saturated fat, and sodium densities in home and away-from-home foods exceed the benchmark measure, implying that Americans need to reduce fat, saturated fat, and sodium intakes at, and especially away from, home.

Americans have a long way to go before reaching the recommended fiber intake in their diets, as the fiber density in home and away-from-home foods falls substantially below the benchmark. While cholesterol intake is not a problem for many Americans, adult males have to reduce their cholesterol intake at and away from home in order to meet the recommendation. Insufficient calcium is a major dietary problem facing adolescent females and adult females, and the data show that none of the foods selected by consumers in five food outlets have sufficient calcium to meet their recommended calcium intakes at reported energy intake levels.

The increased popularity of dining out presents a barrier for Americans to continue improving their diets. Food purchased away from home generally contain more of the nutrients overconsumed and contain less of the nutrients underconsumed by Americans. Therefore, nutrition policy, education, and promotion strategies focused on improving the nutritional quality of food away from home are needed. Improvements in the nutritional quality of school meals, under USDA's School Meals Initiative for Healthy Children, are expected to help reduce children's intake of fat, saturated fat, and sodium. Past efforts by some fast-food chains and restaurants to market nutritionally improved products have been unsuccessful. It appears that consumers are less attentive to the importance of nutrition when they eat out. Consumers need to pay attention to the nutritional quality and portion sizes of foods eaten at and away from home if they want to meet the recommended Dietary Guidelines. Dietary changes come only gradually and require strong commitment from consumers, with educational assistance from health professionals and the Government.

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