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Understanding Structural Change in the Food Industry

...Upfront

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Understanding Structural Change in U.S. Agribusiness

As agricultural commodity prices have fallen from record levels, much attention has been focused on the depressing effect that changes in the structure of agribusiness may have on farmers' returns. Across the food and agricultural sector, the smart pace of mergers and acquisitions, along with the construction of bigger plants, has resulted in fewer and larger firms buying farm commodities, manufacturing food products, and selling them to consumers—a phenomenon known as concentration.

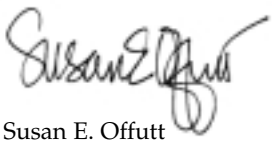
With fewer firms, will markets remain competitive? Or will firms be able to exploit market power to exclude rivals, to hold down prices paid to farmers, to raise prices to consumers? To begin answering these questions, this issue of *FoodReview* takes a close look at five important food industries, illustrating how they have restructured and explaining the reasons behind the changes.

Appreciating the role of the consumer in shaping the agricultural and food system is key to understanding its structure and evolution. In the United States, the quantity of food consumed in the aggregate essentially increases only with population growth. In a mature food market such as this, growth in demand for one product likely comes only at the expense of another product. Consumers may switch from one product to another based on a desire for a different quality characteristic, as from one kind of breakfast cereal to another. No more cereal is consumed, so growth in one cereal's market share comes at the expense of another's.

In the food business, the past 10 or 15 years has seen a marked increase in the number and variety of products sold. Grocery stores offer choices that provide novelty, variety, and convenience, even as they compete with restaurants and fast food outlets for the consumers' food dollar. Against this backdrop, firms look for a competitive edge by offering new products but also by lowering production costs. Cost-saving measures often take advantage of economies of scale, achieved through mergers and/or construction of larger stores and factories. For example,

- Poultry firms have built bigger plants and have differentiated their product lines, moving away from selling whole birds to offering cut-up parts and specialty items.
- Farmer-owned dairy cooperatives and propriety companies have gotten bigger through mergers and have gained cost advantages by specializing in narrower product lines.
- Supermarket fruit and vegetable offerings have expanded dramatically, as Americans are eating more produce and seeking greater convenience. Bagged salads and cut carrots have emerged on the scene, and grocers have changed the way they do business with produce suppliers to assure supply and reduce costs.
- The market for breakfast cereals has long been dominated by a few firms, which avoid price competition and instead have attracted consumers with coupons and advertising. But sales of branded cereals have slipped in recent years because of competition from cheaper store brands and the rising popularity of more portable breakfast alternatives such as bagels and breakfast bars.
- Mergers in food retailing continue apace, as supermarket chains adopt new business strategies and information technologies to lower their costs.

These industries provide ample evidence that changing consumer preferences provoke dynamic responses from processors, retailers, and ultimately, farmers. Understanding the genesis of structural change will help anticipate the effects of such concentrated markets.



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Inside...

Structural Change in the U.S. Food Industry

Also Inside

Poultry Plants Lowering Production Costs and Increasing Variety

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Over the past 30 years, large plants producing a variety of ready-to-cook poultry products have come to dominate the U.S. poultry slaughter industry. In 1967, less than one-third of our poultry was produced in large plants, but today more than four-fifths comes from plants employing more than 400 workers. Moreover, production has changed from mainly whole birds for domestic consumption to cut-up and deboned poultry packed in bulk containers for both the domestic and export markets and chicken and turkey parts packed in Styrofoam trays for domestic consumption.

An increase in average plant size can cause the number of plants to drop and the production share of the largest plants to rise because each plant would then account for more of industry production. However, the number of poultry slaughter and processing plants in 1992 was about the same as in 1967. The four-firm industry concentration ratio (the share of industry sales from the four largest firms) did not change substantially for turkey slaughter and stood at 35 in 1992. For chicken slaughter, the four-firm concentration ratio rose over the 1977-92 period from 22 to 41. This level is not particularly high when compared with levels for other manufacturing industries. By contrast, similar increases in plant size for cattle and hog slaughter coincided with a 75-percent reduction in the number of hog and cattle slaughter plants between 1967 and 1992. Based on product value data from the Bureau of the Census, the four-firm concentration ratio in cattle slaughter increased from 26 to 71 during this time. Many economists believe that, when four-firm concentration ratios exceed 80, it is easier for large firms to raise prices without fear of a competitor taking away sales by selling a similar product at a lower price because many retailers may not even stock products from smaller firms, and larger firms have fewer competitors that would try to underprice them.

The trend toward larger plant sizes raises some public policy issues. Some critics argue that the need to continuously reduce production costs may come at the cost of worker safety and may impose compensation burdens on chicken and turkey farmers and slaughter plant workers. Then there's the issue of animal waste. Large slaughter plants require a vast number of live chickens that generate an enormous amount of animal waste. Historically, chicken and turkey farmers and slaughter plants have spread poultry waste on nearby farms as fertilizer. With bird farmers typically located within 20 miles of a slaughter plant, bird farmers and plants have been disposing of a growing volume of animal waste within a confined area. In some parts of the country, animal wastes pose no environmental threat, but in other, more environmentally sensitive areas, the high concentration of animal wastes has resulted in nitrogen and phosphates leaching into ground water or washing into streams, causing water quality problems and environmental degradation.

Booming Demand Benefits Poultry Firms

Before 1970, most poultry bought by consumers was whole chickens and turkeys, and the export business was quite small. It would have been very difficult to find a restaurant or fast food outlet selling chicken sandwiches or nuggets; turkey luncheon meats, poultry frankfurters, and deboned chicken breasts did not exist. Today, exports account for almost one-sixth of U.S. poultry production. Consumers are besieged with neon signs alerting them to all sorts of fast food chicken products, and most supermarkets carry chicken nuggets, ground chicken patties, turkey bologna, and a wide variety of chicken and turkey traypacks containing various cuts. Indeed, Americans have come

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to take the availability of an eclectic mix of poultry products for granted.

Per capita poultry consumption has jumped from 34 pounds in 1960 (a level that was about one-half the level of beef) to 96 pounds in 1999—nearly 40 percent higher than beef consumption (table 1). The change began after 1950 when new poultry farming and processing techniques began to lower production costs, making poultry more price competitive with red meat. Price changes were particularly dramatic from 1960 to 1977 when the price of whole chicken fryers dropped from about half to about one-sixth the price of beef. Today, whole chicken fryers are about one-third the price of beef, and after accounting for inflation, are about half their 1960 price.

Already able to sell chicken at a much lower price per pound than beef, chicken companies further boosted chicken consumption with adept marketing programs. These companies enticed consumers worried about the amount of saturated fat in their diets by touting chicken's lower fat content relative to beef and pork. They also churned out a host of new, ready-to-use products such as boneless chicken breasts, marinated chicken pieces, and poultry frankfurters.

Chicken firms proved to be particularly canny marketers as they segmented their market along several dimensions. First, they observed that American consumers were willing to pay much higher prices for white meat breasts than for dark meat thighs and drumsticks. They also noted that some products, such as chicken feet, could fetch a higher price in overseas markets than in domestic markets. To take advantage of these taste differences, chicken processors began offering proportionately more white meat to domestic consumers and dark meat and other products to overseas consumers.

Exports of chicken began to take off after 1975. Before that time, the export market had never accounted for more than 5 percent of production. Exports doubled from 1975 to 1976 and, except for a couple of bad production years in the early 1980's, consistently increased, reaching 5 billion pounds (17 percent of production) in 1997.

Market segmentation by product quality preceded the surge in exports. In the late 1960's, some chicken and turkey producers realized that consumers would be willing to pay a higher price for higher quality birds. Frank Perdue and other chicken firms began earning a price premium on their higher quality birds by selling them under a brand name and selling lesser quality birds that just meet Grade A specifications to retailers for private-label (store brand) chickens. After brand names had been established, firms maintained their images by packaging cut-up and whole chickens in more expensive traypacks and other packaging and by launching ad campaigns that stressed the high quality of their products. They also continued to reserve the highest quality birds for their own brands.

Chicken firms further stoked chicken consumption by marketing ready-to-eat products to nontraditional vendors, such as fast food restaurants and grocery store delis. By 1991, chicken nuggets, breaded parts, patties, popcorn chicken, and other semi-prepared chicken parts sold to restaurants and grocery stores accounted for over 10 percent of chicken sales. Recently, marinated whole birds have become popular items for take-out meals at both fast food restaurants and supermarket delis, and probably account for the increase in the percentage of chicken sold at retail as whole birds from 12.5 to 13.1 percent between 1995 and 1997, a reversal of a 35-year downward trend.

Credit: Ken Hammond, USDA.

The average chicken plant now produces about four times as much product as it did 20 years ago as Americans' appetite for chicken has grown along with the variety of products offered, from chicken nuggets to marinated, fully cooked whole chickens.

Credits: USDA.

Increased processing came a little later for the turkey industry than for chicken. Although per capita consumption had increased from 6 pounds to 10 pounds between 1960 and 1980, turkey was still a very seasonal product. The introduction of turkey luncheon meats, sausages, and deli products after 1980, however, encouraged consumption to grow to 18 pounds per capita by the early 1990's. Similar to chicken, turkey firms exported dark meat and sold white meat in the domestic market. But unlike chicken, restaurateurs have not been nearly as receptive to turkey products.

Consumer acceptance of the new poultry luncheon meats, frankfurters, and other ready-to-eat poultry products coming to market after 1972 likely contributed to the ninefold increase in per capita consumption of processed poultry products to about 18.5 pounds in 1992. Some of this growth appears to have come at the expense of processed red meat products, which, based on Census data, dropped about 7.5 percent to 51.5 pounds per capita over the 1977-92 period.

Plants Change Their Product Mix

To lower production costs and capitalize on consumers' desires for easier-to-use products, poultry slaughter plants changed dramatically. Perhaps no change was as dramatic as the shift from the production of whole birds to chicken cut up into parts and boneless chicken meat trimmed manually or mechanically from the bone, commonly called deboned chicken. Prior to the late 1960's, most consumers wanting pre-cut poultry or specialty parts had to ask an in-store butcher to cut up a whole bird. Chicken and turkey companies later recognized that many consumers preferred buying chicken parts to whole fryers and marketed their products accordingly.

The vast majority of chicken and turkey is cut up in slaughter plants, and for good reason. Although this approach increases the number of workers per production line, it avoids the costly process of offloading whole birds and having higher wage butchers prepare them at stores or other production workers process them at wholesale establishments. Moreover, by cutting up chickens and turkeys within the slaughter plant, poultry firms could increase total revenues by selling bulk bird parts in either domestic or export markets, whichever valued them higher, or using parts within

Table 1
Poultry Consumption Per Capita and Net Exports Soar and Prices Decline Between 1960 and 1999

Product	1960	1963	1967	1972	1977	1982	1987	1992	1997	1999
					Retail pounds					
Per capita consumption:										
Chicken	27.8	30.8	32.4	41.7	40.2	47.0	57.4	67.8	72.7	78.8
Turkey	6.3	6.9	8.7	9.0	8.8	10.6	14.7	17.9	17.6	17.8
Beef	64.2	69.9	78.8	85.1	91.5	76.9	73.7	66.3	66.9	65.4
					Dollars per pound					
Nominal retail prices (December):[1]										
Chicken	0.41	0.40	0.37	0.41	0.58	0.68	0.74	0.88	1.00	1.06[2]
Turkey	.55	.49	.47	.57	.83	.89	.89	.93	1.06	n.a.
Beef	.80	.78	.86	2.38	3.09	4.67	4.86	2.87	2.80	3.01[2]
Inflation-adjusted retail prices (December 1997):[1]										
Chicken	2.23	2.11	1.80	1.59	1.53	1.14	1.05	1.01	1.00	1.06[2]
Turkey	2.91	2.59	2.27	2.18	2.21	1.50	1.20	1.07	1.06	n.a.
Beef	4.36	4.14	4.14	9.16	8.22	7.84	6.90	3.30	2.80	3.01[2]
					Million pounds					
Net exports:										
Chicken	137	157	88	100	349	524	767	1,530	5,043	4,421
Turkey	24	31	49	36	54	51	33	202	605	400

n.a. = Not available.
[1]Prices are whole fryers for chickens, young hens for turkeys, and weighted composite of choice beef for beef.
[2]Year average; prices are not adjusted to 1997 levels because the inflation factor was not available.
Sources: Published in various issues of *Livestock, Dairy, and Poultry Situation and Outlook,* USDA, ERS. Early data also in *Poultry Yearbook and Red Meat Yearbook,* USDA, ERS.

the plant for the firm's own poultry products. Today, cut-up and deboned poultry account for nearly 90 percent of chicken and more than 50 percent of turkey slaughter plant production (table 2).

Poultry slaughter plants produce traypacks of cut-up poultry using packaging machinery added to the end of a cut-up line. Similarly, they convert some deboned poultry into their own luncheon meats, frankfurters, and other processed products. Private-label whole birds, traypacks, and processed products can be produced by a wholesaler, retailer, or another processor. By 1997, traypacks and processed products accounted for about 35 percent of chicken slaughter production, and processed products accounted for about 21 percent of turkey slaughter production. Whole birds and cut-up/deboned poultry for exports constituted about 18 and 11 percent, respectively, of total chicken and turkey output. Slaughter plants shipped the remainder of their whole birds and cut-up/deboned poultry to other domestic plants dedicated to performing a particular processing operation or to retailers and wholesalers for sale as private-label products (table 2).

Turkey plants have traditionally faced highly seasonal demand, with most production in the last half of the year for the end-of-the-year holiday season. This seasonal demand imposes a cost on slaughter plants, as they shut down their plants and lay off employees, only to restart plant production and rehire and retrain employees when demand picks up again. By 1992, consumers' greater year-round consumption of turkey permitted more evenly distributed production schedules in which costly layoffs and rehiring of workers were avoided. Much of the added production came from

Table 2
Slaughter Plant Product Mix Requires Fewer Whole Birds as It Becomes More Complex

Product	Share of total slaughter production							
	1963	1967	1972	1977	1982	1987	1992	1997
	Percent							
Product mix:								
Styrofoam traypacks—								
Chicken	n.a.	n.a.	13.9	15.8	20.5	24.2	21.9	24.3
Further processed (from cut-up, deboned, or whole birds)—								
Chicken	n.a.	n.a.	2.7	2.1	5.1	6.5	9.6	11.4
Turkey	n.a.	n.a.	10.4	14.6	19.3	16.2	22.2	20.6
Bulk domestic: Cut-up, deboned, and whole birds in large containers—								
Chicken	97.4	98.9	82.3	78.7	69.9	64.6	60.8	46.0
Turkey	97.7	97.4	87.7	82.7	78.7	82.9	73.6	68.2
Bulk export: Cut-up, deboned, and whole birds in large containers—								
Chicken	2.6	1.1	1.1	3.4	4.5	4.7	7.1	18.3
Turkey	2.3	2.6	1.9	2.7	2.0	0.9	4.2	11.2
Raw bird processing:								
Total cut-up and deboned—								
Chicken	15.2	21.9	29.6	38.2	48.1	56.1	78.2	86.9
Turkey	3.4	6.8	16.7	22.5	29.9	36.6	55.1	n.a.
Total whole birds—								
Chicken	84.8	78.1	70.4	61.8	51.9	43.9	21.8	13.1
Turkey	96.6	93.2	83.3	77.5	70.1	63.4	44.9	n.a.

n.a. = Not available.
Sources: U.S. Department of Commerce, Bureau of the Census, *Longitudinal Research Data Base,* 1963-97; U.S. Department of Agriculture, Economic Research Service, *U.S. Egg and Poultry Statistical Series,* 1960-90, 1991; National Turkey Federation and the National Chicken Council for 1992 and 1997 raw bird processing data.

cooked or otherwise processed products, which accounted for 15 percent of turkey slaughter plant production in 1992 versus only about 3 percent for chicken slaughter plants.

Larger Plants Enable Cost Reductions

Before 1950, chicken comprised a small part of the American diet. Chickens were raised by farmers as a way either to produce eggs or to put spilled grain, grass, and insects around the farmyard to productive use. Typically, chickens intended for egg production were hatched in the early spring, and since many young males were not needed for egg production, they were slaughtered together with hens not needed for egg production during the summer months. Large numbers of hens then became available for slaughter in the late fall when egg production dropped off.

Chicken farming changed dramatically after 1950 when improved feeds, veterinary services, and medicines made it possible to grow chickens in large quantities at much lower costs. Additionally, new chicken breeds enabled farmers to raise both meatier and more uniform-sized birds. Around this time, chicken supply contracts between slaughter plants and farmers emerged as a way to reduce the risk associated with raising chickens and permitted better control over chicken quality (see box). Glenn Bugos, a historian and fellow at the German Marshall Fund of the United States, asserts that by 1960, specialized bird breeds of uniform size, combined with advancements in slaughtering techniques and the availability of large numbers of chickens, led to large scale economies for chicken slaughtering plants (lower per unit production costs in larger plants than in smaller ones). These reductions in production costs were passed on to consumers in the form of lower prices. Consumers responded by increasing consumption and making chicken a staple in the American diet.

Uniform bird size is particularly important to the low-cost conversion of live chickens into ready-to-cook and ready-to-eat products in modern chicken slaughtering plants. Typically, plants specialize in products made from breeds of uniform-sized chickens with similar quality characteristics because chickens of different sizes require costly plant equipment adjustments and specialized breeds are most suitable for certain types of products. Small chickens are usually cut up into parts for processing and export. Medium-sized chickens are bred for traypack plants where chicken parts are packaged on Styrofoam trays for sale in grocery stores, and large chickens are used in deboning plants for production of boneless products.

After 1960, consumer tastes began to shift away from a preference for whole chickens toward semi-processed products, such as chicken parts in Styrofoam traypacks, and, after 1970, toward processed chicken products, such as luncheon meats, nuggets, and frankfurters. Most of these new products required cut-up and deboning operations that were typically added to the end of production lines. The combination of

Slaughter Plants Rely on Contracts With Chicken Farmers

Before the 1950's, farmers were reluctant to undertake chicken farming because investments in buildings, other equipment, feed, chicks or poults, and other inputs could easily be lost due to disease or natural calamities. Chicken feed suppliers recognized that they could increase their own sales by extending credit to farmers, enabling them to remain in business while they paid off their debts. This risk-sharing arrangement spurred chicken production and eventually evolved into the grower contracting arrangements now common to all poultry production. Meanwhile, the feed suppliers integrated further into slaughter and processing operations and now are the integrated chicken firms that provide much of the Nation's poultry.

Through contracting arrangements, integrated chicken firms accept much of the risk of chicken growing in exchange for greater control over both the quality and quantity of the birds. Usually, the firm provides company-owned chick or poult hatchlings and feed, veterinary services, medication, part of the fuel, and field supervisors to monitor operations. Ownership of the breeding stock and most of the other inputs enables the firm to develop chicken breeds specifically to meet market needs and to better control feed and medication quantities, quality, and costs. The contract farmer provides housing, equipment, labor, water, and management, and then returns the fully grown chickens to the firm for slaughter. Usually, the firm pays a pre-established fee per pound for live broilers plus a bonus or penalty for performance relative to other chicken farmers. Performance is determined mainly by the amount of weight gained per unit of feed and losses due to disease.

Chicken firms adopted grower contracting much more vigorously than did turkey firms. Chicken contracts accounted for over 90 percent of all chicken production in 1955 and almost 100 percent by 1994. In turkeys, contract growing accounted for only 56 percent of production by 1994, up from 4 percent in 1955. By contrast, about 30 percent of turkey farms are owned outright by the turkey firm, whereas, chicken firms own about 1 percent of chicken farms. Some economists attribute this difference in farm ownership to the greater riskiness of turkey farming.

these new, more labor-intensive operations and the increase in output caused a jump in the number of employees per chicken slaughtering plant. U.S. Bureau of Census data indicate that, by 1992, the average chicken plant produced about four times as much product as in 1972, and that production from plants with more than 400 employees rose from less than 30 percent of industry output to more than 85 percent.

Researchers at USDA's Economic Research Service used data from USDA and the Census Bureau to analyze slaughtering costs over the 1972-92 period for chickens and the 1967-92 period for turkeys. The Census data give plant-level information on all plants with more than 20 employees, including quantities slaughtered, dollar values of different products produced, materials used, employment, and capital equipment. Our analyses suggest the existence of scale economies that are much greater than those in cattle and hog slaughter, and, unlike those of cattle and hogs, they show no signs of decreasing with plant size. Chicken plants that were two times larger than the average-sized plant had 8 percent lower per-unit costs relative to average-sized plants, and those four times larger had 15 percent lower per-unit costs (table 3). Similarly, turkey plants that were two times larger than average plants had 11 percent lower per-unit costs, and plants four times larger had 17 percent lower costs.

The existence of large scale economies enabled the largest chicken and turkey plants to decrease labor, nonmeat material, and capital costs by about 10 percent over those of their smallest competitors. To remain competitive, smaller plants had to either increase their own production, reduce production costs, or switch their product mix to highly specialized products for niche markets. Some plants increased output, but few, if any, were able to lower production costs while remaining the same size and were therefore compelled to exit the industry. We estimate that about two-thirds of all plants exited the industry over each 5-year Census period during the 1967-92 period and that almost no plants with fewer than 100 employees existed after 1982. Despite this dramatic shift in plant size, new plant construction caused the number of poultry slaughter and processing plants to remain almost constant.

Whether or not the chicken or turkey slaughter industries will consolidate to the same extent as the cattle and hog slaughter industries may depend on growth in demand for poultry. Many economists believe that scale economies are a driving force in industry consolidations. Yet, even though scale economies in poultry slaughtering are stronger than in cattle and hogs, the number of poultry slaughtering plants has not declined. New, large plants have been built to supply the tremendous growth in domestic consumption and exports. If growth in poultry consumption and exports were to slow, however, it appears likely that plant consolidation would follow.

Table 3
Poultry Production Costs Are Much Lower in Larger Plants

Product	Plant size	Process cost[1]	Average cost index[2]	Plant size relative to 1992 mean
	Million pounds	*Percent of total costs*	*Ratio*	
Chicken	37.4	32.4	1.05	0.26
	74.8	31.6	1.00	.53
	149.6	30.8	.92	1.06
	299.2	29.9	.85	2.11
Turkey	21.9	35.0	1.04	.19
	43.7	33.8	1.00	.38
	87.4	32.6	.89	.75
	174.8	31.3	.83	1.51

[1]Process costs include the costs of labor, all packaging and shipping materials and other nonmeat materials, energy, and capital costs. It does not include the cost of live animals for slaughter.

[2]All costs are relative to average-sized plants. Average-sized chicken slaughter plants during the study period from 1972 to 1992 produced about 74.8 million pounds of chicken meat per year, and the average-sized turkey slaughter plants during the study period from 1967 to 1992 produced about 43.7 million pounds of turkey per year.

Source: Michael Ollinger, James MacDonald, and Milton Madison, *Structural Change in U.S. Chicken and Turkey Slaughter*, forthcoming AER, U.S. Department of Agriculture, Economic Research Service.

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Large Companies Active in Changing Dairy Industry

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The dairy industry has dramatically restructured in the last 50 years. New processing technologies, shifts in consumers' preferences, and changes in economic conditions have changed the way dairy companies process fluid milk, manufacture dairy products, and market their beverages and products. Economies of scale (lower per unit production costs for large-scale operations versus smaller scale ones) have led to fewer and larger dairy marketing firms.

Traditional dairy companies that manufactured and sold a full line of dairy products (fluid milk, ice cream, cream, cheese, butter, and canned milk) have disappeared from the scene. In the 1960's and 1970's, institutional investors—pension funds, mutual funds, and the like—favored conglomerates and companies that diversified into a variety of product lines. Of the seven largest companies in the U.S. dairy business in 1975, five were or became conglomerates comprised of a variety of unrelated businesses, and two were diversified. Conglomerates eventually fell out of favor. They were a profitable means of buying and selling businesses but were exceedingly difficult to run profitably.

Today, Wall Street investors favor companies that produce or market high-margin branded products and those that specialize in "core competencies." These companies concentrate on much narrower lines of products. For instance, in the dairy business, they may deal only in cheese, only in yogurt, or only in premium ice creams. Other dairy firms have moved toward specialization in a single segment of the dairy market, such as branded products for the grocery store trade, products for foodservice, or ingredients for manufacturers of other foods. Dairy companies have also tried to capitalize on consumers' interest in lower fat foods by developing and promoting reduced-fat and nonfat (skim) milk. Lower fat versions of frozen desserts, yogurt, and cheese were also tried, but the loss of flavor discouraged many consumers and sales of high-fat versions of these products have begun to grow again.

Farmer-owned dairy cooperatives, such as Land O' Lakes, are larger and fewer in number today, manufacturing and distributing significant shares of butter, natural cheese, and nonfat dry milk.

Credit: Land O'Lakes, Inc.

The authors are economists with the Market and Trade Economics Division, Economic Research Service, USDA.

Milk processing firms produce fluid milk products—those described as beverages—such as whole milk, lowfat milk, and chocolate milk. Cheeses, butter, ice creams, and nonfat dry milk are some of the products produced by dairy manufacturing firms. Manufactured dairy products are further described as hard (cheese and butter) or soft (ice cream, yogurt, sour cream, and cottage cheese).

Firms that produce fluid milk and dairy products are either dairy cooperatives or proprietary companies. Many of the proprietaries are large companies in themselves or are subsidiaries of some larger company. Dairy cooperatives are businesses owned by the farmers who supply them with milk. Farmer cooperatives range from very small, either by volume or membership criteria, to very large. Proprietary companies have gravitated toward the fluid milk and ice cream businesses, cooperatives have dominated butter manufacturing, and both have been important to cheese.

Proprietary Dairy Companies Consolidating

Mergers, acquisitions, leveraged buyouts, and divestitures have drastically changed the dairy industry. Large firms—those with food and nonfood sales in 1998 of $800 million or more (not including retailers)—accounted for 69 percent of U.S. dairy sales in 1998 (table 1). In 1975, firms of comparable size accounted for 56 percent of sales. Smaller companies have lost sales share since 1975, from about 44 percent to 31 percent in 1998. The sales share for large proprietary companies has grown from 39 percent in 1975 to 42 percent in 1998, while the share for large cooperatives has grown from 17 percent to 27 percent during the same period. The sales shares suggest that the lost sales of the smaller companies have been largely taken up by the large dairy cooperatives.

Proprietary companies are not classified as dairy companies unless 50 percent or more of their domestic sales are of dairy products. Based on that criterion, there were six large U.S. proprietary dairy companies in 1998—Dean, Suiza, Leprino, Schreiber, Southern Dairy Group, and Dreyer's/Edy's (table 2). Dean, Suiza, and the Southern Dairy Group sell mainly consumer packaged fluid milk and ice cream. Dreyer's/Edy's, an ice cream maker, is 22 percent owned by Unilever, a multinational food and household products manufacturer. Dreyer's/Edy's obtains a substantial share of its revenues from manufacturing and/or delivering products for other premium and superpremium ice cream companies

Table 1

Large Dairy Companies and Cooperatives Account for 70 Percent of Total U.S. Dairy Sales[1]

Type of firm	1975	1985	1994	1998	1975	1985	1994	1998
	Million dollars				*Percent*			
Large proprietary companies:	7,864	13,363	16,343	24,751	39.3	36.0	33.1	42.2
Diversified[2]	7,536	12,263	12,098	13,756	37.6	33.0	24.5	23.5
Specialized[3]	328	1,100	4,245	10,995	1.6	3.0	8.6	18.8
Domestic	7,364	9,931	10,731	18,132	36.8	26.8	21.7	30.9
Foreign	500	3,432	5,612	6,619	2.5	9.2	11.4	11.3
Large U.S. cooperatives	3,392	7,600	11,796	15,779	16.9	20.5	23.9	26.9
Smaller companies[4]	8,771	16,143	21,207	18,088	43.8	43.5	43.0	30.9
Total	20,027	37,106	49,346	58,618	100.0	100.0	100.0	100.0
Minimum sales for a large firm	250	433	630	800	NA	NA	NA	NA

NA = Not applicable.

[1]Sales value of raw bulk milk, packaged fluid milk products, frozen desserts, cottage cheese, butter, natural and processed cheese, dry milk products, canned milk, and bulk condensed milk from U.S. operations.

[2]Sales 50 percent dairy products or less.

[3]Sales more than 50 percent dairy products.

[4]U.S. and foreign companies, including smaller cooperatives.

Source: Alden Manchester and Don Blayney, ERS, USDA, drawing on information in *Dairy Foods* and *Dairy Field* magazines.

Table 2
U.S. Dairy Industry Exhibits an International Flavor

Company	Sales					Dairy products sold
	Domestic operations[1]			International operations		
	Total sales	Total domestic	Domestic dairy	Total international	Dairy products	
	Million dollars					
U.S. companies:						
Proprietary—						
Dean Foods	3,755	3,748	2,984	7	0	Packaged fluid milk products, ice cream
Philip Morris/Kraft	57,813	36,429	4,300	21,384	0	Cheese
General Mills	7,073	5,973	620	1,100	0	Yogurt
ConAgra	24,594	24,094	970	500	0	Packaged fluid milk products, cheese
Simplot Industries	3,000	2,600	350	400	0	Cheese
Michael Foods, Inc.	1,021	1,021	139	0	0	Cheese
Mars	14,000	8,000	205	6,000	0	Ice cream
Suiza Foods	3,321	2,904	2,572	417	244	Packaged fluid milk products, ice cream
Leprino Foods	1,300	1,300	1,300	0	0	Cheese
Schreiber	1,300	1,300	1,300	0	0	Cheese
Southern Foods Group[2]	600	600	550	0	0	Packaged fluid milk products, ice cream
Dreyer's/Edy's	1,022	1,022	842	0	0	Ice cream
Cooperative[3,4]						
Dairy Farmers of America	7,963	7,963	7,963	0	0	Bulk milk, cheese
Land O'Lakes	5,174	5,124	3,275	50	0	Packaged fluid milk products, ice cream, cheese, butter
Foremost Farms	1,376	1,376	1,191	0	0	Packaged fluid milk products, cheese
California Milk Producers	962	962	962	0	0	Bulk milk, cheese
Prairie Farms	1,620	1,620	1,620	0	0	Packaged fluid milk products, cheese
West Farm Foods	931	931	931	0	0	Bulk milk, cheese
AMPI	964	964	964	0	0	Bulk milk, cheese
Foreign companies:[5]						
Diageo, plc	16,303	8,007	320	8,296	100	Ice cream
Danone, S.A.	14,386	922	522	13,464	5,779	Yogurt
Bongrain, S.A.	2,040	360	360	1,680	1,680	Packaged fluid milk products, cheese
Bols Wessanen	2,912	1,922	961	990	407	Packaged fluid milk products, ice cream, cheese
Fromageries Bel	1,650	104	104	1,546	1,546	Cheese
Nestle, S.A.	51,991	10,615	300	41,376	13,595	Ice cream
Sodiaal, S.A.	3,077	240	240	2,837	2,837	Yogurt, butter
Unilever	44,895	8,546	1,035	36,349	3,100	Ice cream
Saputo Group	1,274	927	927	347	302	Cheese
Lactalis, S.A./Besnier	4,970	850	850	4,120	4,120	Cheese
Parmalat	5,959	450	450	5,509	5,509	Packaged fluid milk products
Allied Domecq, plc	6,248	1,285	200	4,963	0	Ice cream
Avonmore Waterford	1,616	200	200	1,416	948	Cheese

[1]Domestic operations are manufacturing plants in the United States, and sales include exports of products from those plants.
[2]Proprietary company share; the other 50 percent is included in Dairy Farmers of America.
[3]Sales of most include bulk milk.
[4]Includes estimated sales of dairy products in joint ventures.
[5]Includes proprietary companies and cooperatives.
Source: Alden Manchester and Don Blayney, ERS, USDA, drawing on information in *Dairy Foods* and *Dairy Field* magazines.

such as Ben and Jerry's, Mars Dove brand, and Nestlé. Leprino and Schreiber are well-known cheese companies. Another famous cheesemaker, Kraft, is a major subsidiary of the food/nonfood conglomerate Philip Morris.

Perhaps the more interesting note relating to U.S. proprietary dairy companies is the names that are not anywhere on our list. Companies like Borden, Sealtest, Pet, Beatrice, and Carnation, large dairy companies still in the 1970's, have gotten out of the dairy business altogether or were swallowed up by other companies. Also missing are the names of some retail food chains, companies particularly important in the evolution of fluid milk processing structure and competition.

Retail food chains became a significant part of fluid milk processing in the 1950's and 1960's when many bought or built large, efficient plants to process high volumes of fluid products for their stores. Retail food chains operating their own bottling plants—that is, integrated into fluid milk processing—sold about 17.5 percent of the fluid milk in 1980. By the late 1980's, the three largest chains of the 1970's that were integrated—A&P, Kroger, and Safeway—had made major readjustments and disposed of many milk plants. A&P had closed many supermarkets, including entire divisions of stores in geographic regions, leaving their milk plants with overcapacity. For a while, the A&P milk plants packaged milk for other supermarket chains but eventually got out of the business. Safeway and Kroger went through major restructuring in the 1980's, which eventually led to disposal of a number of milk bottling plants and greater reliance on buying milk from other companies, although both still package much of their milk. Integrated convenience stores, such as 7-Eleven and Cumberland Farms, also came into prominence over the last 25 to 30 years and, for a while, owned and operated significant numbers of milk processing plants. They too have left bottling.

The merger wave among retail supermarkets during the 1990's has provided some incentives to fluid milk processors to acquire other processors to supply private label (store brand) milk and ice cream to the growing supermarket chains (see "Grocery Retailers Demonstrate Urge To Merge" elsewhere in this issue). Suiza and Dean have been active in this regard. Suiza Foods grew rapidly in the 1990's through acquisitions and joint ventures with Dairy Farmers of America, the largest dairy cooperative. Kroger, a leader since the 1920's in the integrated milk business, merged in 1999 with Fred Meyer, a company also integrated into fluid milk processing. Kroger also acquired a milk plant when it purchased Winn-Dixie's Texas stores in 1999. Other changes in recent years include Michaels Foods, a large egg producer and processor, entering the dairy product business; Simplot Foods selling its cheese plants to Besnier (now called Lactalis) in 1999; and Labatt, a Canadian brewing company, selling its U.S. fluid milk business to Interbrew, a Belgian brewer, which in turn sold the last of its dairy subsidiaries in 1996.

Dairy Cooperatives Consolidating, Too

Dairy cooperatives are the primary marketers of bulk (raw) milk from U.S. dairy farms. This raw milk is sold to proprietary dairy processors or kept by the dairy cooperatives that have processing and manufacturing capacity for their own use. Dairy cooperatives process, manufacture, and distribute significant shares of butter, natural cheese, and nonfat dry milk. Cooperatives sold 61 percent of the butter, 40 percent of the natural cheese, and 76 percent of the nonfat dry milk in 1997. Consistent with trends in agriculture and other sectors, dairy cooperatives are fewer in number and are handling larger volumes of milk (table 3).

Today's dairy cooperative landscape has been shaped by merger activity perhaps more than at any time since the 1960's and 1970's, when the large regional dairy cooperatives were formed. Dairy Farmers of America (DFA) emerged in 1998 as the result of a merger of four regional cooperatives (Milk Marketing, Inc., Mid-America Dairymen, Inc., the southern division of Associated Milk Producers, Inc., and Western Dairymen). Land O'Lakes and California Milk Producers, as they existed in 1998, were the result of merger actions. Three large cooperatives in California united in 1999 to form California Dairies, Inc., a cooperative that might be as large as Land O'Lakes, the second largest in the country. Cooperatives continue to look at mergers and consolidations for various reasons, including gaining more milk supplies for their manufacturing plants and adding products to already existing lines.

Foreign Companies Engaging in U.S. Dairy Markets

Foreign-owned companies have been a growing presence in the U.S. dairy industry, particularly for frozen products, cheese, and yogurt. In 1998, large foreign-owned proprietary firms accounted for about 11.3 percent of domestic U.S. dairy product sales, up from 2.5 percent in 1975 (table 1). The foreign companies' share grew the most between 1975 and 1985. (We should point out that some proportion of the smaller company share in table 1 is from foreign-owned companies, but there

Table 3
Cooperatives' Share of U.S. Milk Deliveries Rose 9 Percent Since 1973

Year	Cooperatives	Producer members	Milk marketed to plants and handlers by U.S cooperatives		
			Quantity	Value	Share of total milk delivered
	Number		Million pounds	Million dollars	Percent
1973	592	281,065	83,227	6,102	76
1980	435	163,549	95,634	13,666	77
1987	296	120,603	105,798	16,548	76
1992	265	110,440	122,622	20,239	82
1997	226	87,938	127,418	23,374	83

Source: Compiled from Liebrand, 1995; Ling and Liebrand, 1994; and Ling, 1999.

is no way to determine the amount; it is likely to be small.)

Up through 1975, the only foreign companies in the U.S. dairy business were Nestlé and Unilever, each marketing a variety of dairy products. Since then, each has narrowed its dairy line in the United States to a single product—ice cream. In the 1980's, 12 other companies—all European except Labatt, the Canadian brewer, which came and went—have acquired U.S. dairy operations in order to expand their companies' marketing opportunities. Some of these acquisitions were facilitated by favorable exchange rates for their national currencies. In almost all cases, the acquired operations produced the dairy product line in which they specialized in their home country.

In 1998, Wessanen (Dutch), Bongrain (French), and Parmalat (Italian) were in fluid processing and Danone (French) was in yogurt. Unilever (British-Dutch) produces frozen products (Good Humor) and soft cheeses, Diageo (U.K.) makes frozen products (Häagen-Dazs), and Nestlé (Swiss) is in frozen desserts, dairy-based beverages, and other dairy product markets. Allied Domecq (U.K.) produces and sells frozen desserts (Baskin-Robbins), and Sodiaal (French cooperative) makes yogurt, butter, and dairy ingredients. The other foreign-owned companies listed in table 2 produce mainly cheese. Many smaller foreign companies also manufacture cheese in the United States on a more modest scale. Saputo Group, a Montreal-based cheese manufacturer, acquired Stella Cheese in 1997 and Avonmore-Waterford's Wisconsin cheese plants in 1998.

Brand Differentiation Weak

The decline in numbers and the growth in size of proprietary dairy companies and dairy cooperatives are seen by many as evidence of their growing market power—the ability to obtain a higher price for products. Manufacturers of consumer goods derive market power by differentiating their brands in consumers' minds. Strong brand preferences for most dairy products have always been more difficult to create than for many other foods.

Basic dairy products were standardized at an early date. For example, Federal law established the composition of butter (how much milk fat and what added ingredients are allowed) in the early 1900's. Products with rigid standards of composition are harder to differentiate. Standardized products generally are differentiated on the basis of quality, uniformity of quality, or variations in flavor or texture created by manufacturing or aging techniques. At one time, certain dairy companies were recognized for their high-quality brands for basic products like butter, cheese, or even milk. However, the value of such brands diminished greatly as quality became much more uniform.

Fluid milk and ice cream were subjected to more flexible standards than butter and cheese. Variations in butterfat content above minimum levels were important in earlier times for fluid milk, and some brands of high butterfat (4 percent) milk gained loyal customers. But in the last 20 years, milks with high butterfat have virtually disappeared. Somewhat more variation was, and still is, possible in butterfat content and other ingredients and flavorings for ice cream. Thus, ice cream makers are able to differentiate their products and command premium prices.

Product differentiation is relatively weak for most dairy products. Brands are important for processed cheeses, higher priced ice cream, some specialty cheeses, yogurt, and to some extent, butter. For the dairy products that are not so dependent on brands, such as fluid milk, market power rests on other sources—packaging and new product development are examples. Dean Foods and Prairie Farms have introduced

consumer-friendly containers similar to those for bottled water and soft drinks, which are carried in backpacks and pockets. Suiza is testing three low-fat milks with added nutrients, hoping to gain sales and loyalty among consumers looking for ways to increase calcium in their diets.

The structure of the dairy industry is often the subject of debate and has become more so as the firms involved have grown larger. The questions concerning the dairy industry are an outgrowth of the growing concerns about industrialization and concentration in agriculture. Farmers, consumers, and policymakers are asking questions about the prices agricultural product processors pay to farmers, the continuing viability of small family farms, and impacts on rural communities, farm families, and food costs for consumers. However, as the new century begins, nothing on the horizon suggests that the trends will not continue.

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Evolving Marketing Channels Reveal Dynamic U.S. Produce Industry

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Sales of fresh fruits and vegetables to U.S. consumers through supermarkets and other retail stores, through meals and snacks eaten in foodservice establishments, and through direct sales by farmers were $70.8 billion in 1997, up from $34.6 billion a decade earlier. Supermarket produce departments have expanded dramatically, increasing from an average of 173 items in 1987 to 335 in 1997. Many of these items—prepackaged salads, cilantro, and bok choy—reflect consumers' demand for added convenience, variety, and ethnic items.

Growing consumer demand for fresh fruits and vegetables and the changing structure of produce wholesalers and retailers have affected how produce travels from the farmer to the consumer. Both wholesalers and retailers have significantly consolidated as they have attempted to take advantage of economies of size in procurement and information technologies (see "Grocery Retailers Demonstrate Urge To Merge" elsewhere in this issue). More produce is being shipped directly from grower/shippers to large retailers that operate their own distribution centers, while less produce is shipped to wholesalers at central produce markets (terminal markets) in major cities. Within retailing, the amount of produce sold through discount mass merchandisers, such as Wal-Mart supercenters, has increased from almost nothing in 1987 to $1.3 billion in 1997.

Produce sales are also shifting from retail stores to foodservice operators. During the past decade, retail stores' share of total produce sales to consumers fell from 63.6 percent in 1987 to 48.4 percent in 1997 (fig. 1). The share of produce sales to consumers accounted for by the foodservice sector, in contrast, rose from 34.7 percent to 50.0 percent. The share of consumer sales through direct markets remained nearly constant at about 1.6 percent.

Health Concerns and Convenience Boost Consumption

Several factors account for the dramatic rise in consumption of fresh fruits and vegetables. Federal agencies, private health organizations, and produce companies have

Packaged salads—washed, precut, and ready to eat—answer consumers' cry for convenience and have helped boost fresh produce sales.

Credit: Ken Hammond, USDA.

Handy and Kaufman are agricultural economists with the Food and Rural Economics Division, Economic Research Service, USDA. Park and Green are extension support specialists with the Food Industry Program at Cornell University.

encouraged Americans to increase consumption of fruits and vegetables. For example, the Food Guide Pyramid, nutritional recommendations developed by the U.S. Departments of Agriculture and Health and Human Services, advises Americans to eat five to nine servings of fruits and vegetables per day. Campaigns like the Produce for Better Health Foundation's 5-A-Day program also seek to inform consumers of produce's health benefits. Improved quality, increased variety, and year-round availability have also boosted consumption of fresh fruits and vegetables.

Another factor contributing to rising consumption of fresh fruits and vegetables is the produce industry's effective response to consumers' and foodservice managers' demand for convenience. Packaged and precut vegetables and fruits are occupying more shelf space in the produce department as they continue to gain acceptance by consumers. Supermarket executives reported that packaged salads accounted for 9.7 percent of total produce department sales in 1997, up from 4.1 percent in 1994, and no reported sales in 1987. Fresh-cut produce (such as peeled baby carrots and cut melon) is growing rapidly and accounted for 5.2 percent of produce department sales in 1997.

Restaurants, fast food outlets, and other foodservice operators are seeking to reduce labor costs associated with food preparation by increasing their purchases of prepared, trimmed, and cut produce that is ready to use. Many of these new value-added products for retail and foodservice markets have been introduced since 1987.

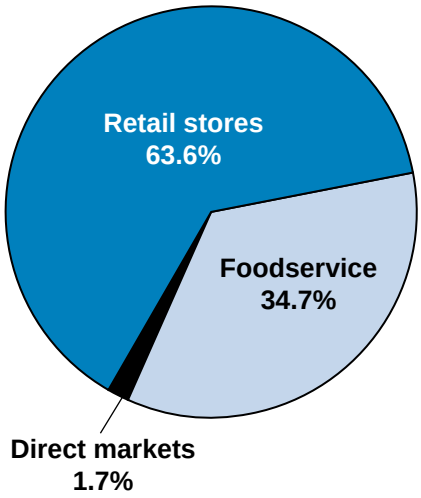
Consumption of fresh fruits and vegetables has increased by 12.3 percent over the period 1987-97 to 318.8 pounds per capita (table 1). Americans also consumed an additional 391.9 pounds per capita of canned and frozen fruits and vegetables. Consumption of fresh fruit increased from 121.6 pounds in 1987 to 133.2 pounds in 1997. The fresh fruits with the highest consumption in both 1987 and 1997 were bananas, apples, and watermelons. Per capita consumption estimates can overstate actual consumption because they include spoilage and waste accumulated through the marketing system and in the home.

Per capita consumption of fresh vegetables rose even more significantly, from 162.4 pounds in 1987 to 185.6 pounds in 1997. The three most highly consumed fresh vegetables in 1987 were potatoes, lettuce, and tomatoes, while in 1997, onions beat out tomatoes.

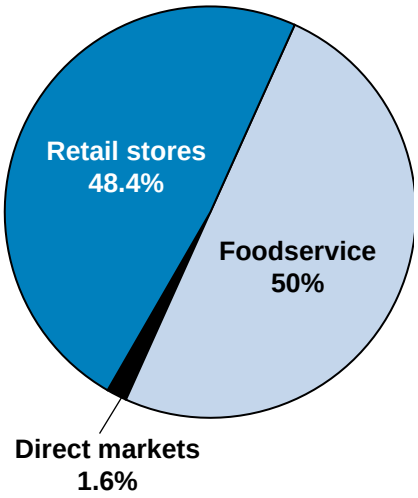
Along with the increases in fresh fruit and vegetable consumption in the last 10 years, the diversity of produce items has expanded. With the introduction of fresh-cut carrots, per capita consumption of fresh-market carrots increased from 8.3 pounds in 1987 to 14.4 pounds in 1997. Traditional varieties of some commodities have lost market share to specialty varieties. For example,

Figure 1

Retail Stores Had the Largest Share of Produce Sales to Consumers in 1987...



...But, Foodservice Had the Largest Share in 1997



Source: Figure 2.

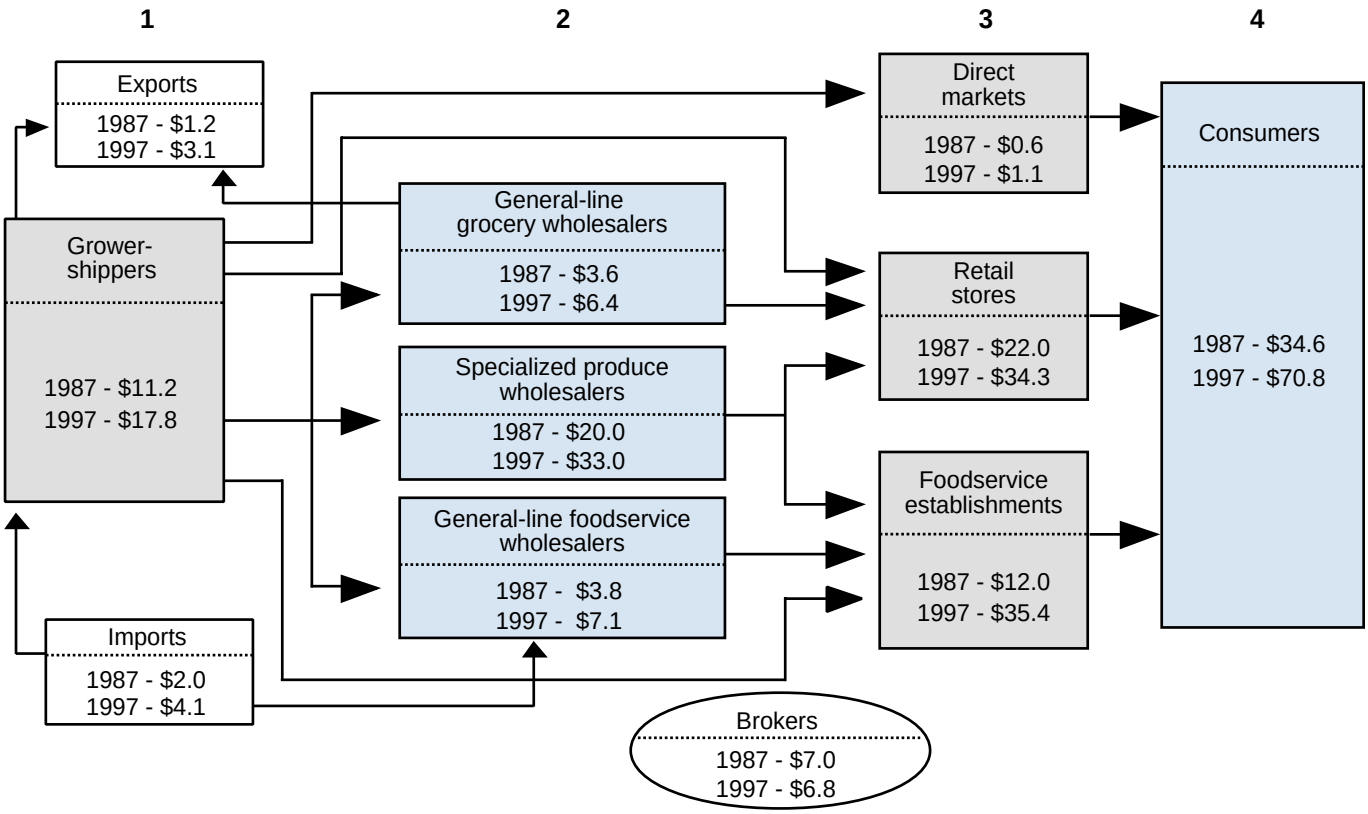
Table 1

Per Capita Consumption of Fresh Fruits and Vegetables Increased 12.3 Percent Between 1987 and 1997

Product	1987	1997	Percentage change
	Pounds per person		Percent
Total fresh fruits and vegetables	284.0	318.8	12.3
Fresh fruits	121.6	133.2	9.5
Fresh vegetables	162.4	185.6	14.3

Source: U.S. Department of Agriculture, Economic Research Service, *Fruit and Tree Nuts Situation and Outlook Yearbook,* 1999, and *Vegetables and Specialties Situation and Outlook Yearbook,* 1999.

Figure 2
Fresh Fruits and Vegetables Move Through Four Primary Marketing Channels



Note: All values are in billion dollars.
Sources: Census of Wholesale Trade: Census of Retail Trade *Blue Book*, 1997; McLaughlin and others, 1998.

per capita consumption of iceberg lettuce fell by 1.4 pounds between 1987 and 1997, while per capita consumption of romaine and leaf lettuces increased 3.6 pounds during the same period.

New Data Reveal Changes in Produce Marketing

A number of different, often competing, industries form the produce distribution system that procures, packs, ships, warehouses, facilitates transactions between buyers and sellers, and distributes produce to local retailers and foodservice operators.

Produce moves through four primary marketing channels on its way from the grower-shipper to final consumer—grower-shippers, wholesalers, retailers, and consumers (fig. 2). (Grower-shippers own the packing sheds that assemble, wash, and pack produce. A grower-shipper may handle produce bought from other growers, along with his or her own crops.) In addition to these four major channels, produce also moves through export and import channels and through direct markets that include farm stands, farmers' markets, and mail order companies (see box). Not all fresh fruits and vegetables move through each channel. For example, some imported fruits and vegetables are shipped directly to wholesalers, bypassing U.S. grower-shippers altogether.

Grower-Shippers Harvest, Package, and Ship Produce

After harvesting, fresh produce moves through various handling and packing activities performed either by a produce shipper or by the grower. For example, bulk lettuce is often washed and packaged in the field. These handling and packing costs are added to the growing cost to derive the total value of fresh produce at the grower-shipper level.

To arrive at a total value for the U.S. market, we must account for imports and exports. The value of imports of fresh fruits and vegetables equaled $4.1 billion in 1997, a 105-percent increase over 1987's total of $2.0 billion. Both grower-shippers and merchant wholesalers import produce for domestic use. Researchers at Cornell University estimate that, in 1997, $2.6 billion worth of produce was imported by grower-shippers and $1.5 billion worth was imported directly by wholesalers.

Exports by both grower-shippers and merchant wholesalers were valued at $3.1 billion in 1997, up 158 percent over 1987. The net value of produce imports minus exports in 1997 by grower-shippers was approximately $1.0 billion, which, when added to domestic production of $16.8 billion, gives a total value of $17.8 billion for fresh fruits and vegetables entering the U.S. distribution system from growers and shippers. A decade earlier, this total was about $11.2 billion.

Growing consumer demand for fresh fruits and vegetables is reflected in U.S. retail stores. Supermarket produce departments stocked an average of 335 items in 1997, up dramatically from the 173 items in 1987.

Credit: Ken Hammond, USDA.

Wholesalers Deliver Produce to Individual Stores and Restaurants

Grower-shippers serve a number of domestic produce customers, including wholesalers, self-distributing retailers, foodservice firms, and direct markets. Wholesalers serve as the next vertical stage in produce distribution, purchasing about 35 percent of total grower-shippers' volume. Wholesale produce sales in 1997 reached an estimated $53.3 billion, an increase of 54.7 percent over 1987 sales.

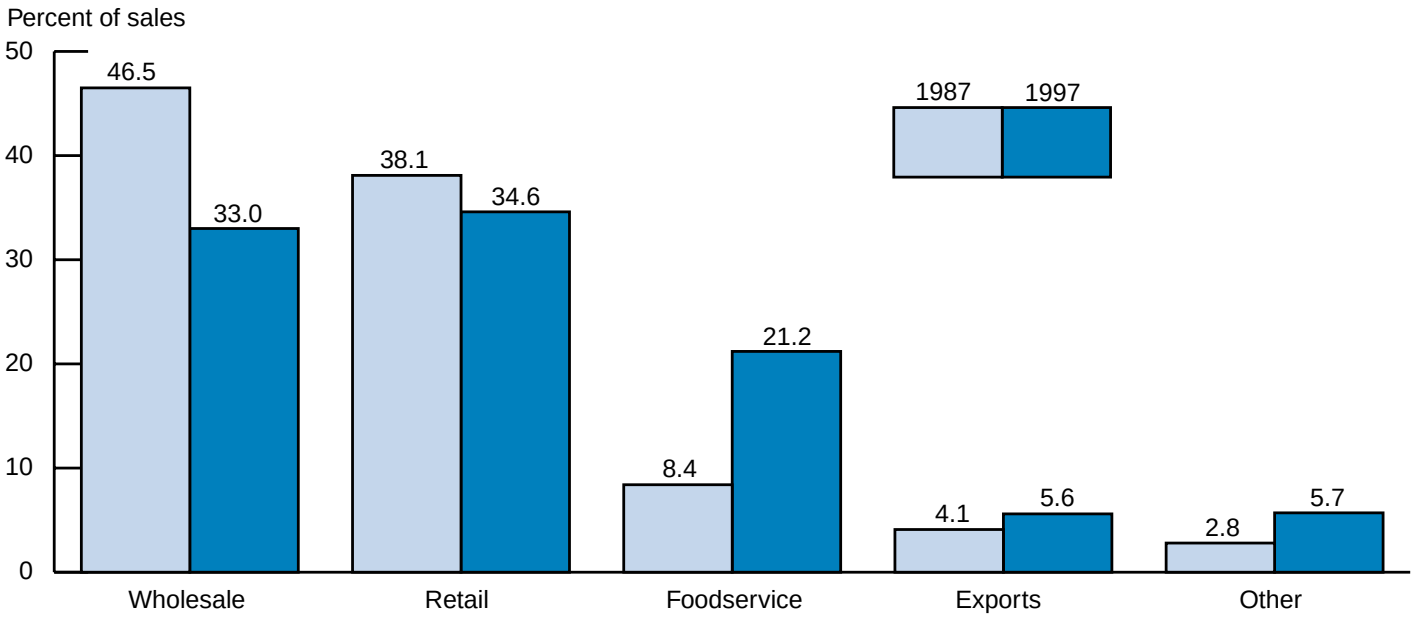
There are two basic types of wholesalers—merchant wholesalers and brokers. The majority of wholesalers are merchant wholesalers who take title to the product that they handle. Brokers do not take ownership of the produce but rather serve as an intermediary on behalf of either a grower-shipper attempting to sell produce or a wholesale or retail buyer of produce. Merchant wholesalers had estimated sales of $46.5 billion in 1997, an increase of 69.5 percent, while broker sales amounted to an estimated $6.8 billion, a 2.9-percent decrease since 1987. Although wholesale brokers still serve an important role in the produce market channels, they have declined in number, and their share of total wholesaler channel sales has declined as well, as larger grower-shippers deal more directly with larger retail buyers.

Merchant wholesalers consist of general-line grocery wholesalers, general-line foodservice wholesalers, and specialized fresh fruit and vegetable wholesalers. General-line grocery wholesalers procure grocery products, both food and nonfood, for individual stores or smaller retail chains that are too small to own and operate produce-buying offices, warehouses, and trucking fleets. General-line foodservice wholesalers serve foodservice establishments such as restaurants, hospitals, schools, and hotels and handle products specifically for foodservice use. Some of the largest foodservice wholesalers, Sysco and Alliant for example, carry a broad range of products including paper

Growers Also Sell Directly to Consumers

A minor but increasingly important share of fresh produce sales is transacted directly between the producer and consumer. Farm stands and stores, pick-your-own operations, roadside stands, farmers' markets, and mail order sales are ways growers market their produce directly to consumers. Direct sales benefit many smaller growers that are located near population centers. These direct sales are usually on a cash basis and are, therefore, extremely difficult to estimate. Using surveys conducted by Ed McLaughlin and Debra Perosio of Cornell University, we estimate that sales through direct marketing channels reached $1.1 billion in 1997, compared with $0.6 billion in 1987.

Figure 3
Share of Wholesalers' Produce Sales to Wholesalers and Retailers Declined in 1997



Source: Census of Wholesale Trade, 1987 and 1997.

supplies and equipment. Foodservice wholesalers handle a growing share of the produce flowing through the system and are an integral part of the produce marketing channel.

In addition to general-line grocery and foodservice wholesalers, specialized produce wholesalers procure and deliver fresh fruits and vegetables to retail stores and foodservice operators. They are often based at produce terminal markets located near large population centers. Specialized produce wholesalers handle the largest share of produce moving through merchant wholesalers.

Wholesalers' Customers Vary

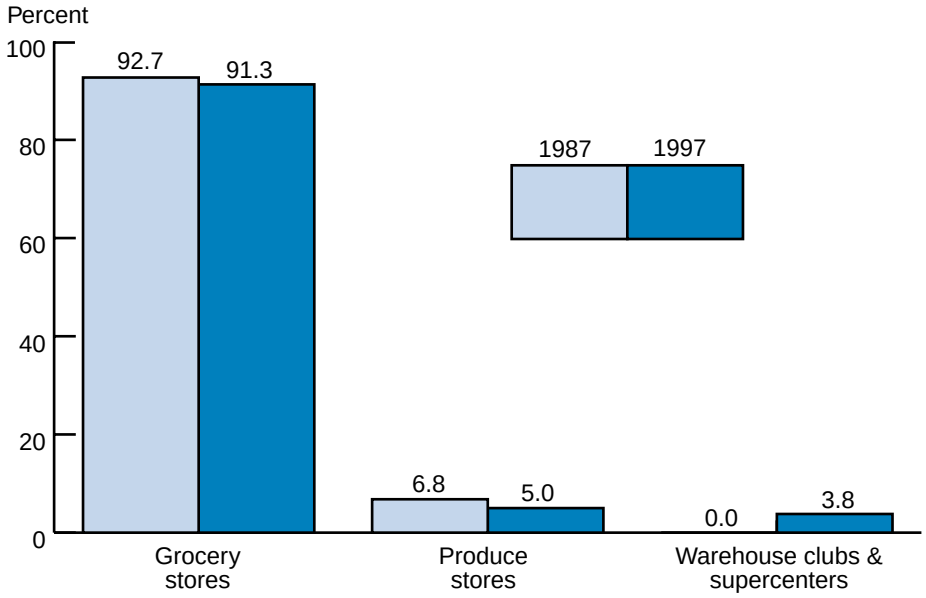
Wholesalers serve a variety of produce customers. However, as produce markets and market channels have evolved, the relative importance of those customers has changed in the decade since 1987. Foodservice customers and exporters gained in importance, while the share of sales to other wholesalers and to retailers declined (fig. 3).

In 1987, 38.1 percent of all wholesaler produce sales went to retail stores. By 1997, the share of their sales to retailers had actually declined to 34.6 percent. This decline in retailers' share of wholesalers' produce sales reflects the growing importance of large supermarket firms that purchase produce directly from grower-shippers. Retail store executives have reported that an increasing portion of their produce will be purchased in this manner. They predict that by 2004, 51 percent of their purchases will be directly from grower-shippers, up from 41 percent in 1997.

Conversely, the proportion of wholesaler sales to foodservice customers has increased substantially from 8.4 percent of total wholesaler produce sales in 1987 to 21.2 percent in 1997, as foodservice accounts for a larger share of the consumer's food dollar. What has offset this large increase in sales to the foodservice trade was a decrease in the proportion of sales to other wholesalers. In 1987, wholesalers sold 46.5 percent of their produce to other wholesalers, whereas by 1997, that number is estimated to have dropped to 33.0 percent.

The share of produce sales going to the export market also increased from 4.1 percent in 1987 to 5.6 percent in 1997. The increase in export and import activity has provided additional marketing opportunities for the wholesaler. It is still difficult for food retailing chains to buy produce directly from overseas growers. Therefore, a substantial portion of imports and exports enter and exit the system at the wholesaler

Figure 4
Grocery Stores Accounted for the Largest Share of Produce Sales by Retailers in 1987 and 1997



Source: Census of Wholesale Trade, 1987 and 1997.

level. According to some of the larger wholesalers, imports account for about one-third of their inventory at any one time.

Retailers Acquire More Produce Directly From Grower-Shippers

Retail food stores provide the overwhelming majority of produce purchased for at-home consumption. The 1987 Census of Retail Trade reported $22.0 billion worth of produce was sold through food stores in 1987. By 1992, produce sales through food stores had increased to $26.3 billion, an increase of 20 percent. The Census of Retail Trade defines food stores to include supermarkets and general-line grocery stores, convenience stores, delicatessens, and smaller food stores that specialize in products such as fruits and vegetables, meat, retail bakeries, candy, and dairy. While the number of these small specialty shops is extensive, they account for only 5.3 percent of produce consumed in the United States.

In the early 1990's, another retail phenomenon started emerging. Alternative retail outlets, other than grocery stores, started selling significant amounts of food to consumers. Some of these nontraditional outlets included mass merchandisers, such as Wal-Mart and Kmart, which started opening supercenter stores that housed clothing, small appliances, and other mass-merchandise and supermarket goods, including food, under one roof. In addition, warehouse club stores, such as Sam's and Costco, provided consumers with bare bones store services, but with tremendously discounted prices on goods. In 1992, these mass merchandisers and warehouse stores contributed an estimated $0.8 billion in produce sales.

By 1997, food stores still retained the majority of food, and produce, sales. Mass merchandisers, however, were increasing their food sales exponentially and were opening supercenter stores at a rapid rate. When combined with warehouse club sales, nontraditional stores accounted for $1.3 billion worth of produce sales in 1997. Produce sales from food stores were estimated at $33.0 billion in 1997.

The importance of the emerging, nontraditional retail food outlets is better viewed by looking at each outlet's share of total sales (fig. 4). In 1987, when wholesale club stores were just emerging, they carried no produce or other perishables and focused on providing discounted prices on bulk, dry groceries. National mass merchandisers had not yet built their supercenter formats. Supermarkets and other general-line grocery stores dominated food sales and sold approximately 92.7 percent of all produce sold through retail outlets. The remaining produce retail sales were through fruit and vegetable specialty stores (6.8 percent) and other specialty food stores (0.5 percent).

By 1997, however, warehouse clubs had added perishables, including produce, to their mix of products. Warehouse club stores sold 1.7 percent of all produce sold through retail stores in 1997, while mass merchandisers accounted for 2.1 percent.

Although sales of traditional food stores grew as well, nontraditional stores' sales grew faster, increasing the proportion of sales through mass merchandisers and wholesale clubs to 3.8 percent. Food stores sold 96.2 percent of retail produce sales in 1997, down from 100 percent in 1987.

Foodservice Accounts for Growing Share of Produce Sales

Foodservice establishments are another important outlet for pro-

duce sales to consumers. Consumers purchased an estimated $35.4 billion worth of fresh fruits and vegetables from fast food restaurants, white tablecloth dining, college cafeterias, and other foodservice establishments in 1997. The foodservice industry is highly fragmented with operations ranging from individual restaurants to fast food chains to hospital cafeterias. Because of this tremendous diversity, it is extremely difficult to use averages to describe the industry. In light of the increase in away-from-home eating, however, it is important to provide an estimate of the sales of produce through this channel.

When produce is purchased from foodservice, it is almost always purchased as part of a complete meal, already transformed substantially from individual commodities to a cut, primped, and prepared dish. In addition, typical margins added to food costs are much higher than in foodstores, due to the larger services component of the meal.

Placing a value on that portion of the meal or dish derived from produce is therefore extremely difficult. R. Brian How of Cornell University estimated foodservice sales of fresh fruits and vegetables in 1987 to be $12.0 billion. In 1997, Ed McLaughlin and others at Cornell reported that 11 percent of food costs for the foodservice industry was for produce. Applying this 11 percent to total foodservice sales results in approximately $35.4 billion in produce sales in 1997, an increase of 195 percent since 1987.

As packaging technology (and thus shelf-life) improves, more produce will be washed, peeled, precut, and packaged for greater convenience and ease of use. Supermarket and supercenter produce departments will continue to get larger—both in terms of total store space share and number of items stocked. Supercenters will continue their rapid growth—nearly 300 additional supercenters have entered the market since 1997. Still, the share of produce sold through the foodservice sector will likely increase as more meals and snacks are consumed away from home.

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Cereal Sales Soggy Despite Price Cuts and Reduced Couponing

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The ready-to-eat (RTE) cereal industry is highly concentrated, with the top four companies accounting for 84 percent of all RTE cereal sales. This concentration of sales allows the major manufacturers to de-emphasize price competition. With few competitors, prices for branded cereals are well above costs of production. Furthermore, the dominant cereal makers heavily promote their brands with coupons and mass-media advertising to try to boost sales and win consumer loyalty. Consumers are also inundated with scores of cereals. Introducing many new brands and offering numerous spin-offs limit the success of new firms and the makers of store brand cereals.

Consumption of RTE cereals has increased tremendously since their introduction over a century ago. According to USDA's Economic Research Service, per capita consumption of RTE breakfast cereals rose from 4.4 pounds in 1939 to a peak of 14.8 pounds in 1994 (fig. 1). During the mid-1990's, high prices for branded cereals and the gaining popularity of more portable alternatives such as bagels and breakfast bars caused RTE cereal sales to stagnate. Grocery store sales tracked by Information Resources, Inc., indicate that annual household purchases of RTE cereals declined approximately 1.5 pounds between 1993 and 1997. Although sales have slipped for cereal makers in recent years, RTE cereal remains a favorite breakfast food among American consumers.

While the popularity of RTE cereals has contributed to the manufacturers' success over the past century, the small number of cereal makers and their marketing strategies have allowed the companies to sustain high profits and sales growth up until the early 1990's. In the 1980's and the first half of the 1990's, the RTE cereal industry was one of the most profitable of all food manufacturing industries, with profits averaging 17 percent of sales.

In addition, the RTE cereal companies' production costs are well below the total value of their cereal shipments (approximately equal to the wholesale value of the cereal), as indicated by the industry's price-cost margin (PCM). The PCM is defined as the total value of industry shipments less the cost of materials (specifically those for food ingredients and packaging) and

Many grocery stores devote an entire aisle to breakfast cereals to make room for some of the over 400 brands of ready-to-eat cereals available for stocking.

Credit: Ken Hammond, USDA.

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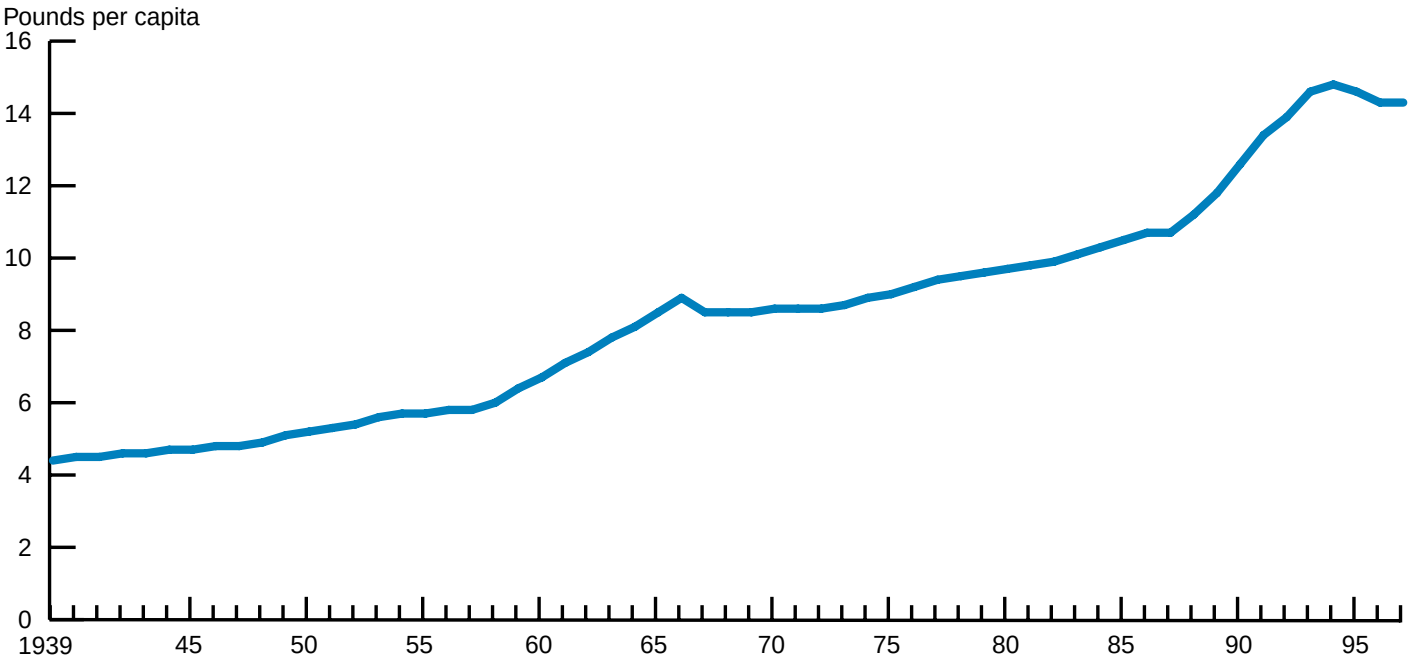
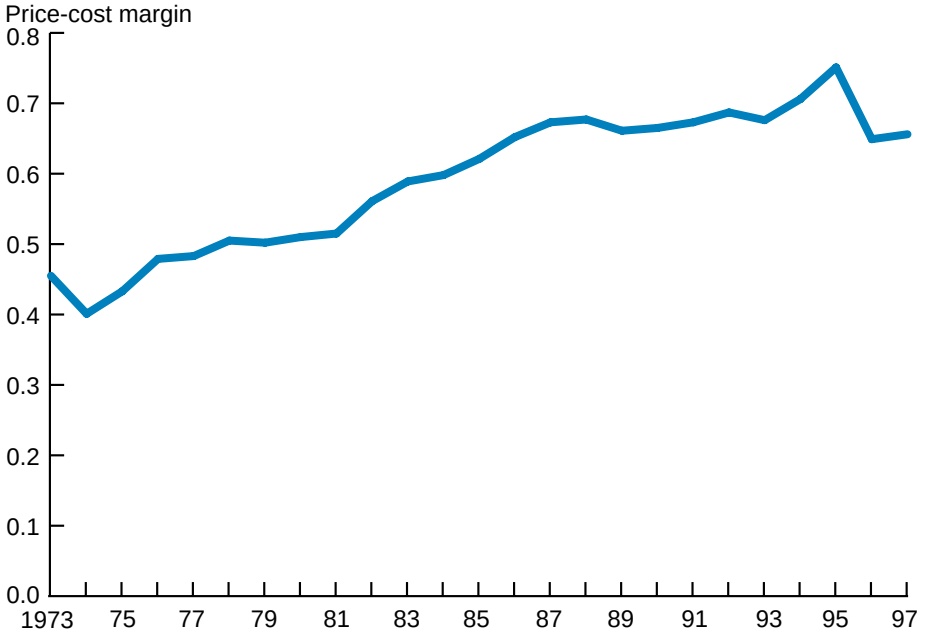
Figure 1
Per Capita RTE Cereal Consumption Stagnated in the Mid-1990's



Source: Economic Research Service, USDA.

wages paid to production workers divided by the value of shipments. In other words, the PCM denotes the proportion of total shipment value that is above production costs. Between 1973 and 1995, the RTE cereal industry's PCM (approximated with data from the cereal breakfast foods industry) climbed from 0.46 to 0.75 (fig. 2). The PCM's of other food manufacturing industries are much smaller. For example, the PCM's of the soft drink; frozen specialty foods; mayonnaise, sauces, and dressings; and cookies and crackers industries in 1997 were 0.37, 0.45, 0.46, and 0.55, respectively. In 1996, the RTE cereal industry's PCM slipped to 0.66, the lowest level in 11 years, because of deep price cuts that were intended to stimulate waning consumer demand. Consumers' consumption of RTE cereals declined in the early 1990's because of the high prices of name-brand cereals and the rising popularity of convenient breakfast foods such as bagels and toaster pastries.

Figure 2
Difference Between the Total Value of RTE Cereal Shipments and Production Costs Rose Steadily for Two Decades



Sources: U.S. Bureau of the Census, *Census of Manufactures* (various years) and *Annual Survey of Manufactures* (1992).

RTE Cereals Emerged in the 1860's and Took Off in the 1930's

The birth of RTE cereals can be traced back to around 1860 when the pioneer brands of RTE cereal were marketed as health foods. Processing innovations such as granulation, flaking, shredding, and puffing paved the way for other types of natural cereal like Henry D. Perky's shredded wheat in 1894. Perky, from his Niagara Falls, New York, factory, was the first individual to mass produce and nationally distribute RTE cereal. Perky sold his Shredded Wheat Company to the National Biscuit Company (later known as Nabisco) in 1928.

In the early 1900's, the center of the RTE cereal industry moved to Battle Creek, Michigan. It was there that J. H. Kellogg operated a sanitarium that stressed vegetarian nutrition as a healthy lifestyle, and he sent his own RTE cereals to former patients. One of his patients, C. W. Post, founded a cereal foods company and clinic. Post introduced Grape Nuts and Toasties (corn flakes) in 1898 and 1904, respectively, and he was the first RTE cereal manufacturer to promote his products with nationwide advertising campaigns. Fierce competition began when Kellogg's brother, W. K. Kellogg, produced his own version of corn flakes in 1906. Kellogg advertised his cereal in magazines and mailed free samples to individuals. Kellogg, Post, and Nabisco, the three leading firms nearly 100 years ago, were each independently operated until Post acquired Nabisco in 1993.

Consumers began to regard RTE cereals as different from cooked cereals (for example, oatmeal, cream of wheat, and cream of farina) in the 1920's and 1930's, and the demand for RTE cereals grew as the American economy expanded. Many companies entered the RTE cereal market due to the success of Kellogg and Post. Quaker, the dominant manufacturer of oatmeal, diversified its product line with puffed wheat and rice cereals. By the late 1930's, RTE cereals were more popular than hot cereals. Presweetening cereals and fortifying them with vitamins and minerals in the 1940's and 1950's boosted the popularity of RTE cereals even further.

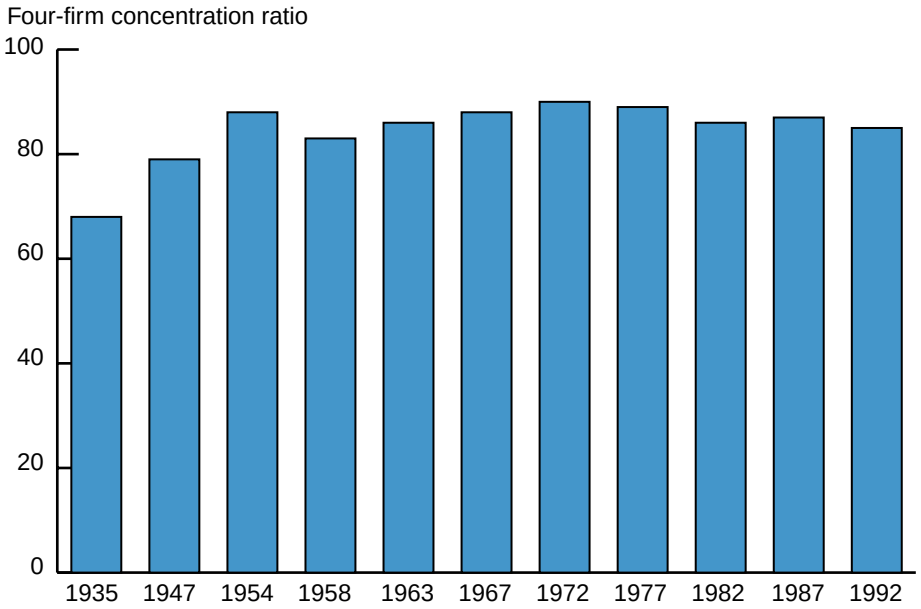
Number of Companies and Plants Have Shrunk

Many of the small, regional companies that began in the early 1900's went out of business over the next few decades. By 1947, only 55 companies made RTE cereal. The RTE cereal industry has remained highly concentrated for nearly half a century, as indicated by the industry's four-firm concentration ratio (fig. 3). This measure of industry concentration is calculated by adding together the market shares of the top four firms. Although the current level of concentration in the breakfast cereal industry is below the peak reached in 1972, the four-firm concentration ratio has remained above 80 for almost 40 years. Today, four companies—Kellogg, General Mills, Post, and Quaker—make practically all of the branded RTE cereal in the United States. According to John M. Connor, a professor of agricultural economics at Purdue University, there are only 6 to 13 domestic manufacturers of any given variety of cereal (for example, raisin bran).

Production of RTE cereal at the plant level has also become increasingly concentrated over the years. In the first decade of the 20th century, over 100 plants manufactured both hot and cold cereals. During the following 30 years, the number of plants fell dramatically. By 1940, only 30 to 35 plants produced nearly all RTE cereals. The most recent census information indicates that, in 1997, 36 plants produced all RTE cereals.

The dominant cereal manufacturers lower their per unit production

Figure 3
RTE Cereal Industry Has Been Highly Concentrated for Over 40 Years



Source: U.S. Bureau of the Census, *Concentration Ratios in Manufacturing* (various years). The four-firm concentration ratios were taken from the cereal breakfast foods industry, which includes the RTE cereal industry as well as other cereal manufacturing industries (in particular, those that produce hot and infant cereals).

costs by operating large plants that each supply 40 to 60 million pounds of cereal annually. The major producers also operate plants at several locations and, therefore, achieve multiplant economies mainly through reduced shipping costs by transporting final boxed cereal over shorter distances. The companies also increase their efficiency by producing several brands at one plant. Multiproduct economies arise due to synergies in handling and using common ingredients, equipment, and overhead.

In addition, the large cereal manufacturers enjoy economies of advertising. In other words, large firms can efficiently promote their brands with less advertising expenditures per unit than small companies. Primarily, large RTE cereal firms are able to negotiate significant discounts because advertising space in newspapers and magazines as well as television and radio time are purchased in volume or blocks. Moreover, the benefits accrued from promoting the large companies' brands typically spill over to similar cereals that the firms produce. For example, when General Mills advertises the traditional version of its Cheerios brand cereal, it indirectly promotes the other flavors and varieties (including honey and nut, frosted, apple cinnamon and multigrain) in the Cheerios line.

Price Competition Stymied

Because of the small number of firms, the major RTE cereal manufacturers realize that their actions are interdependent. Any given strategy not only affects the profit of the acting firm but also influences the performance of the other companies and the industry as a whole. As a result, the dominant producers deemphasize price competition and have done so since the mid-1940's. One company's price hikes are usually matched by the other firms, and price cuts are resisted to prevent destructive discounting practices within the industry.

Thus, branded cereal prices are well above costs of production. Compared with other processed food manufacturers, RTE cereal makers use a small amount of materials (including grains, sugar, dried fruit, nuts, oils, cardboard boxes, and plastic bags) relative to sales (27 percent in 1997). Economists have shown that, in the 1970's and 1980's, consumers paid prices for RTE cereals that were 18 to 38 percent above production costs. Significant price enhancements over production costs have also occurred in other food manufacturing industries such as the soft drink, oils and margarine, and flour mixes industries. For over 10 years, prior to the 1996 industry-wide price cuts, cereal price advances were greater than food-at-home price increases. Analyses by Ronald W. Cotterill of the Food Marketing Policy Center at the University of Connecticut indicate that cereal prices rose 91 percent from 1983 to 1994 while food prices, in general, increased only 45 percent during the same period.

Nearly all of the overall price increase was due to changes in the prices of branded cereals. Private-label cereals (also known as store brands) are not highly promoted or differentiated. Therefore, they are sold at prices that are significantly less than those of branded cereals. Connor noted that between 1989 and 1991, the average price difference between private-label and branded cereals was 43 to 47 percent.

The majority of private-label cereals are produced by Ralcorp and two smaller companies, Gilster Mary Lee and Malt-O-Meal. Interestingly, none of the major cereal makers produce private-label brands. Up until 1996, Ralcorp was the only branded RTE cereal manufacturer that also produced store brand cereals, and it controlled 60 percent of the private-label cereal market. In December 1996, General Mills acquired Ralcorp's branded cereal line. The products, marketed under the Ralston name, included the Chex line of cereals as well as Almond Delight and Cookie Crisp. Ralcorp realized that it could not operate profitably as the fifth largest manufacturer of branded cereals (in terms of sales volume), and the company decided to focus on its private-label cereal business. General Mills purchased the Ralston cereals in order to capture the Chex brands' 3-percent market share and solidify the company's number two position behind Kellogg.

The total market share of private-label cereals is small but has grown over the past two decades. The rising sales of these brands can be partly attributed to the increasing price differential between branded and private-label cereals. In 1999, private-label cereals accounted for over 10 percent of the total volume of RTE cereal sold, up from less than 3 percent in 1980.

RTE Cereals Are Heavily Promoted

Rivalry arises among the RTE cereal manufacturers through a variety of nonprice strategies. Advertising is used to differentiate similar cereals and to try to create consumer loyalty to particular brands. Connor's research shows that the major branded cereal producers spend 10 to 15 percent of the value of their sales on mass-media advertising, a significantly higher amount than in most other food manufacturing industries. This high spending raises the level of introductory advertising that is required for potential entrants to make consumers aware of their new brands. Cereal manufacturers also compete with each other by offering trade deals (such as free cases of cereal), and to a lesser extent, wholesale price discounts to

encourage retailers to stock their products.

For RTE cereals, couponing is the predominant promotional strategy. Company couponing expenditures average 17 to 20 percent of sales. Coupons are designed to persuade price-sensitive consumers to purchase brands that they would not normally buy without some type of discount. Couponing is an expensive promotional strategy because the firms incur costs beyond the total dollar value of the coupons. For example, while the total redemption value of the 44 billion breakfast cereal coupons issued in 1993 was $915 million, cereal manufacturers spent an additional $300 to $400 million on printing, distributing, and processing the coupons.

RTE cereal coupons have a high redemption rate because breakfast cereals are purchased frequently and the values of the coupons are larger than those for most other food products. In 1993, the redemption rate for RTE cereal coupons was 3.8 percent as compared with 2.2 percent for all grocery coupons. Moreover, approximately one-third of the volume of RTE cereal is purchased with coupons. The face values of coupons vary across firms and cereal type. Among the top four manufacturers, the average coupon value rises as firm market share falls. This relationship implies that the cereal makers issue coupons to try to increase their market shares. Some firms such as General Mills have been successful with this strategy. Other companies, namely Kellogg, have lost significant market share over the past 10 years despite the issuance of billions of cents-off coupons.

The coupon values offered to consumers by large cereal makers are typically higher than those offered by small producers (for example, Kashi, Health Valley, Organic Milling, and Weetabix). Large RTE cereal manufacturers also issue bigger cents-off coupons for new cereals than for established brands because the firms try to ease consumers' uncertainty about new brands with greater savings. Compared with those for adult brands, large cereal makers' cents-off coupons are typically smaller for presweetened cereals. The difference in size may be due to children's preference for presweetened cereals and parents' willingness to purchase them for their children. Specialized cereals such as granolas and brands with fruit and nuts have relatively large coupon values. The larger savings on those cereals may exist because they appeal to a narrow segment of consumers, and larger price cuts may be required to entice the purchasers of other types of cereal to switch to specialized brands.

Companies Produce Numerous Brands and Occupy Prime Shelf Space

In addition to hefty couponing budgets, top manufacturers of branded cereals produce an enormous number of brands that cover every possible niche in the market. This strategy, known as product proliferation, is a way by which the leading firms compete with each other. Product proliferation also minimizes the market penetration of small firms and private-label cereal makers. In most cases, new offerings of RTE cereal are variants of established brands. For example, General Mills offers Cheerios in several other flavors besides the traditional version. In the mid-1980's, cereal makers were introducing 60 new brands each year. In 1989, that number jumped to over 100 brands. By 1996, over 400 different brands of RTE cereal were available for stocking at grocery stores nationwide.

According to Richard Schmalensee, a professor at Massachusetts Institute of Technology, crowding the market with many brands allows the dominant RTE cereal producers to deter the entry of new companies and prevent fierce price competition that would hurt all established sellers. Offering numerous brands lowers the potential market share that a new cereal can acquire and reduces the probability that a new firm will have sales large enough to cover plant and production costs.

Product proliferation affects existing manufacturers to a lesser degree than potential entrants because the incumbents are established and have plants in operation. Furthermore, consumer acceptance of new brands is easier for established firms since consumers are familiar with the incumbents' other products. Moreover, a manufacturer's new product is more likely to succeed if the firm has a reputation for producing high-quality goods.

Shelf space and the location of brands on store shelves are extremely important to branded food manufacturers, including RTE cereal makers. Although most grocery stores have an entire aisle devoted to breakfast cereals, shelf space is still limited. Dominant branded food manufacturers negotiate product placement by sending sales representatives to individual stores. Since shelf space and product location are usually determined by past sales volume, large companies obtain the majority of shelf space as well as the most desirable locations: placement at the eye-level of adults and in the middle of the aisle. There may be little, if any, shelf space for small companies' products. If retailers stock these smaller companies' brands, they are usually placed at the ends of the aisle. Not having prominent placement of their products makes it difficult for small firms to compete. Small companies may be able to obtain good shelf positions by offering deals to retailers, such as giving free cases of their products, or offering temporary reductions on the wholesale prices

of their brands. However, these strategies are costly and cut into profits.

RTE Cereal Industry Comes Under Fire

Some regulatory agencies, elected officials, and consumer advocacy groups have been critical of the RTE cereal industry. These critics believe that the large cereal makers' pricing practices and marketing strategies have caused consumers to pay prices which greatly exceed the cost of producing the cereals. In 1972, the Federal Trade Commission (FTC) charged Kellogg, General Mills, Quaker, and General Foods (later known as Post) with monopolizing the industry through highly effective tacit collusion and not competing on the basis of price (Quaker was dropped from the suit in 1978). The FTC also alleged that the large cereal manufacturers were using product proliferation as a barrier to entry. After nearly 10 years of litigation, the companies were exonerated in September 1981.

Although the FTC did not oppose the 1993 merger of Post and Nabisco, it did not go unchallenged. Robert Abrams, the New York State attorney general, filed a motion to rescind the purchase and force Philip Morris (the parent company of Post) to sell Nabisco. When the case was tried in Federal court, the presiding judge ruled that Post's acquisition of Nabisco's 3-percent market share would not substantially lessen competition in the RTE cereal industry.

In 1995, Representatives Sam Gejdenson (D-CT) and Charles Schumer (D-NY) again sparked media and public scrutiny of the breakfast cereal industry with their report entitled "Consumers in a Box." Gejdenson and Schumer asserted that high retail prices and excessive promotional activities have hurt consumers.

Companies Cut Prices

For years, expenses for couponing, advertising, and trade promotions had exceeded the branded cereal manufacturers' costs of producing and shipping their cereals. Although some economists have taken the position that nonprice competition is wasteful and inefficient relative to price competition, it was not until the early 1990's that cereal makers began to reconsider the amount of money that was being spent on advertisements and promotions.

Household purchases of branded RTE cereals stagnated in the mid-1990's because of their high retail prices and consumers' switching to more portable foods such as bagels and breakfast bars. According to Information Resources, Inc., the average household purchased almost 25 pounds of cereal in 1993. Four years later, that value had declined to just over 23 pounds. Similarly, data from USDA's Economic Research Service indicate that per capita consumption of RTE breakfast cereals fell slightly in the mid-1990's after rising almost 6 pounds per person over the previous 20 years. Cereal sales were also shifting from national to store brands due to the 40 to 50 percent difference in their prices. Intense promotional spending, combined with waning consumer demand, contributed to the RTE cereal industry's lackluster performance in the early 1990's and forced the major manufacturers to address the situation hoping to improve sales and profits.

In April 1996, Post slashed the wholesale prices of its entire product line by 20 percent so that it could reduce the firm's reliance on couponing to promote its brands. Post also lowered the face values of its coupons as well as the number of cents-off coupons offered. Two months later, the other major players followed Post with similar actions. General Mills cut the prices

Ready-to-eat cereal makers issue billions of coupons annually to entice price-sensitive consumers to purchase their brands. Cereal coupons have a high redemption rate because the products are purchased frequently and the discounts are large.

Lower Coupon Values Offset Cereal Price Cuts

About one-third of branded breakfast cereal was being purchased using manufacturers' coupons prior to Post's 1996 price cuts. Consequently, cereal manufacturers had considerable opportunity to offset their price cuts with reduced couponing. The manufacturers could not, however, require retailers to pass along their wholesale price reductions to consumers. Retailers set shelf prices.

We used consumer panel data from Information Resources, Inc., for 1996 through 1998 to determine the influences of manufacturer couponing and shelf prices on the prices consumers paid for breakfast cereal after the 1996 price cuts. The data contain breakfast cereal purchases by more than 50,000 panel members. The data include shelf prices for branded and private-label cereals, the percentage of cereal purchased using a coupon, and average coupon values redeemed.

In the first full 4-week period following Post's April 15, 1996, announcement, overall branded cereal prices fell 3.5 percent (see figure). (The base price for calculating the reductions was $3.18 per pound—the shelf price of branded cereals for the 4-week period ending before Post's announcement.)

The rapid price reductions for branded cereals indicate that retailers passed on the manufacturer wholesale price reductions to consumers. In mid-October 1996, shelf prices for cereal had decreased by 9 percent relative to the base price. Price decreases in February and April 1997 relative to the base price were almost 10 percent. Shelf prices for cereal remained below their levels prior to Post's April 1996 announced wholesale price reduction for over 2 years, although the shelf price reductions became smaller over time.

Declines in the number and face values for coupons from mid-1996 to the end of 1998 partially offset shelf price reductions, lowering the price reduction for consumers who use coupons. The effective percentage price reduction in the figure is an average over all consumers (both coupon users and noncoupon users). These percentage reductions are calculated as follows. First, the effective coupon value is calculated by multiplying the average coupon value redeemed times the percentage of consumers using coupons. Then, the effective coupon value is subtracted from the shelf price to provide an effective shelf price. (A 1-cent decrease in effective coupon value is the same as a 1-cent increase in shelf price for all consumers.) Lastly, the percentage reduction in the effective shelf price is calculated.

During the 3-year study period, the average difference between actual and effective price reductions was 3.3 percentage points. The actual shelf price reduction over the 3 years averaged 7.1 percent. These results indicate that almost half of the shelf price reduction was offset by reductions in the quantity of coupons and their face values. Our analysis shows that the savings to consumers who use coupons from the branded cereal manufacturers' 1996 price cuts are greatly overestimated if coupon effects are ignored. However, noncoupon users received the full benefit of the price cuts as shown by the top (actual) line in the figure.

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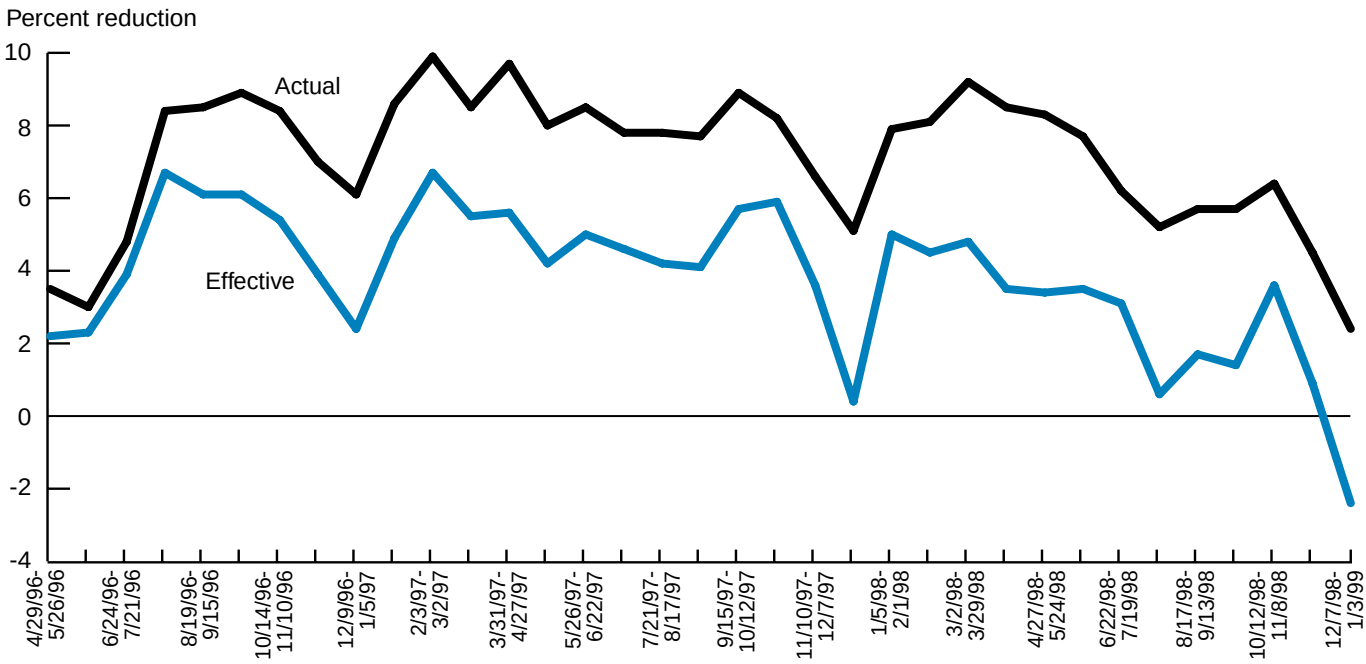
Actual and Effective Shelf Price Reductions for Branded Cereals



of nearly half of its cereals by 11 percent. In addition, Kellogg dropped the prices of those brands that competed directly with Post's cereals by 19 percent (approximately two-thirds of Kellogg's brands). Both General Mills and Kellogg also reduced some of their coupons' face values. While Kellogg, General Mills, and Post significantly lowered the prices of their cereals, it is suspected that the simultaneous reduction in the number and values of their coupons caused the net price effects to be much smaller than those claimed by the firms (see box).

Although the industrywide price cuts of 1996 were designed to stimulate sales and increase firm profitability, the manufacturers have struggled since then to achieve those goals. The industry's margin over production costs declined 12 percent in 1996 because of the slashing of cereal prices (fig. 2). The RTE cereal industry's PCM in 1997 was slightly higher than in the previous year, but it was still significantly less than the peak reached in 1995. It is possible that the firms underestimated consumers' sensitivity to price changes net of coupon savings. That is, because the net prices of cereals did not decline dramatically, consumers did not significantly increase their consumption of RTE cereals. On the other hand, the shift in consumers' preferences to portable breakfast foods may represent a long-term or even permanent change.

Despite the RTE cereal industry's reduced profitability over the past few years, Post and General Mills have gained significant market share, mainly at the expense of Kellogg. In 1970, Kellogg's domestic market share reached 47 percent. However, the company's market share has dropped precipitously since that time. Kellogg's slide has been due, in part, to the fact that its brands are easily imitated by private-label cereal makers. While Kellogg remains the top manufacturer in the industry with 31 percent of total volume in 1999, General Mills has surpassed Kellogg in terms of the share of total dollars spent on RTE cereals. General Mills' share of total RTE cereal volume was 26 percent in 1999. Post's 1996 price cuts and its acquisition of Nabisco boosted the company's market share to 17 percent in 1999, up from 12.5 percent in 1992. Quaker's sales currently cover approximately 10 percent of the RTE cereal market.

The price cuts do not seem to indicate a permanent change in the RTE cereal industry's pricing behavior. Cereal makers counteracted their 1996 price reductions with fewer coupons and smaller face values, thus making the effective price cuts smaller than what were stated by the firms. The industry's profitability did not significantly improve, and the major cereal producers have reacted in recent years by raising prices again (as evidenced by the industry's rising PCM). Therefore, it appears that despite waning consumer demand for RTE cereals, the leading firms will try to maintain profitability through intense nonprice promotional strategies.

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Grocery Retailers Demonstrate Urge To Merge

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Two blockbuster mergers were announced in 1998 involving the largest-ever combined sales by food retailers. Kroger, already the largest grocery retailer in the United States with 1997 sales of $26 billion, merged with Fred Meyer to form a multiregional supermarket operator with $45.3 billion in combined sales in 1999 (table 1). The merger resulted in the combined sales accounting for an estimated 10.4 percent of total grocery store sales, which reached $434.7 billion in 1999, including sales of supermarkets, superettes, convenience stores, delicatessens, and smaller grocery stores. With Fred Meyer operated as a wholly owned subsidiary of Kroger Company, the combined firm operates 2,288 supermarkets in 31 States and 816 convenience stores in an additional 6 States.

Also in 1998, the fourth-largest U.S. food retailer, Albertsons, initiated its merger with second-ranked American Stores—operator of Lucky Stores, Jewel, and Acme Markets—resulting in combined sales of $28.9 billion, operating 1,690 supermarkets in 38 States. These mergers are part of a recent strategy among the largest U.S. grocery store retailers to maintain their leading positions while considerably growing in size both by merging with or acquiring other grocery retailers (table 2 and fig. 1).

Mergers and acquisitions have enabled grocery retailers to quickly become larger by purchasing existing stores rather than building new ones. Prior to 1998, both Kroger and Albertson's had grown primarily by building stores in new locations and regions. Although mergers and

Table 1
Sales of the 20 Largest Food Retailers Totaled $232 Billion in 1999

Rank	Rank/retailer	Supermarkets owned	U.S. grocery store sales[1]
		Number	*Billion dollars*
1	The Kroger Company/Fred Meyer	2,288	45.3
2	Albertson's, Inc./American Stores, Inc[2]	1,690	28.9
3	Safeway Stores, Inc[3]	1,659	25.5
4	Ahold, USA	1,063	20.3
5	Wal-Mart Supercenters[4]	721	15.7
6	Winn-Dixie Stores	1,188	13.9
7	Publix Supermarkets	635	13.1
8	Delhaize America (Food Lion, Hannaford Bros.)	1,365	10.9
9	Meijer Inc.	130	9.5
10	Great Atlantic & Pacific Tea Co.	570	8.0
11	H.E. Butt Grocery Company	257	7.5
12	Supervalu[5]	345	6.6
13	Southland Corporation (7-Eleven)	n.a.	4.6
14	Shaw's Supermarkets	179	4.0
15	Pathmark Stores	135	3.7
16	Hy-Vee Food Stores, Inc.	247	3.5
17	Raley's	150	3.0
18	Aldi USA, Inc.	475	2.8
19	Wegman's Food Markets	57	2.5
20	Grand Union	221	2.3

n.a. = Not applicable.
[1]Sales by U.S. grocery stores, only. Excludes sales by other business units, foreign sales, and franchised sales.
[2]Excludes sales of drugstores.
[3]Includes sales of Randall's Supermarkets, acquired September 1999.
[4]Sales of food and nonfood grocery items only.
[5]Excludes sales other than company-owned grocery stores.
Sources: USDA-ERS estimates and company annual reports.

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Figure 1
The Pacific Region Led the Way in Number and Sales of Acquired Grocery Stores...

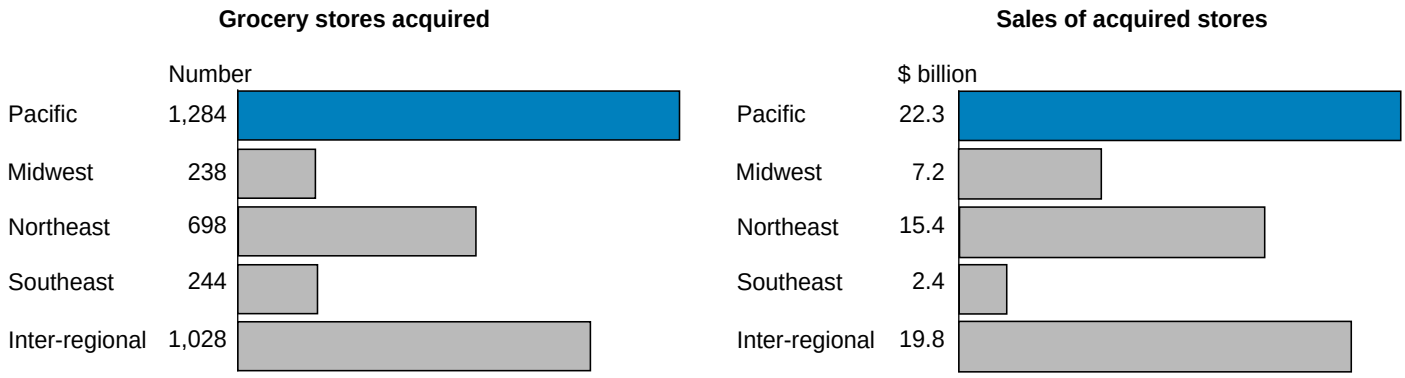


Table 2
...As the Nation's Largest Grocery Retailers Maintained Their Leading Positions and Grew by Merging

Acquiring and acquired retailer	Grocery stores acquired	Sales of acquired stores
	Number	*Million dollars*
Pacific Region:		
Safeway - Vons, 1997	325	5,400
Yucaipa - Fred Meyer, 1997	101	3,124
Quality Foods Centers - Hughes, 1997	57	1,250
Yucaipa - Smiths Food & Drug, 1997	150	3,000
Yucaipa - Quality Foods Centers, 1997	203	1,200
Albertson's - Lucky (American Stores), 1998	448	8,295
Midwest Region:		
Giant Eagle - Riser Foods, 1997	56	4,000[2]
Lund's - Byerly's, 1997	11	65
Albertson's - Jewel/Osco (American Stores), 1998	171	3,166
Northeast Region:		
Ahold - Stop & Shop, 1996	189	4,400
Ahold - Giant Food, Inc., 1998	176	4,200
Albertson's - Acme (American Stores), 1998	183	3,388
Food Lion - Hannaford, 1999	150	3,400
Southeast Region:		
Food Lion - Kash & Karry (Florida), 1997	100	1,000
Jitney Jungle - Delchamps, 1997	118	1,300
Kohlberg & Co. – Schwegmann's, 1997	26	115
Inter-regional:		
Safeway - Dominicks, 1998	112	2,300
Kroger - Yucaipa/Fred Meyer, 1999	800	15,000
Safeway - Randalls, 1999	116	2,500

[1]Total sales of American Stores (Lucky, Jewel/Osco, and Acme) was $19.9 billion in 1998. Sales by region exclude sales of 773 pharmacy/drugstores.
[2]Sales include wholesale sales to 586 independent grocery retailers.
Sources: Company annual reports, *Wall Street Journal* (various issues), *Supermarket News* (various issues), and *Food Institute Weekly Digest* (various issues).

acquisitions have always been a part of the food retailing industry, they were mostly on a smaller scale, involving a local or regional retailer. The large company combinations that have taken place since 1996 are unprecedented.

Supermarkets Debut in the 1930's

Mergers, acquisitions, and divestitures have always played a role in the changing structure of food retailing. During the 1920's, multi-store grocery chains, such as Kroger and A&P, expanded rapidly both by building new stores and acquiring others. The supermarket revolution began in the 1930's when single-store retailers introduced self-service, multi-department supermarkets. As their numbers grew, the procurement and selling efficiencies of supermarkets led grocery chain retailers to sell many of their smaller stores. By the 1950's, the chain retailers' transition to supermarkets was complete. Subsequent growth of large supermarket chains was accomplished through building new stores and through mergers and acquisitions.

Beginning in the mid-1980's, there was a wave of restructuring among many food retailers. These mergers involved "leveraged buyouts" in which an investor group would offer to purchase all outstanding stock of a publicly held grocery retailer, typically through the issuance of high-risk, high-yield debt often called "junk bonds." These private investor groups believed that after the purchase, a company would be worth more if the less profitable parts of the company were divested while maintaining the more profitable operations as a private company. As a result, leveraged buyouts often created smaller retailers through divestitures. The leveraged buyout of Safeway Stores, Inc., in 1986 began a series of often-controversial private investor buyouts of many publicly owned retailers, including Southland Corporation (7-Eleven), Supermarkets General Corporation (Pathmark), and Grand Union.

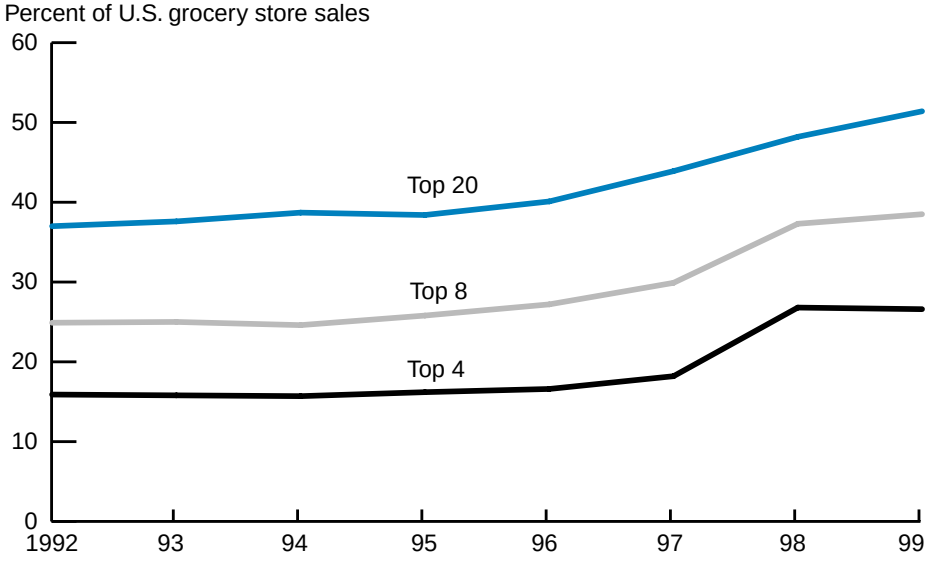
By the early 1990's, the leveraged buyout wave had ended. Some firms, such as Safeway, took steps to become public once again by issuing stock for sale to the public. Some grocery retailers grew by building new supermarkets or acquiring grocery stores, on a modest scale, from smaller firms to achieve sales growth. During the 1990's, the frequency of mergers and acquisitions fell as retailers focused on improving financial performance and reducing long-term debt. The blockbuster combinations in recent years are relatively few in number, but are large when measured by the number of stores involved, and by their effect on increases in the share of U.S. grocery store sales accounted for by the 4, 8, and 20 largest firms (fig. 2).

Retailers Face Slow Spending Growth and Higher Costs

The effect of slowing growth in real grocery store sales (net sales growth after adjusting for inflation) and competition from nontraditional retailer rivals is motivating grocery retailers to become larger.

Food retailing is a relatively slow-growth industry, typically expanding with increases in population, about 1 percent per year, on average. In the 1989-99 decade, real grocery store sales were relatively flat, averaging 0.2 percent annually. This small growth is likely the result of greater spending for food away from home and sales lost to other retailers selling food. The share of consumers' disposable income—income after taxes—spent on food sold in retail stores (food at home) has fallen from 7.1 to 6.3 percent over this same period. As incomes rose, consumers purchased more prepared foods and meals away from home. Of total spending for food, consumers spent 47 percent on meals and snacks in restaurants, fast

Figure 2
The 20 Largest Food Retailers Captured 51 Percent of the Nation's Grocery Store Sales in 1999



food places, and other foodservice establishments in 1998 compared with 45 percent in 1988, continuing a long-term trend.

In the 1980's, new store formats were developed to better address the needs of specific consumer segments, ranging from warehouse stores serving economy-minded shoppers, to organic and natural foods supermarkets aimed at less price-conscious, but health-oriented consumers. Nontraditional discount retailers such as mass-merchandisers and warehouse club store operators expanded their array of grocery products as well. Mass-merchandisers introduced the supercenter format containing a supermarket within a larger general merchandise department store. Warehouse club stores greatly expanded their grocery and perishable food offerings in order to expand their appeal to traditional supermarket shoppers and increase shopping frequency.

The growth of discount mass-merchandisers and warehouse club stores has likely provided additional sources of competition for food retailers. Mass-merchandisers, such as Wal-Mart, Kmart, and Target, and warehouse club operators, such as Costco, Sam's (a division of Wal-Mart), and BJ's, have increased their share of retail food sales from 2.8 percent in 1988 to 8.1 percent in 1998. In contrast, supermarkets' share of food sales fell from 65.8 percent in 1988 to 60.3 percent in 1998. Convenience stores, other grocery stores, specialized food stores, and other retail stores accounted for the remaining sales shares.

To compete with fast food eateries, as well as to address time-pressured shoppers' need for convenience, salad bars and prepared foods were introduced by grocery retailers. Although many supermarkets of the 1980's had a service meat counter offering sliced-to-order items, few offered prepared hot or heat-and-serve items. By 1997, fully 83.6 percent of supermarkets sold prepared foods, including sandwiches, pizzas, and pasta dishes, accounting for 4 percent of store sales, on average.

The produce department has changed dramatically through the provision of year-round varieties, pre-cut produce, and more packaged and branded products of higher quality. From 1987 to 1997, the number of different items sold in the supermarket produce department nearly doubled, from about 173 to 335, on average (see "Evolving Marketing Channels Reveal Dynamic U.S. Produce Industry" elsewhere in this issue). With the growing popularity of the Internet in the mid-1990's, a number of retailers introduced at-home shopping and delivery services, raising shopping convenience to new levels.

Food retailers have responded to changing consumer tastes and preferences through diverse store for-

The supermarket revolution began in the 1930's, when single-store, independent grocery stores invited their customers to take a basket and "serve yourself."

Credit: Archives of the Food Marketing Institute.

Today, discount mass merchandisers, such as Wal-Mart, and warehouse club operators have expanded their grocery product offerings and are cutting into supermarkets' sales. The share of retail food sales accounted for by these discount retailers grew from 2.8 percent in 1988 to 8.1 percent in 1998.

Credit: Ken Hammond, USDA.

mats and expanded product offerings and store services, despite their often higher costs. As a result, a number of grocery retailers have pursued mergers and acquisitions seeking efficiency gains in order to offset the higher costs of providing consumers with the variety and services they want.

Efficiency Gains and High Construction Costs Encourage Consolidation

Food retailers involved in recent mergers and acquisitions have cited potential lower costs and efficiency gains as primary benefits of consolidation. These retailers believe they can lower their procurement, marketing, and distribution costs if they increase in size. The retailers hope these lower costs will allow them to maintain their profitability while keeping prices competitive with mass-merchandiser and warehouse-club rivals.

To lower operating costs, consolidating grocery retailers are centralizing management and control at headquarters. New information technologies, such as companywide satellite and Internet communications and store checkout scanner data, allow for centralization of many management activities that previously were the responsibility of store-level managers. The availability of timely and detailed information at headquarters also allows for effective control of operations over relatively large geographic areas.

Food retailers also cite greater efficiencies in the procurement of retail products as a benefit of consolidation. Food retailers hope to lower per unit cost of goods by negotiating with suppliers and distributors for lower wholesale prices on large orders. In return, retailers are able to offer exclusive procurement agreements such as partnering, long-term agreements, and other strategic alliances that offer potential benefits to suppliers and distributors. Retailers also gain a more reliable source of supply, and, over time, can work to develop higher quality and more uniform food products, very important for many perishables such as produce, meat, and prepared foods.

Large supermarket chains are also asking suppliers and distributors to provide additional marketing services that formerly were the responsibility of retailers. These marketing services include designing and providing category management activities, in which the mix of items sold are determined both by their sales and by distribution and in-store costs associated with the item; supplying in-store promotion and point-of-purchase promotional materials, such as special displays and shelf-based coupon dispensers; planning and advertising sales events; and providing special packaging, such as multiple-item packs or special package sizes. Retailers may also share checkout scanner data with suppliers and distributors to better evaluate how consumers respond to promotions, advertising campaigns, and price changes. By working closely with their suppliers and distributors, retailers can reduce marketing costs while improving the effectiveness of store-level marketing activities.

Large retailers also cite potential cost savings through streamlining product distribution functions. Large grocery chains typically perform wholesaling activities such as purchasing goods from suppliers, arranging for shipment to distribution warehouses, and replenishing store-level inventory. Supply-chain management practices such as continuous inventory replenishment (a method by which more frequent deliveries by suppliers reduce storage and inventory costs of the retailer), the use of cross-docking facilities (where single-load truck shipments from suppliers are transferred directly to mixed-load trucks for shipment to stores, eliminating the need for warehousing), direct store delivery to supermarkets by suppliers, and selective use of specialized wholesalers can reduce the need for large retailer-operated distribution centers and their associated costs.

Another factor contributing to growth through mergers and acquisitions concerns the greater capital expenditure requirements of building new stores compared with the purchase of existing stores. Today's larger supermarkets and supercenters call for much higher sales volume in order to achieve profitability. As long as 2 years may be required to develop sufficient sales volume to achieve positive store profitability, whereas most existing stores have already reached minimum sales requirements. As a result, the financial risk of building a new store is often greater than purchasing an existing store.

Consolidation's Effect Varies

Grocery retailers are consolidating to ensure their long-term success in response to competitive forces. Trends in consumer spending and the growth of nontraditional retailers are likely to continue. Whether expected benefits to consolidating retailers will be realized has yet to be determined. Over time, analyses of profitability, sales growth, and operating costs will show whether these large retailers have benefited from consolidation. Smaller retailers also may adopt supply-chain management practices to gain efficiencies as an alternative to becoming part of a larger company.

Concerns have been raised about sufficient competition as grocery retailers become larger in size but fewer in number. One safeguard is the role of Federal antitrust agencies that review mergers and acquisitions for their impact in the local areas such as cities and towns where retailers compete. Regulators may require the sale of one or more of the firms' retail outlets to another competitor in order to preserve competition in the affected local market area. For example, antitrust regulators required Albertson's and American Stores to sell 144 supermarkets operating in 57 local markets in California, Nevada, and New Mexico before approving the merger of these two grocery retailers. Regulators determined that the merger as proposed would substantially lessen supermarket competition, and higher prices, or reduced quality and selection for consumers could result in those local markets.

Consolidation may have the greatest impact on grocery suppliers, such as wholesalers and manufacturers and farmers. As more grocery retailers pursue supply-chain management practices, suppliers will be asked to perform more retail support activities, such as marketing and promotion. Suppliers must be willing to develop these capabilities through employee training and adopting new technologies. Small grocery suppliers may conclude that by forming alliances, such as joint ventures, cooperatives, or even mergers, they are better able to meet the procurement and marketing needs of large retailers. Other suppliers may concentrate in a niche market, such as specialty fruits and vegetables or organically grown foods, to have the capability to meet the procurement needs of all sizes of retailers.

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Decline in Nutrition Assistance Expenditures Continued in 1999

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Federal expenditures for domestic nutrition assistance totaled $32.9 billion in fiscal 1999. This represented a 2.5-percent decrease from the previous year, the third consecutive year in which annual nutrition assistance expenditures fell after increasing for 14 consecutive years prior to fiscal 1997 (fig. 1). Nearly all of the decrease in nutrition assistance expenditures was due to the contraction of the Food Stamp Program. Most of the other nutrition assistance programs expanded in fiscal 1999.

USDA's Food and Nutrition Service administers a wide variety of programs that comprise the Nation's nutrition assistance system. These programs differ by size, target population group, and type of benefits provided (see box on domestic nutrition assistance programs). They represent our Nation's commitment to the principle that no one in our country should fear hunger or experience want. By providing children and families better access to food and a more healthful diet, these programs provide a nutritional safety net to people in need.

This article discusses how each program expanded or contracted in fiscal 1999 (October 1998 through September 1999). Individual nutrition assistance programs are grouped into four broad categories—Food Stamp-Related, Child Nutrition, Supplemental Food, and Food Donation—in order to examine general trends. The data cited in this article are based in part on preliminary data submitted by various reporting agencies as of December 1999 and are subject to change as reporting agencies finalize data.

Costs of Food Stamp-Related Programs Declined Slightly

The Food Stamp Program is available to most households (subject to certain work and citizenship requirements) that meet income and asset criteria, unlike the other nutrition assistance programs that target specific groups. In lieu of the Food Stamp Program, Puerto Rico, the Commonwealth of the Northern Marianas Islands, and American Samoa receive grant funds that allow them to operate nutrition assistance programs designed specifically for their low-income residents.

While food stamp-related programs remain the largest of the four broad nutrition assistance groups, their share of the total expenditures for nutrition assistance has declined from almost 70 percent during its peak in fiscal 1992 to about 58 percent in fiscal 1999 (the lowest share since fiscal 1973). Combined expenditures for these programs totaled $18.9 billion in fiscal 1999, a decrease of 6 percent from fiscal 1998. This marked the fourth consecutive year in which expenditures for this group of programs declined.

In fiscal year 1999, 4.5 billion lunches were served as part of the National School Lunch Program, the second-largest nutrition assistance program behind the Food Stamp Program.

Credit: Ken Hammond, USDA.

The author is an agricultural economist with the Food and Rural Economics Division, Economic Research Service, USDA.

The Food Stamp Program

The Food Stamp Program is the Nation's principal nutrition assistance program, accounting for over half of all nutrition assistance expenditures in fiscal 1999. The Food Stamp Program was the only major nutrition assistance program to contract in fiscal 1999 (the other programs that contracted accounted for less than 1 percent of total nutrition assistance expenditures). Expenditures for the program totaled $17.7 billion in fiscal 1999, or 6.5 percent less than the previous year (table 1). By comparison, food stamp expenditures decreased by over 12 percent in fiscal 1998.

The fiscal 1999 decrease in expenditures was largely the result of a decline in program participation. An average 18.2 million persons per month participated in the food stamp program in fiscal 1999, 8.1 percent fewer than the previous year, and 33.8 percent fewer than fiscal 1994 when participation peaked at 27.5 million people per month. In fact, in each of the last 5 years, the number of food stamp recipients in a given month was lower than the corresponding month a year earlier (fig. 2). In fiscal 1999, about 1 out of 15 U.S. residents received food stamps, down from about 1 out of 9 residents in fiscal 1994 (see box on the proportion of the U.S. population receiving food stamps).

This steady decrease in participation is attributable largely to the Nation's favorable economic conditions and low unemployment rate. As people find work, their households' income increases, and they may either no longer qualify for food stamps or feel they no longer need food stamps. Welfare reform has also reduced participation in the Food Stamp Program by severely restricting the eligibility of legal immigrants and limiting the length of time that some nonworking able-

Table 1
Nutrition Assistance Program Expenditures Fell in Fiscal 1999

Nutrition assistance program	Program costs 1999	Program costs 1998	Change in costs, 1998-99
	Million dollars		*Percent*
Food-stamp-related programs[1]	18,911.6	20,109.0	-6.0
Food Stamp Program	17,665.2	18,894.6	-6.5
Nutrition assistance programs	1,246.4	1,214.4	2.6
Child nutrition programs[2]	9,325.5	9,059.0	2.9
National School Lunch	5,985.6	5,829.4	2.7
School Breakfast	1,333.6	1,271.6	4.9
Child and Adult Care Food[1]	1,613.5	1,553.2	3.9
Summer Food Service[1]	266.6	262.5	1.6
Special Milk	16.6	16.9	-1.8
Supplemental food programs	4,020.4	3,984.2	.9
WIC[1, 3, 4]	3,922.3	3,889.9	.8
CSFP[1, 5]	98.2	94.4	4.0
Food donation programs	493.6	457.3	8.0
Food Distribution on Indian Reservations[1]	75.3	71.6	5.5
Nutrition Program for the Elderly	140.2	141.1	-.6
Disaster Feeding	8.5	1.0	750.0
TEFAP[6]	266.6	234.4	13.7
Charitable institutions and summer camps	3.1	9.2	-66.3
All programs[7]	32,862.3	33,717.1	-2.5

[1]Includes administrative costs.
[2]Total includes the Federal share of State administrative costs, which was $109.6 million in fiscal 1999 and $125.3 million in fiscal 1998.
[3]Refers to the Special Supplemental Nutrition Program for Women, Infants, and Children.
[4]Expenditure data for fiscal 1999 do not include the costs associated with the WIC Farmers' Market Nutrition Program.
[5]Refers to the Commodity Supplemental Food Program.
[6]Refers to The Emergency Food Assistance Program.
[7]Total includes Federal administrative expenses of $111.2 million in fiscal 1999 and $107.6 million in fiscal 1998.
Source: USDA, Food and Nutrition Service, Keydata September 1999. Data subject to change with later reporting.

Figure 1
Nutrition Assistance Expenditures Continued To Decrease in Fiscal 1999

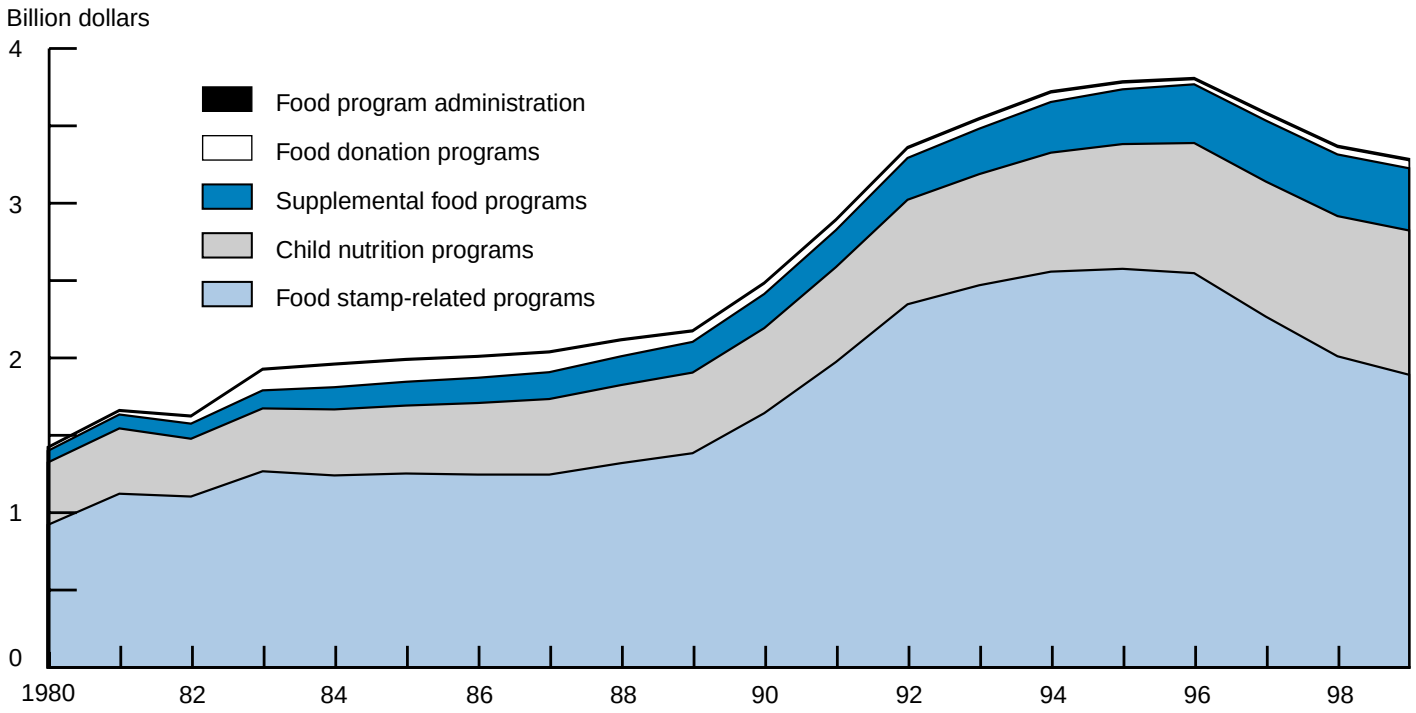
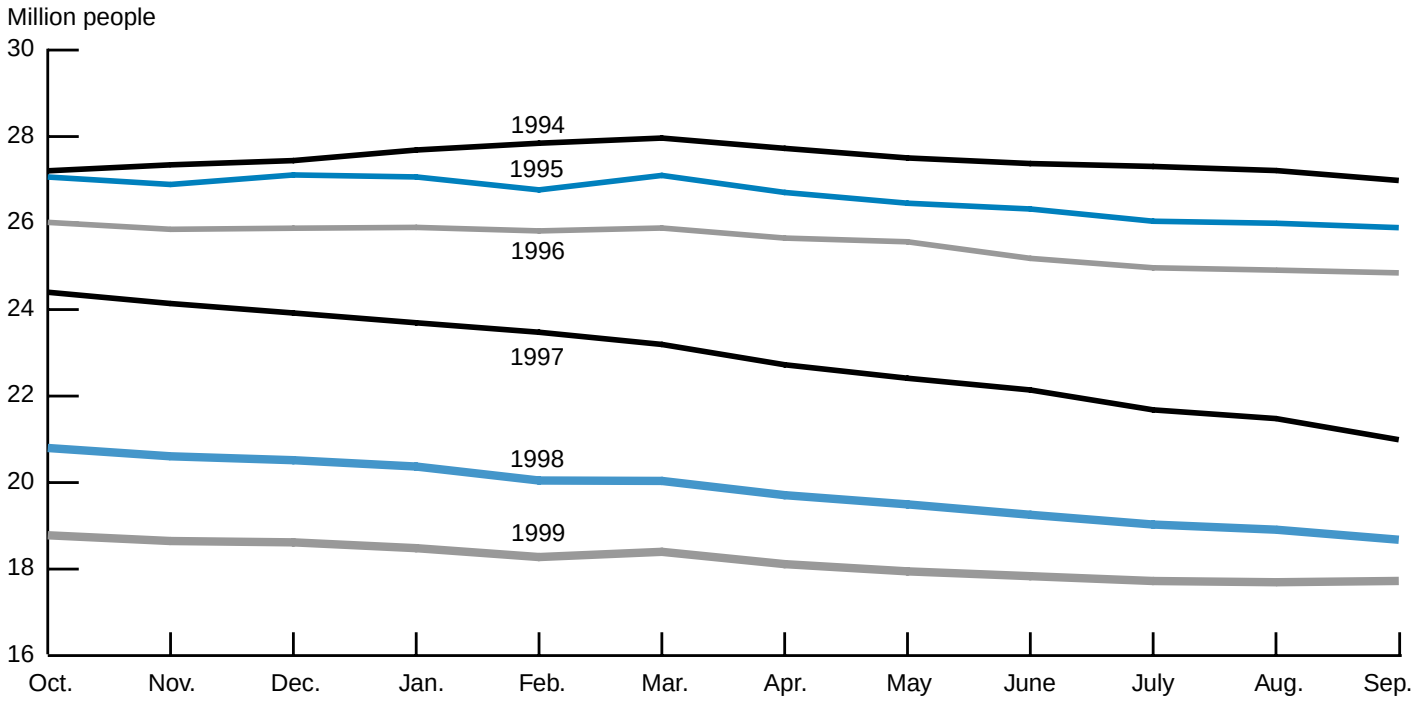


Figure 2
Number of Food Stamp Recipients Declined for 5th Straight Year in Fiscal 1999



Domestic Nutrition Assistance Programs

About one in six Americans are estimated to participate in at least one of USDA's nutrition assistance programs. The goals of these programs are to provide needy people with access to a more nutritious diet, to improve the eating habits of the Nation's children, and to help America's farmers by providing an outlet for the distribution of food purchased under farmer assistance authorities.

The cornerstone of USDA's nutrition assistance programs, the ***Food Stamp Program***, helps low-income households buy the food they need for a nutritionally adequate diet. The program provides monthly benefits for eligible participants to purchase approved food items at approved food stores. The Food Stamp Program is available to most households (subject to certain work and citizenship requirements) that meet income and asset criteria. Eligibility and benefits are based on household size, household assets, and gross and net income (gross monthly income cannot exceed 130 percent of the poverty guidelines).

Able-bodied adults between 18 and 50 who do not have any dependent children can receive food stamps for only 3 months in every 36-month period if they do not work or participate in a workfare or employment and training program. In the past, nearly all households received monthly allotments of coupons that were redeemable for food at authorized retail food stores. However, more than half of all food stamp benefits are now distributed by an Electronic Benefits Transfer (EBT) card system. (All States must convert to EBT systems by 2002.) The amount of a household's monthly food stamp allotment is based on USDA's Thrifty Food Plan, a market basket of suggested amounts of foods that make up a nutritious diet and can be purchased at a relatively low cost.

The Food Stamp Program in Puerto Rico was replaced in 1982 by the ***Nutrition Assistance Program***. In the same year, the Nutrition Assistance Program for the Northern Marianas was started. The program for American Samoa started in 1994. These modified food stamp programs receive Federal funds through block grants, which allow these areas to operate programs designed specifically for their low-income residents.

The ***National School Lunch Program*** provides lunch to children in public schools, nonprofit private schools, and residential childcare institutions. Schools receive cash and some commodities from USDA to offset the cost of foodservice. In return, the schools must serve lunches that meet Federal nutritional requirements and offer free or reduced-price lunches to needy children. Any child at a participating school may enroll in the program. Children from families with incomes at or below 130 percent of the poverty level are eligible for free meals, and those from families between 130 and 185 percent of the poverty level are eligible for reduced-price meals. Children from families with incomes over 185 percent of the poverty level pay a full price, though their meals are still subsidized to some extent. (Effective from July 1, 1999, through June 30, 2000, a family of four would have to have annual income at or below $21,710 to be eligible for free meals and at or below $30,895 to be eligible for reduced-price meals.)

The ***School Breakfast Program*** provides breakfast to school children, with students from low-income families receiving free or reduced-price meals (eligibility is the same as that for the National School Lunch Program). USDA provides schools with cash assistance to offset the cost of food service. In return, the school must serve breakfasts that meet Federal nutrition standards. As an incentive for schools in low-income areas to participate in the program, a school may qualify for higher "severe needs" reimbursement rates if a specified percentage of its meals are served free or at a reduced price and if preparation costs exceed the standard reimbursement rates.

The ***Child and Adult Care Food Program*** provides healthy meals and snacks to children in participating childcare centers and in family and group day care homes as well as to adults in adult day care centers. In centers, children and adults from low-income families are eligible for free or reduced-price meals based on the same eligibility guidelines used in the School Lunch and School Breakfast Programs. There are two sets of reimbursement rates for family day care homes. Those located in low-income areas, or whose own households are low-income, are reimbursed at one rate (tier I), while other day care home providers are reimbursed at a lower rate (tier II). In tier II homes, meals served to children who are identified as coming from households with income below 185 percent of the poverty level are reimbursed at the higher tier I rate.

The ***Summer Food Service Program*** provides free meals to children (age 18 and under) and handicapped people over 18 years of age during school vacations in areas where at least half of the children are from households with incomes at or below 185 percent of the Federal poverty guidelines. There is no

income test for eligibility in these low-income areas; any child in the program's operating area may participate. Sites not in low-income areas may participate if at least half of the children are from families with incomes at or below 185 percent of the Federal poverty guidelines (based on income applications collected from program participants). All children at these sites may receive free meals. The program is operated at the local level by sponsors who are reimbursed by USDA.

The ***Special Milk Program*** provides funding for milk in public and nonprofit schools, childcare centers, summer camps, and similar institutions that do not participate in any other federally assisted nutrition program. Milk is provided either free or at low cost to all children at participating sites. These sites may elect to serve free milk to children from families with incomes at or below 130 percent of the poverty level.

The ***Special Supplemental Nutrition Program for Women, Infants, and Children (WIC***) provides nutritious supplemental foods, nutrition education, and healthcare referrals at no cost to low-income pregnant and postpartum women, as well as infants and children up to their fifth birthday who are determined by health professionals to be nutritionally at risk. To be eligible in most States, income must fall below 185 percent of the poverty guidelines. States can, however, set lower income limits. Food vouchers can be redeemed at retail food stores for specific foods that are rich in the nutrients typically lacking in the target population (iron, protein, calcium, vitamin A, and vitamin C).

The ***Commodity Supplemental Food Program (CSFP)*** provides nutritious supplemental foods at no cost to infants and children up to their sixth birthday and pregnant and postpartum women, at or below 185 percent of the poverty level, who are not served by WIC. The program also serves persons 60 years of age or over with incomes not greater than 130 percent of the poverty guidelines. States have the option to require that participants be nutritionally at risk. The program provides food packages (instead of vouchers) tailored to the nutritional needs of the participants. The program operates in parts of 18 States and the District of Columbia.

The ***Food Distribution Program on Indian Reservation***s provides commodities to low-income households living on participating reservations and to Native American families residing in designated areas near reservations. It provides an alternative to the Food Stamp Program for many American Indians who do not have easy access to food stores. Participants receive a monthly food package weighing about 50 to 75 pounds containing a variety of foods selected to meet their health needs and preferences. Eligibility is based on household income, resources, and proximity to a reservation.

The ***Nutrition Program for the Elderly*** provides cash and commodities to States for meals served in senior citizen centers or delivered by meals-on-wheels programs. Administered by the U.S. Department of Health and Human Services, the program receives commodity foods and financial support from USDA. There is no income test for eligibility; all people age 60 or older and their spouses are eligible for the program.

The ***Disaster Feeding Program*** is administered by the Federal Emergency Management Agency (FEMA), which is responsible for coordinating disaster relief. Under this program, USDA provides food commodities for assistance in major disasters or emergencies when other food supplies are not readily available.

The Emergency Food Assistance Program (TEFAP), which began as a cheese-giveaway program in 1982, was implemented as a way to reduce inventories and storage costs of surplus commodities through distribution to needy households. In 1989, Congress appropriated funds to purchase additional commodities specifically for this program. USDA buys the food, processes and packages it, and ships it to the States. States are allocated commodities and administrative funds based on a formula that considers the number of people below the poverty level in each State and the number unemployed. Within broad guidelines, each State sets its own eligibility criteria and selects local emergency feeding organizations (including soup kitchens, food recovery organizations, and food banks) to distribute the food.

Under the ***Food Distribution Programs for Charitable Institutions and Summer Camps***, USDA donates food to nonprofit charitable institutions serving meals on a regular basis for needy persons and to summer camps for children. These institutions include orphanages, soup kitchens, temporary shelters, homes for the elderly, and church-operated community kitchens for the homeless. (Summer camps participating in the Summer Food Service Program are not eligible to receive commodities through this program.) The amount of food donated each year depends on the amount of surplus and price-support commodities available.

bodied persons can receive food stamps benefits.

While participation fell, the average monthly food stamp benefit per person increased slightly, from $71.12 in fiscal 1998 to $72.29 in fiscal 1999.

Nutrition Assistance Block Grant Programs

Because Food Stamp Program standards and criteria may not be suitable in outlying areas, USDA provides block grants to Puerto Rico, American Samoa, and the Northern Marianas Islands to operate separate nutrition assistance programs. Funding for these programs is limited to an annual amount specified by law, unlike the Food Stamp Program, which is an entitlement program that can expand or contract as more or fewer people become eligible. Combined expenditures for these programs totaled $1.2 billion, an increase of almost 3 percent over the previous fiscal year.

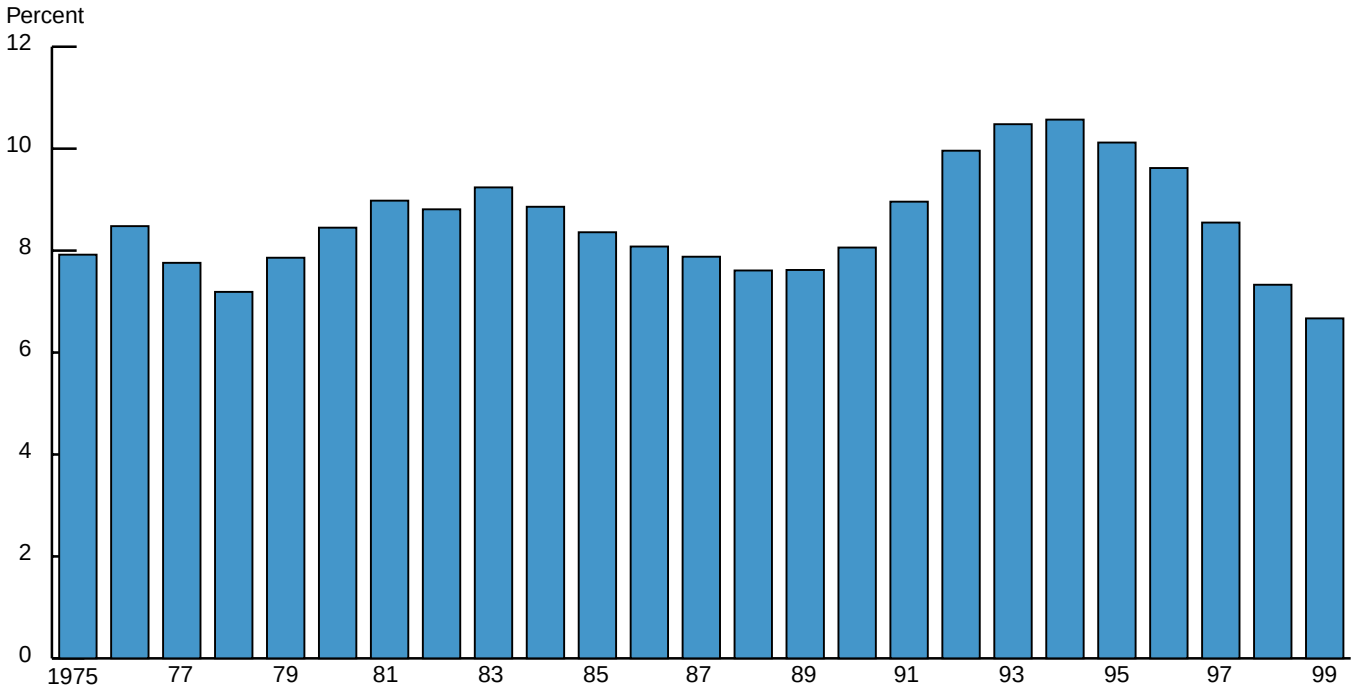
Child Nutrition Programs Continued To Expand

The Child Nutrition Programs consist of five programs: the National School Lunch, School Breakfast, Child and Adult Care Food, Summer Food Service, and Special Milk Programs. Together, these programs assist State and local governments in providing nutritious meals to children in those public and nonprofit schools, child care institutions, summer recreation pro-

The Proportion of People Receiving Food Stamps Drops

The number of food stamp participants peaked in fiscal 1994 at an average 27.5 million recipients per month. This represented almost 11 percent of the U.S. population, or about one in nine residents (see figure). From fiscal 1994 to 1999, the average number of food stamp recipients per month decreased by almost 34 percent to 18.2 million. During the same period, the U.S. population increased by almost 5 percent. As a result, the percentage of the U.S. population receiving food stamps fell to less than 7 percent, or about 1 in 15 residents. This represents the lowest percentage of the U.S. population on food stamps since the program achieved full nationwide coverage in 1975.

Proportion of U.S. Population Receiving Food Stamps Reached New Low in Fiscal 1999



Note: The proportion of the U.S. population receiving food stamps was calculated by dividing the average monthly number of food stamp recipients for the fiscal year by the national population estimate as of July 1.

grams, and adult day care centers that participate in the program. USDA provides reimbursement for all meals served in these programs. In most of these programs, the neediest children receive the largest subsidies. Continuing the trend of annual increases during most of the 1980's and 1990's, combined expenditures for these programs totaled $9.3 billion in 1999, or almost 3 percent more than the previous year.

National School Lunch Program

With 18 percent of all USDA nutrition assistance expenditures in fiscal 1999, the National School Lunch Program is the second-largest nutrition assistance program. It also accounted for almost two-thirds of all the child nutrition program expenditures. The program, which is available in almost 99 percent of all U.S. public schools, provided nutritious meals in close to 97,000 schools and residential child care institutions in fiscal 1999. Nearly 27 million children, or about 57 percent of the children attending these schools and institutions, participated in the program each school day.

A total of 4.5 billion lunches were served under this program in fiscal 1999, or 1.6 percent more than in fiscal 1998. About 49 percent of these meals were provided free to students and another 9 percent were provided at a reduced price. The remaining 42 percent were full-price meals; however, USDA subsidizes even these full-price meals to some extent. Expenditures for the program totaled almost $6 billion in fiscal 1999, or about 3 percent more than the previous year.

School Breakfast Program

Although the School Breakfast Program is much smaller than the National School Lunch Program, it serves about 7.3 million children each school day, or about 21 percent of the children attending participating schools and institutions. The program also serves a larger percentage of low-income children than the National School Lunch Program—78 percent of all breakfasts served in the program were free, and another 8 percent were reduced price in fiscal 1999.

The School Breakfast Program is the fastest growing of the child nutrition programs, as increasing numbers of schools make the program available. Almost 1.3 billion breakfasts were served in fiscal 1999, or 3 percent more than in fiscal 1998. Expenditures for the School Breakfast Program totaled $1.3 billion, or 5 percent more than in the previous fiscal year.

The Child and Adult Care Food Program

About 1.6 million meals were served under the Child and Adult Care Food Program in fiscal 1999, of which 53 percent were in child care centers, 46 percent in day care homes, and 1 percent in adult care centers. The number of meals served in fiscal 1999 increased by 9 percent in adult care centers and by 4 percent in child care centers. However, the number of meals served in day care homes declined by 1 percent, continuing a declining trend since welfare legislation reduced the reimbursement rate structure in those homes not located in low-income areas or operated by low-income providers. Program costs totaled about $1.6 billion in fiscal 1999, or about 4 percent more than in the previous fiscal year.

Summer Food Service Program

In fiscal 1999, a total of 137 million meals were served in the Summer Food Program, or about 2 percent more than the previous year. During the peak month of July, an average of 2.2 million children at 31,000 sites across the country participated in the program daily. All meals under this program are served free. Program costs totaled almost $267 million in fiscal 1999, or about 2 percent more than in fiscal 1998.

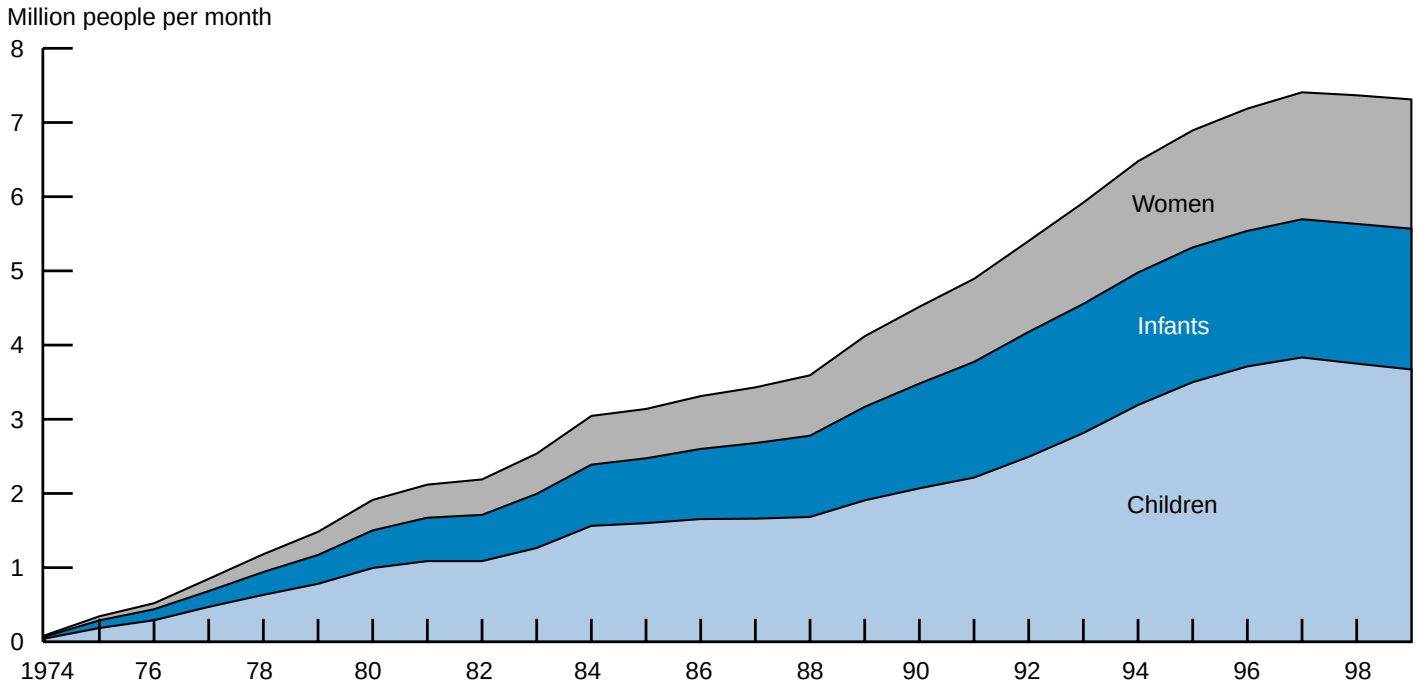
Special Milk Program

Expenditures for the Special Milk Program totaled about $17 million in fiscal 1999, or almost 2 percent less than the previous year, making it the only child nutrition program to contract in fiscal 1999. The number of half pints of milk served under this program in fiscal 1999 totaled over 128 million, or 4 percent fewer than the previous year. In fact, fiscal 1999 marked the 11th consecutive year in which the number of half pints served in the program decreased from the previous year. Schools continue to leave the Special Milk Program as they participate in the National School Lunch and School Breakfast Programs, which include milk with their meals.

Costs of Supplemental Food Programs Increased Slightly

The Supplemental Food Programs consist of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the much smaller Commodity Supplemental Food Program. Together, these programs had expenditures of $4.0 billion in fiscal 1999, an increase of about 1 percent from the previous year. After substantially increasing (about 9 percent annually) from fiscal 1990 to 1997, expenditures for these programs have leveled off the past 3 years.

Figure 3
Participation in WIC Has Leveled Off in Recent Years



The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)

WIC is the third-largest nutrition assistance program in terms of expenditures, trailing only the Food Stamp and National School Lunch Programs. Expenditures for WIC totaled $3.9 billion in fiscal 1999, an increase of less than 1 percent from the previous year.

An average 7.3 million people per month participated in the program in fiscal 1999, of whom 50 percent were children, 26 percent infants, and 24 percent women. The number of WIC participants has declined slightly in each of the last 2 fiscal years (this decrease was concentrated among children). This is in stark contrast to the dramatic annual increases in participation prior to fiscal 1998 (fig. 3). WIC is not an entitlement program and the number of people served by the program is limited by funding levels established by Congress. As funding for WIC has leveled off in recent years, the number of participants has stabilized.

The average monthly food cost per person in fiscal 1999 was $32.47, or 2 percent greater than in fiscal 1998.

The Commodity Supplemental Food Program

A monthly average of 382,000 persons participated in the Commodity Supplemental Food Program in fiscal 1999, about the same number as during the previous fiscal year. However, the change in the composition of participants continued, as elderly participants increased by 8 percent while the number of women, infants, and children decreased by almost 13 percent. As a result, the elderly component accounted for almost 71 percent of all participants in the program in fiscal 1999, compared with only 39 percent in fiscal 1990. Expenditures for the program totaled $98 million in fiscal 1999, about 4 percent more than the previous year.

Food Donation Programs Expand

The Food Donation programs include the Food Distribution Program on Indian Reservations, the Nutrition Program for the Elderly, the Disaster Feeding Program, The Emergency Food Assistance Program (TEFAP), and the Food Distribution Programs for Charitable Institutions and Summer Camps. The smallest of the four major nutrition assistance program groups, these programs provide food assistance to needy persons through the distribution of surplus foods purchased by USDA to support prices and stabilize market conditions.

Combined expenditures for these programs totaled $494 million in

fiscal 1999, an increase of 8 percent from the previous year. However, it remains far below the levels of the mid-1980's largely because of reductions in stocks of surplus foods. Modifications in the commodity price support programs and changing market conditions result in varying amounts of surplus food being available for distribution to the needy through these programs each year.

On average, 129,500 people per month participated in the Food Distribution Program on Indian Reservations in fiscal 1999, about 4 percent more than fiscal 1998. This marked the 6th consecutive year in which program participation modestly increased. Cost of the program totaled $75 million in fiscal 1999.

Although administered by the U.S. Department of Health and Human Services, the Nutrition Program for the Elderly receives commodity foods and financial support from USDA. In fiscal 1999, the program served 252 million meals, roughly the same as in fiscal 1998. Program costs to USDA totaled $140 million in fiscal 1999, a slight decrease from the previous fiscal year.

Expenditures for the Disaster Feeding Program totaled over $8 million in fiscal 1999, compared with only $1 million in the previous year. Much of the food assistance provided through this program in fiscal 1999 was for victims of Hurricane George in Puerto Rico.

Expenditures for The Emergency Food Assistance Program (TEFAP) (which includes the Food Donation Program to Soup Kitchens and Food Banks) totaled $267 million in fiscal 1999, an increase of almost 14 percent from fiscal 1998. Combined expenditures for the Food Distribution Programs for Charitable Institutions and Summer Camps totaled $3.1 million in fiscal 1999 or 66 percent less than the previous year.

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Awareness of Risks Changing How Hamburgers Are Cooked

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More Americans are eating their hamburgers more thoroughly cooked, partly due to greater awareness of the health risks of eating undercooked meat. The change in behavior means fewer cases of foodborne illness than would otherwise have occurred because thorough cooking kills harmful bacteria that may be present in the meat, such as *E. coli* O157:H7, *Campylobacter* or *Salmonella*. The changes also mean lower medical costs and productivity losses due to foodborne illnesses associated with rare and medium-rare hamburger. Understanding which consumers already follow food safety recommendations and why can help food safety educators reach more consumers through targeting and designing food safety messages.

According to the Consumer Food Safety Surveys by the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS), the percentage of consumers serving hamburgers rare or medium-rare fell from 25 percent in 1988 to 16 percent in 1998. These findings are supported by a survey done by the Market Research Corporation of America (MRCA), a private market research firm. According to the MRCA survey, the percentage went from 24 percent in 1991 to 20 percent in 1996 for consumers cooking hamburgers rare or medium-rare at home and from 21 percent to 15 percent for consumers ordering hamburgers rare or medium-rare in restaurants.

Consumers Switched for Their Health

In 1996, MRCA asked consumers how they usually cooked and ordered their hamburgers at the time of the survey and in 1991 (see box on surveys analyzed). About 10 percent of the respondents switched from cooking hamburgers rare or medium-rare in 1991 to cooking them medium, medium-well, or well-done in 1996 (fig. 1). However, about 4 percent of respondents reported switching from cooking

Surveys find U.S. consumers cooking their hamburgers more thoroughly and ordering rare and medium-rare hamburgers less often when eating out due to worry over foodborne illness.

Credit: PhotoDisc.

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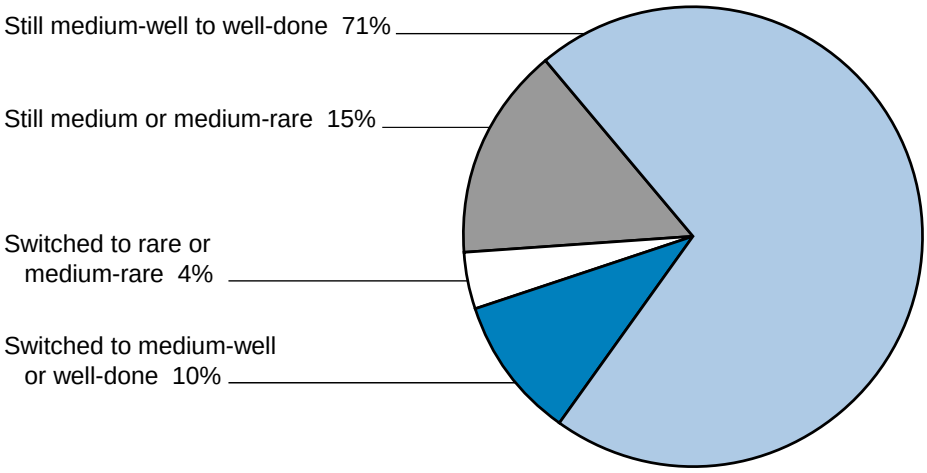
Figure 1
In 1996, 10 Percent of Respondents Said They Switched From Cooking Rare or Medium-Rare to Cooking Medium or Well-Done



hamburgers medium to well-done in 1991 to cooking hamburgers only rare or medium-rare in 1996. The results were similar for hamburgers ordered in a restaurant.

Almost three-quarters of the respondents who switched from less well-done to more well-done explained they had made the change because of the possibility of becoming ill. Some reported making the change because of their peers, and some because of taste. One-quarter of respondents who changed their ordering behavior reported making the change because restaurants were no longer serving hamburgers rare or medium rare.

Taste was the most often-cited reason reported for cooking hamburgers less well-done than 5 years ago. Many in this group also cited nutrition as a reason for cooking less well-done. This could reflect a concern about loss of nutrients during cooking, but another reason comes from focus groups conducted by FDA and FSIS in 1995. Some participants expressed a concern about overcooking lean hamburger—lower fat hamburger may lose juiciness and flavor when cooked well-done. Therefore, some consumers concerned about nutrition may be using lower fat ground beef and cooking it less well-done than they did in the past to preserve the juiciness and flavor.

Some consumers also cited fear of illness as a reason for cooking less well-done than 5 years ago. This concern about illness may be related to fears of carcinogens from the charred surface on a well-done hamburger—a concern also discussed by participants in the FDA/FSIS focus groups.

Food Safety Awareness Comes From Many Sources

Consumers receive food safety messages from a variety of sources—magazine articles, store brochures, television newscasts, and food labels. In 1995, FSIS began requiring safe handling labels on raw meat and poultry. The 2-by-1½-inch label reminds consumers to cook thoroughly, thaw properly, refrigerate unused portions quickly, and wash food preparation equipment and surfaces to avoid cross-contamination. FSIS worked with supermarket chains and local health authorities to jointly produce supermarket brochures and materials for school children to draw attention to the safe handling label and reinforce its messages. More recently, the Partnership for Food Safety Education, a public-private partnership, began the *Fight BAC!* campaign, a national educational campaign with messages similar to those on the safe handling labels. Media coverage of foodborne illness outbreaks and recalls of contaminated food also increase consumer awareness of foodborne illness risks.

It is difficult to separate the effects of labels and brochures from the effects of publicity surrounding foodborne illness outbreaks and recalls. In fact, the two are intended to work together because food safety officials work with news providers to incorporate food safety education into news, magazine, and television stories, and to increase awareness of safe food handling recommendations. Thus, food safety messages often reach consumers indirectly through newspapers, magazines, and cookbooks rather than directly from consumer education materials such as labels and brochures.

The importance of the many channels for food safety education is reflected in the diversity of sources respondents cite as providing food safety information. The 1996 MRCA survey asked respondents where they obtained information about "how to cook a hamburger to minimize the chances of getting sick." Newspapers and TV/radio were cited most frequently as information sources about how to cook hamburgers safely (71 percent of the sample for each). Word of mouth, magazines, and labels were also important, cited by 61, 58, and 50 percent of the sample, respectively. In the 1998 FDA/FSIS Consumer Food Safety Survey, food labels were the most frequently cited source of "a lot of information

about food safety," with 43 percent of respondents, followed by broadcast media (37 percent), print media (29 percent), and cookbooks (26 percent).

Respondents to other surveys say that both food safety education messages and media coverage of food safety issues contributed to their shift in hamburger cooking behavior. The 1996 Food Marketing Institute's (FMI) annual survey of consumer trends in grocery shopping found that 59 percent of shoppers had seen the new safe handling label for raw meat and poultry. Of those who had seen the labels, 43 percent said the safe handling labels had caused them to change their behavior and 8 percent (5.6 percent of the total sample) said they had begun to follow proper cooking directions. In FMI's 1997 survey, respondents were asked what they

Several Surveys Analyzed

FDA/FSIS Consumer Food Safety Surveys

FDA and FSIS conducted three Consumer Food Safety Surveys in 1988, 1993, and 1998. All three were conducted by telephone, with the adult in the household who most recently celebrated a birthday, in order to randomize the selection of respondents within a household. The 1988 survey covered 3,202 adults during the summer of 1988. The 1993 survey had a sample size of 1,620 and was conducted from December 1992 to February 1993. The 1998 survey had a sample size of 2,001 and was conducted from February to April 1998. The data for all three surveys were weighted using Census counts for 1990 based on proportions of the U.S. population categorized by ethnicity, gender, and education. That is, each observation was counted a certain number of times so that the proportions of the weighted observations in each demographic category would match the proportions of the 1990 U.S. population.

MRCA Hamburger Preparation Quiz

MRCA conducted this survey as a supplement to its ongoing Menu Census Survey from March 1996 to February 1997. The Menu Census Survey is a nationally representative mail survey in which respondents complete a 2-week diary on food consumption and a questionnaire on attitudes related to food purchases. The survey covers about 2,000 households that are selected from a 12,000-household purchase diary survey. The 12,000-household sample, 2,000 household subsample, and the Menu Census Survey are selected as stratified samples to match U.S. Census data for geographic and demographic characteristics. The Hamburger Preparation Quiz was added as a supplement to the Menu Census Survey attitude questionnaire. The supplement included questions on the respondent's usual hamburger cooking style, and how the respondent usually orders hamburgers in a restaurant, as well as questions about taste preferences for hamburger styles, risk perceptions about foodborne illness, sources for food safety information, and foodborne illness experience.

The household adult who celebrated the most recent birthday completed the supplement in order to randomize the selection of adult respondents within the household. The survey supplement was completed by 1,133 individuals, of which 571 provided complete responses to the questions used in this study. The data for both the Hamburger Preparation Quiz and the Hamburger Consumption Diary were weighted using Census counts for 1990 based on proportions of the U.S. population categorized by ethnicity, gender, and education of the household head.

FMI Trends Survey

FMI sponsors an annual survey called "Trends in the United States: Consumer Attitudes & the Supermarket." The survey covers a wide variety of consumer opinion and shopping behavior including, for 1996 and 1997, awareness of safe handling labels on meat and poultry. Data are representative of shoppers rather than the general population and are not weighted to reflect Census counts. The 1996 survey data on consumers' response to labels were collected from 1,007 telephone interviews during January 1996. The ratio of females to males in the survey is 73-27. The 1997 survey data on labels were collected from 1,011 telephone interviews conducted in January 1997, with a female-to-male ratio of 74-26.

How the Surveys Measured Hamburger Doneness

The FDA/FSIS and MRCA surveys used the respondent's judgement of the doneness of the hamburger (rare, medium-rare, medium, etc.) and the respondent's description of the color of a patty cooked to medium. These descriptions were based on the advice by FSIS, prior to 1997, that consumers cook hamburgers until neither the juices nor the meat showed any red or pink color.

In 1997, FSIS began recommending that consumers cook hamburgers to 160 degrees Fahrenheit using a food thermometer to accurately measure temperature. FDA and CDC joined in this recommendation in 1998. FSIS made the change because research at Kansas State University in 1997, confirmed by USDA's Agricultural Research Service in 1998, showed that some meat that has been frozen appears brown in the center before reaching a safe temperature (160 degrees Fahrenheit) while some meat still appears pink in the center even at temperatures above 160 degrees. The new thermometer recommendation was designed to prevent consumers from perceiving a brown, but unsafe, hamburger as thoroughly cooked, and to prevent wastage or overcooking of pink, but safe, hamburger.

were doing differently as a result of the safe handling labels. Thirteen percent reported they were "cooking properly," "using correct temperatures," or "following proper cooking directions." The large increase over 5.6 percent the previous year could be due to the new format of the question, since it was asked of all respondents, and not just those who specifically said they saw the label.

In 1998, the FDA/FSIS Consumer Food Safety Survey asked a similar question and found that 65 percent of respondents had seen safe handling labels on raw meat and poultry. While only 11 percent of those who had seen the label said that they found some of the information new, 29 percent of those who had seen the label said they had changed their behavior as a result of the label. Of those who said they changed their behavior, 22 percent, or 4 percent of the original sample, said they were now cooking meat and poultry properly. Here, the format of the question is more like the FMI survey in 1996, and the result is similar. This suggests that the large increase reported by FMI in 1997 was more likely due to the change in the format of the question.

These reported changes in response to labels could account for some of the changes in hamburger style choices. Assuming those who changed their behavior were cooking their hamburgers unsafely before, the 4 percent of the total sample who began cooking their hamburgers more thoroughly could represent a sixth of the consumers who in 1993—2 years before labels were introduced—said they usually cook their hamburgers rare or medium-rare.

Several well-publicized incidents of foodborne illness or recalls have also contributed to the shift in consumer behavior. Sixty-eight percent of respondents to the 1998 FDA/FSIS Consumer Food Safety Survey had heard of the 1993 outbreak of foodborne illness associated with the Jack-in-the-Box fast food chain. Of those, 70 percent recalled that it was related to hamburger, and 38 percent recalled that it was caused by a strain of *E. coli.* Twenty-seven percent of those who recalled the Jack-in-the-Box outbreak said the incident affected their behavior even though only 5 percent identified "undercooked hamburger" as the culprit. Further analysis of the FDA/FSIS data will be required to determine how respondents changed their behavior in response to the incident.

Additionally, 40 percent of respondents had heard about an incident in 1997 involving Hudson Foods, and of those, 40 percent recalled it was associated with hamburger, and 42 percent could name the bacteria involved. Twenty-five percent of those who remembered the Hudson Foods recall said they had changed their behavior as a result of the news, although again, researchers have not yet determined what respondents are doing differently.

Risk and Taste Compete

Food safety messages can affect consumer behavior by increasing consumers' perception of risk from eating a rare or medium-rare hamburger. Yet consumers also make decisions based on their taste preferences. The MRCA survey explored how these competing motivations affect hamburger preparation.

To measure motivation to avoid foodborne illness, the survey asked respondents to rate the chances of getting sick from hamburgers at each level of doneness and how important the chance of illness was to them. The perceived risk and importance ratings were then multiplied to create a "risk motivation index" where motivation to avoid getting sick grew as the respondent's index increased from 1 to 16.

To measure perceived palatability of different hamburger styles, the survey asked respondents to rank hamburgers at each level of doneness on juiciness, taste, and tenderness and how important these factors were to them. The palatability measures were combined and multiplied by the respondents' importance ratings for taste factors to create a "palatability motivation index" that captures how strongly respondents prefer the characteristics of a rare or medium-rare hamburger as the respondent's index varies from 1 to 20.

Taste preferences were the most important factor affecting how hamburgers were cooked and ordered (table 1). A 10 percent higher palatability motivation index was associated with a 76 percent higher probability of cooking hamburgers rare or medium-rare and a 52 percent higher probability of ordering hamburgers rare or medium-rare.

Respondents with higher motivation to avoid getting sick were less likely to cook hamburgers underdone—5 percent less likely for a 10 percent higher risk motivation index. The response was stronger for hamburgers ordered away from home. Respondents with a 10 percent higher risk motivation index were 9 percent less likely to order hamburgers medium-rare or rare.

These results support the finding that consumers changed their behavior due to fear of illness, and suggest that taste preferences remain an obstacle to further change. The recommendation from FSIS—to cook hamburgers to 160 degrees Fahrenheit using a food thermometer—could improve the sensory characteristics of properly cooked hamburgers because some hamburger may be safe before turning brown in the center of the patty.

Interestingly, few personal and household characteristics were important after accounting for differences in risk motivation and tastes. Respondents with smaller

Table 1
Taste Matters More Than Safety in How Consumers Cook and Order Their Hamburgers

Personal and household characteristics	Effect of personal and household characteristics on the probability of—	
	Cooking hamburgers rare or medium-rare	Ordering hamburgers rare or medium-rare
	Percent	
Northeast[1]	0	86
South[1]	0	83
One additional household member	-22	0
Lives in a city with more than 500,000 (compared with those in rural areas, suburbs, or smaller cites)	0	75
A 10 percent higher risk motivation index[2]	-5	-9
A 10 percent higher palatability motivation index[3]	76	52

[1]Compared with the West, which was the reference region.
[2]The risk motivation index captures how strongly respondents wish to avoid foodborne illness. It combines the respondent's rating of the risk of illness from a rare hamburger and how important the risk of illness was to the respondent.
[3]The palatability motivation index captures how strongly respondents prefer the characteristics of a rare or medium-rare hamburger. It combines the respondent's rating of the taste, tenderness, and juiciness of a rare or medium-rare hamburger and how important taste, tenderness, and juiciness were to the respondent.
Source: Estimated by ERS researchers from the 1996 Hamburger Preparation Quiz, Market Research Corporation of America. Statistically estimated effects are included only if they are significantly different from zero at the 10-percent confidence level.

households were more likely to cook hamburgers medium-rare or rare, while northeastern, southern, and urban respondents were more likely to order hamburgers medium-rare or rare in restaurants. Individuals with these characteristics may require more exposure to safe handling recommendations to change their behavior.

Many Factors Affect Palatability and Risk Motivation

Several household characteristics were associated with a higher palatability motivation index (table 2). White respondents reported a 14 percent higher value for the index compared with all other groups, and respondents reported a 1 percent higher value for each $5,000 higher per capita income in the household. Male respondents reported an 4 percent lower palatability motivation index, and respondents in the Midwest reported a 8 percent lower index.

Experiencing a foodborne illness raised a respondent's risk motivation index by 34 percent (table 3), the highest effect of any factor. Thus, food safety messages may be more effective if they inform consumers of the symptoms of foodborne illness and the risk of serious consequences such as hospitalization.

Several information channels appear to be effective for communicating the risks of unsafe food preparation. Respondents who say they get their information from magazines, television, cookbooks, or government hotlines had 15 to 17 percent higher risk motivation than those who did not cite these sources of food safety information. Respondents who said they get information from labels did not have a higher risk motivation index after accounting for other factors that also increase awareness. Surprisingly, consumers who cited brochures as their information source had lower risk motivation than respondents who did not. These consumers may perceive less risk because the brochures and other information they obtain may help them feel they can control their risk of foodborne illness.

More research is needed to explore these findings, but it is not surprising that it is difficult to separate the effects of different forms of information. Consumers are exposed to several sources at the same time, and information sources may work together to affect consumer perceptions.

Safer Cooking Means Less Foodborne Illness

Overall, survey respondents say they are cooking their hamburgers more, and this change may be due to many information sources working together. The change means there were fewer cases of foodborne illness—and lower medical costs and lost productivity—than would otherwise have occurred.

Assuming rates of contamination and cross-contamination and patterns of eating away from home had stayed the same, the reduction in cooking and ordering hamburgers rare and medium-rare due to con-

cern over foodborne illness between 1991 and 1996 would result in 4.6 percent fewer cases of *E. coli* O157:H7 infection from hamburger. This reduction translates to savings in medical costs and in productivity losses of $7.4 million annually. This estimate is based on estimated total costs of foodborne *E. coli* O157:H7 of $770 million, of which 21 percent are estimated to be caused by ground beef. Other illnesses are likely to have been avoided as well, since other bacteria, such as *Campylobacter* and *Salmonella*, can also be present in undercooked hamburger.

This reduction is smaller than the overall changes in cooking and ordering suggest. While the number of respondents who cook or order their hamburgers rare and medium-rare declined in 1991-96, the number of respondents cooking hamburgers rare at home increased from 3.7 percent in 1991 to 5.2 percent in 1996. Consumers, unable to order hamburgers rare in restaurants, may have chosen to eat them at home instead. We did not include this increase in our estimate of the reduction in foodborne illness cases because the MRCA respondents cited taste rather than fear of foodborne illness as reason for the change. The fact that cooking rare at home did not decrease accounts for the limited effect of cooking and ordering changes on the risk of illness.

To estimate the change in risk of infection from *E. coli* O157:H7, we used a model of food illness risk from hamburgers developed by researchers at USDA's Food Safety and Inspection Service and Economic Research Service. The model predicts the probability that a hamburger will cause *E. coli* O157:H7 infection depending on whether the hamburger is cooked rare, medium-rare, or well-done.

We used data from the MRCA Hamburger Preparation Quiz to estimate the changes in how many hamburgers at home are cooked rare and medium-rare, and how many

Table 2
White Consumers Prefer Lightly Cooked Hamburgers

Personal and household characteristics	Effect of personal and household characteristics on palatability motivation index
	Percent
Male (compared with female)	-4
Midwest (compared with the West)	-8
Additional $5,000 per capita annual income	1
White (compared with all other ethnic groups)	14

Source: Estimated by ERS researchers from the 1996 Hamburger Preparation Quiz, Market Research Corporation of America. Statistically estimated effects are included only if they are significantly different from zero at the 10-percent confidence level.

Table 3
Consumers Who Get Information From Magazines, Cookbooks, Television, and Hotlines Are More Motivated To Avoid the Risk of Foodborne Illness

Personal and household characteristics	Effect of personal and household characteristics on risk motivation index
	Percent
Additional $5,000 per capita annual household income	3
One additional household member	6
White (compared with other ethnic groups)	21
Gets food safety information from magazines (compared with those who don't)	17
Gets food safety information from cookbooks (compared with those who don't)	17
Gets food safety information from television (compared with those who don't)	15
Gets food safety information from brochures (compared with those who don't)	-13
Gets food safety information from hotlines and other government sources (compared with those who don't)	15
Has experienced illness from hamburger, other meat, or fish (compared with those who haven't)	34

Source: Estimated by ERS researchers from the 1996 Hamburger Preparation Quiz, Market Research Corporation of America. Statistically estimated effects are included only if they are significantly different from zero at the 10-percent confidence level.

hamburgers in restaurants are ordered rare and medium-rare. During 1991-96, the percentage of respondents who cooked medium-rare at home decreased from 20.2 to 14.8, while the percentage of respondents reporting they cooked rare at home actually increased from 3.7 to 5.2. The percentage of respondents reporting they order rare in restaurants decreased from 3.6 in 1991 to 2.0 in 1996. In the same period, the percentage of respondents ordering medium-rare in restaurants decreased from 17.1 to 12.8.

Consumer choice may not have been the only reason for the changes in restaurant ordering behavior, however. By 1996, some restaurants no longer served hamburgers rare. We used the MRCA data on the reasons that consumers changed their behavior in order to isolate "concern over illness" from "restricted choice" as causes for the reduction in rare-cooked hamburger consumption in restaurants.

Seventy-seven percent of those who no longer order hamburgers rare in restaurants and 71 percent of those who no longer order medium-rare reported they did so out of worry over foodborne illness. Thus, worry over foodborne illness, rather than restricted choices, caused a 1.2-percentage-point reduction in ordering hamburgers rare and a 3.0-percentage-point reduction in ordering hamburgers medium-rare in restaurants.

We combined the estimated changes in cooking and ordering hamburgers with estimates of where hamburgers were eaten in 1991—at home, in a table-service restaurant, or in a fast-food establishment—from USDA's 1989-91 Continuing Survey of Food Intakes by Individuals. By using 1991 data on where hamburgers were eaten and not 1996 data, we excluded the fact that more hamburgers were being eaten in fast-food establishments in 1996. This increase was probably the result of a desire for convenience rather than concern over foodborne illness.

Our results suggest that most of the change in how hamburgers are cooked and ordered in restaurants was due to changing risk perceptions. While household size, region, and urbanization matter even after risk motivation is taken into account, these household characteristics changed little from 1988 to 1998, and not in the right direction to explain the change.

The Clinton Administration's 1997 Food Safety Initiative directs FSIS, FDA, and CDC to conduct a national public education campaign on safe food handling practices as part of a comprehensive food safety effort. Our research results show that consumers who are more aware of risks from undercooked hamburgers are more likely to adopt safer behavior and thus contribute to a reduction in foodborne illness cases.

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