Have We Turned the Corner on Fat Consumption?

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Fat consumption in the United States is one of the most closely watched and frequently reported on aspects of our diet. The concern with fat intake is clearly reflected in the nutrient content claims on the labels of new food products recently introduced on the market. Beginning in 1992, the number of new products making claims of "reduced/low fat" exceeded similar claims about calorie content. Between 1993 and 1996, the number of new products making claims of "reduced/low fat" exceeded the combined number of claims about calories, sugar, cholesterol, salt, fiber, or calcium content. Even this sharp contrast understates the emphasis on fat content, since a new product may carry more than one nutrient claim.

Fat consumption, or the fat content of the food supply, is comprised of fat from all sources—"naturally occurring fat," in such foods as meats, dairy products, eggs, and nuts, and "added fats," which are used in cooking as table spreads, and in the manufacture of food products, such as baked goods, salad dressings, and potato chips. It is the consumption of these added fats that are reported by USDA's Economic Research Service (ERS) and that are presented here.

The U.S. Department of Agriculture maintains extensive data on the supply and disposition of fats and oils produced and consumed in the United States. In addition, the U.S. Department of Commerce conducts monthly surveys of firms that produce fats and oils and products made from these fats and oils in order to ascertain output and stocks of these products. When combined with information on trade in these items, these data permit the development of supply and use balance sheets for fats, oils, and products. These data are reported in an annual publication by ERS, which also calculates and reports per capita added-fat consumption.

While the data are generally used to indicate consumption, there is currently no direct measure of the amount of fats and oils that comprise an undoubtedly large "waste" category—that is, fats and oils used in food preparation (such as deep frying) and then discarded. Thus, there is no way to measure actual levels of fat ingested. These data nonetheless are widely monitored as a measure of fats and oil consumption in the United States. From a supply perspective, the data are a direct measure of the amount of fats and oils needed in the United States for edible food use and that must be provided from either domestic sources or imported.

Since data have been collected on the subject, annual U.S. per capita consumption of fats and oils has continually increased over the years (table 1). The principal sources of added food fat in our diet include butter, margarine, salad and cooking oils, shortening, and animal fats, such as lard and edible tallow. Sources like margarine, salad and cooking oil, and shortening are comprised of a combination of individual vegetable oils or animal fats. Over time, the relative contribution of individual edible product categories to total fat intake and the types of fats and oils used in these products have changed. But whatever the source or form, Americans have consumed ever more fat.

We identified several important events and long-term trends in Americans' fat intake and in the U.S. fats and oils economy:

- In **1933**, U.S. butter production peaked at 2.38 billion pounds, marking the beginning of the end of its dominance of per capita added-fat consumption. In 1933, per capita butter consumption topped 18 pounds (39 percent of

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total added fat consumed) compared with 1997's 4.2 pounds (6 percent of all added fat consumed).

- In **1953**, soybean oil consumption exceeded that for lard, displacing lard as the largest single source of fats and oils in the American diet. This began an uninterrupted trend that has led to soybean oil's overwhelming dominance in the fats and oils economy. In 1953, soybean oil use was 2.1 billion pounds; in 1997, it was 12.4 billion pounds, or 82 percent of all added fats and oils used.
- In **1973**, per capita consumption of salad and cooking oils

Table 1

U.S. Per Capita Consumption of Added Fats and Oils[1]

Year	Table spreads			Baking and frying fats			Salad, cooking, and other edible oils	Total
	Butter	Margarine	Total	Lard and tallow[2]	Shortening	Total		
	Pounds							
1960	6.1	7.5	13.6	7.5	12.6	20.1	11.5	45.2
1961	6.0	7.5	13.5	7.6	12.9	20.4	11.2	45.1
1962	6.0	7.3	13.4	7.1	13.4	20.5	11.7	45.6
1963	5.7	7.6	13.2	6.3	13.5	19.8	13.2	46.3
1964	5.7	7.7	13.3	6.2	13.8	20.0	14.2	47.5
1965	5.3	7.8	13.2	6.3	14.2	20.5	14.1	47.7
1966	4.6	8.5	13.1	5.5	16.0	21.4	15.1	49.6
1967	4.4	8.4	12.8	5.3	15.9	21.3	15.1	49.2
1968	4.7	8.5	13.2	5.5	16.3	21.8	15.9	50.9
1969	4.5	8.6	13.1	5.0	17.0	22.0	16.5	51.6
1970	4.3	8.7	13.0	4.6	17.3	21.9	17.7	52.6
1971	4.1	8.7	12.9	4.2	16.8	21.0	17.9	51.8
1972	4.0	8.9	12.9	3.7	17.6	21.4	19.1	53.4
1973	3.8	8.9	12.7	3.3	17.0	20.4	20.3	53.3
1974	3.6	8.9	12.5	3.2	16.9	20.1	19.8	52.4
1975	3.8	8.8	12.6	3.2	17.0	20.2	19.9	52.6
1976	3.5	9.5	13.0	2.9	17.7	20.6	21.5	55.1
1977	3.4	9.1	12.5	2.5	17.2	19.8	21.0	53.3
1978	3.5	9.0	12.5	2.4	17.8	20.2	22.2	54.9
1979	3.6	8.9	12.5	2.9	18.4	21.3	22.5	56.4
1980	3.6	9.0	12.6	3.6	18.2	21.8	22.7	57.2
1981	3.4	8.9	12.3	3.5	18.5	21.9	23.2	57.4
1982	3.5	8.8	12.3	3.8	18.6	22.4	23.5	58.3
1983	3.9	8.3	12.2	4.1	18.5	22.6	25.1	60.0
1984	3.9	8.3	12.2	3.8	21.3	25.0	24.2	61.5
1985	3.9	8.6	12.5	3.7	22.9	26.6	25.2	64.3
1986	3.7	9.1	12.8	3.5	22.1	25.6	26.1	64.5
1987	3.7	8.4	12.1	2.7	21.4	24.1	26.9	63.1
1988	3.6	8.3	11.8	2.6	21.5	24.1	27.6	63.5
1989	3.5	8.1	11.6	2.1	21.5	23.5	25.7	60.8
1990	3.5	8.7	12.2	2.4	22.2	24.7	26.0	62.8
1991	3.5	8.5	11.9	3.1	22.4	25.5	28.0	65.4
1992	3.5	8.8	12.3	4.1	22.4	26.5	28.6	67.4
1993	3.7	8.9	12.6	3.9	25.1	29.0	28.5	70.2
1994	3.9	7.9	11.8	4.7	24.1	28.9	27.9	68.6
1995	3.6	7.4	11.0	4.9	22.5	27.4	28.5	66.9
1996	3.5	7.3	10.8	5.3	22.3	27.5	27.5	65.8
1997	3.3	6.9	10.2	4.7	20.9	25.6	29.8	65.6

Notes: [1]Fat content basis. [2]Direct use; excludes use in margarine and shortening.

exceeded that for shortening for the first time, making it the leading source of added fat in the diet, a trend that continues.

- If the recent patterns in added-food-fat consumption continues, **1993** may be included in this list of 20-year hallmarks in the U.S. food fat economy.

U.S. Added-Fat Consumption Drops Sharply

In 1993, U.S. per capita consumption of shortening reached an all-time high of 25.1 pounds (table 1). Also in that year, both the margarine and other edible use categories reached their highest level since the mid-1980's, before declining continuously through the mid-1990's. In 1992, consumption of salad and cooking oil peaked at a then all-time high of 27.2 pounds and commenced a decline that lasted through 1996.

In 1997, per capita consumption of salad and cooking oil jumped a remarkable 2.6 pounds, as some manufacturers increased the fat content of their reduced-fat product lines. Despite this large increase for salad and cooking oil, continuing declines in all other categories more than offset the increase so that per capita added-fat consumption in 1997 actually declined from the 1996 level. For the first third of 1998, total use of added fats and oils in all categories, including salad and cooking oils, were down from the same period a year earlier. The net effect of these movements was to reduce per capita added-fat consumption by 4.6 pounds from its 1993 peak of 70.2 pounds to 65.6 in 1997, the most recent year for which final data are available.

In the late 1980's two government reports—the 1988 Surgeon General's *Report on Nutrition and Health*, and the 1989 National Research Council's *Diet and Health: Implications for Reducing Chronic Disease Risk* concluded that evidence substantiated an association between diet and the risk of chronic disease. Both reports recommended that Americans reduce their intake of fat. Recent data suggest that per capita fat consumption has declined, which could bode well for consumers' health if the pattern continues. *The Dietary Guidelines for Americans*, which represent Federal dietary recommendations, further emphasize the importance of reducing fat intake (USDA / DHHS). On the other hand, lower consumption of fats and oils may not be particularly good news for the U.S. farm sector.

Added-fat consumption in 1997 would have been 1.23 billion pounds higher if per capita use had remained at 1993's level and not fallen to 65.6 pounds. If soybean oil's share of this higher use level had mirrored its actual 1997 share of the market at 82 percent, 1997 soybean oil use could have totaled 298 million pounds above its actual 12.42 billion pounds. Using an average soybean oil yield of 11.2 pounds per bushel of soybeans crushed suggests that domestic edible soybean oil use was, on a bushel-crushed equivalent basis, about 26.6 million bushels less than it would have been if per capita fat consumption had not declined. This is roughly the equivalent production of 672,000 harvested acres of soybeans at current national average yields.

Most of the U.S. supply of added fats and oils comes from the domestic crushing of oilseeds, primarily soybeans, to produce protein meal, which is fed to livestock. Livestock production also directly influences the supply of animal fats, such as, butter, lard, and edible tallow. U.S. poultry and pork production are the major consumers of protein meal, and each has been expanding rapidly in recent years. Annual U.S. soybean crush has set records in six of the last eight seasons. With U.S. vegetable oil output and animal fat production largely determined by a meal-driven crush and meat demand, the United States generally produces more fats and oils each year than it consumes domestically and exports the surplus. A declining domestic demand for added fats and oils may lead to greater exports. However, if export demand is not able to absorb the surplus, domestic supplies could build, with the potential to depress prices for fats and oils, shrink domestic crush margins, and eventually show up as lower farm prices for U.S. oilseed and livestock producers.

Downturns in per capita added-fat consumption are not unusual and can usually be attributed to fluctuations in prices and income levels. Past downturns have usually been modest and of short duration, with consumption quickly rebounding and returning to trend levels. The downturn since 1993 has been sharp and broad based. All categories of domestic edible use have been affected. This downturn raises the issue of whether added-fat consumption has significantly shifted, or whether the downturn is the result of normal variation in general economic factors. If consumption has shifted, effects on the U.S. fats and oils economy could be significant. The fundamental factors that influence per capita consumption of added food fat need to be analyzed to fully assess the situation.

What Influences Added-Fat Consumption?

Several factors have been identified to influence the level of per capita consumption of added food fat. Chief among them are (1) the relative level of fats and oils prices

versus overall prices, and (2) per capita disposable income. Specifically, as the price of fats and oils increases relative to overall consumer prices, the per capita consumption of fats and oils declines. Conversely, as consumer disposable income increases, fats and oils consumption rises (Hazera). In addition, consumer concerns about fat intake and new mandatory nutrition labels on packaged foods were expected to motivate food manufacturers to reduce the fat content of their food products. With the introduction of reduced/low-fat products, it seemed likely that fat consumption would decline.

Building on previous research, we conducted a new analysis that included, in addition to prices and income, variables to assess the impact of new food labeling regulations and product nutrient content characteristics on fat consumption. The analysis sought to determine what influence, if any, consumer concern about fat intake and the new food labeling legislation might have on fat consumption.

The analysis determined that, while traditional price and income effects still apply to the more recent pattern of food fat consumption, the number and proportion of new food products bearing a reduced/low-fat nutrient content claim also play an important role in explaining fat consumption. Specifically, as the proportion of new food products carrying a reduced/low-fat claim on the label rises by 1 percent each year, per capita food fat consumption declines by 0.024 percent. Additionally, as the total number of food products introduced since 1993 bearing a reduced/low-fat nutrient rises by 1 percent, per capita food fat consumption declines by 0.013 percent (Sanford and Allshouse, forthcoming).

Implications for Future Added-Fat Consumption

Per capita added-fat consumption in 1997 fell to 65.6 pounds from 65.8 in 1996, marking an unprecedented fourth consecutive year of decline. With population gains between 1996 and 1998, total added-fat consumption over the period is forecast to stagnate, or increase very slightly, even as per capita consumption declines. However, if declines in per capita added-fat consumption approach 1993-97 levels, total annual added-fat consumption could decline by 135 million pounds. Per capita added-fat consumption in 1998 is forecast to fall to 65.3 pounds.

The potential for declines in domestic use of edible fats and oils comes at a time when potential domestic production of these fats and oils is forecast to surge to record levels. Current USDA estimates of domestic output of the major edible fats and oils in 1997 and 1998 are 25.2 and 25.6 billion pounds, well ahead of the previous record output of 23.6 billion in 1994. U.S. exports of fats and oils in 1997 and 1998 are also forecast to reach their highest levels ever, at 6.0 and 5.9 billion pounds. The potential for continuing production increases and stagnant or declining domestic use could place the United States in the position of increasing dependence on export markets to maintain a balance in domestic supplies of fats and oils.

New Technology May Change the Picture

To reduce fat consumption, a person may choose to eat less of a particular food or replace the food in their diet with a lower fat substitute. For consumers wishing to consume the same amount of a particular food item, the only way to reduce fat consumption is to reduce the amount of fat in the food itself. Several well-documented approaches to reducing a food's fat content include fat trimming of meat cuts, selective breeding for leaner animals, or the use of fat substitutes.

In the past, the most common fat substitutes were derived from nonfat components—namely, carbohydrates or proteins (Morrison, 1992). These techniques reduced not only the food's fat content but also the amount of fats and oils required in the food's preparation.

While in development for several years, the recent appearance on the market of food products that use advances in fat-substitute technology may be particularly well timed. Heralded as a way for consumers to reduce fat intake without giving up foods they desire, the technology also increases the amount of oils required in the food's manufacture, a definite plus for the farmer. If these products are successful in the market, the potential result is a rare win-win outcome for both producers and consumers of fats and oils.

These new food products use a fat-based fat substitute known as olestra. Unlike fat substitutes that use proteins or carbohydrates in their manufacture, olestra starts from vegetable oil. According to Stanton's assessment of near-term developments in the fat substitute area, "... olestra could have a major effect in almost all food sectors."

Olestra is the name of a noncaloric sucrose polyester described in a 1971 patent assigned to Procter & Gamble (P&G), a company based in Cincinnati, Ohio, which had been developing the product since its 1968 discovery. According to P&G, olestra is a food ingredient that brings the flavor and desirable texture of fats and oils to food without adding any fat or calories. This is attributable to olestra's

unique characteristics. It is heat-stable at high temperatures, which permits its use in frying, and it is nondigestible, thus adding no calories or fat to food. In 1987, P&G petitioned the U.S. Food and Drug Administration (FDA) for permission to use olestra in shortenings and oils for home and commercial use. In its petition, P&G proposed using olestra up to 35 percent of a blend in shortening and oils used at home and by foodservice personnel. Also, P&G sought olestra use up to 75 percent in commercial deep frying of snack foods, like potato chips (Morrison, 1992). Then, in 1990, the petition was amended to seek use of olestra in snacks only, but at 100 percent.

In January 1996, FDA approved the use of olestra in salty snacks, at which time olestra had been in development and testing for 25 years. P&G decided to brand the ingredient, "Olean." The current approval allows Olean to be used in snack chips and crackers, with any other use requiring separate FDA review and approval. While currently used only in these salty snacks, P&G maintains that Olean could also replace the fat in shortening and oil, ice cream, salad dressings, and cheese. Even when restricted to the salty snack market, P&G estimates that Olean could replace 774,000 tons (6 pounds per person) of actual fat intake in the U.S. each year, if all 5.6 billion pounds of salted snacks eaten annually (21 pounds per person) were produced with Olean.

Initial use of Olean is in snack foods, such as potato chips, tortilla chips, cheese puffs, and crackers. Frito-Lay opened the test market for snack foods in April 1996 with its Lay's, Ruffles, Doritos, and Tostitos brands. In September 1996, P&G introduced Fat Free Pringles with Olean to the market. R.J.R. Nabisco also introduced products to test markets in March 1997 with their Nabisco Wheat Thins and Ritz Crackers. Throughout 1996 and 1997, test marketing was limited to a few selected cities.

Procter & Gamble began advertising Olean in February 1998. The commercials, aired during the Winter Olympics, explained what Olean is and its benefits. The company also announced that a variety of snacks fried with Olean would be available nationwide by summer. While the product is heralded for its potential to reduce fat intake, its producer, P&G, and FDA have tested the product extensively to assess potential gastrointestinal effects and the product's tendency to absorb certain vitamins. On June 17, 1998, the FDA completed a planned 30-month review, from its January 1996 approval date, and concluded that there were no significant adverse digestive or nutritional health effects associated with Olestra's use in salty snacks. However, FDA also required products containing Olestra to be labeled with information about the potential for gastrointestinal symptoms and adverse effects on nutrient absorption.

Not Just Good News for Consumers

As promising as the potential is for consumers to reduce fat intake with this product, Olean also is a plus for U.S. vegetable oil producers. To produce Olean, P&G constructed a new plant in St. Bernard, Ohio, with the capacity to provide a national supply of the new cooking oil. The plant began shipping Olean to snack food makers in January 1998.

Advertising by P&G for its Olean product has featured soybeans and soybean farmers, highlighting the potential positive impact of the product for these farmers. However, a substantial proportion of the vegetable oil used in the production of Olean is from cottonseed. This would logically stem from the focus on chip frying, particularly potato chips, and cottonseed oil's preeminent status as a preferred oil in this application. For cottonseed oil producers, a particularly attractive aspect of the Olean production process is the vegetable oil input requirement. In order to produce a pound of Olean, the process requires approximately 1.2 pounds of vegetable oil. Thus, aside from any potential consumption increase of cottonseed oil-containing food products that may arise from the reduced-fat attributes imparted by Olean, simply replacing the current level of cooking oil use with Olean will require about 20 percent more cottonseed oil than would have been used otherwise.

The potential for this technology to boost the value of cottonseed oil and the value of the cotton crop to producers is especially important in the current market environment. In the past, U.S. cotton producers have often focused on the profitability of the lint portion of their crops, with the associated cottonseed production receiving less attention in their production and marketing plans. However, since the 1996 Farm Bill, which dramatically increased the influence of market forces on producers' farming plans, cotton producers have become increasingly concerned about the profitability of cotton planting versus alternative crops. To stem declining U.S. cotton planted area and interest in cotton production, the industry has begun to emphasize the importance of reducing production costs and increasing the farm value of the cotton crop—and not just the lint portion of production, but also the value of the cottonseed. The recent appearance of Olean in the food market and the associated produc-

tion technology complements this focus on increasing the cotton crop's value and competitiveness with alternative crops.

Increasing Per Capita Fat Disappearance, but Declining Consumption

The technological advance represented by Olean highlights the difficulties of measuring fat consumption with the data currently available. Since the data are a measure of the amount of fats and oils used in the manufacture of edible products, a process such as that required to produce Olean could give the appearance of rising per capita fat consumption, when the product actually serves to reduce the amount of fat digested.

In the absence of the fat-substitute technology represented by such products as Olean, the data on per capita disappearance, while not a measure of fat consumption, have traditionally given an accurate indication of trends in fat consumption. If future calculations of per capita disappearance indicate continued declines, and 1993 was indeed a high watermark for that indicator, then it may be inferred that actual fat consumption is similarly in decline. If, however, per capita disappearance should reverse and begin to rise, inferences about actual fat consumption will be much more difficult to make due to the appearance in the market of products like Olean.

For those concerned with the production of fats and oils and ensuring an adequate supply for domestic edible use, the inferences to be drawn from the disappearance data are much more direct. If the downturn in per capita fat consumption since 1993 persists in coming years, then the domestic edible fats and oils economy will be in decline and will likely depend increasingly on export markets in the face of predicted record domestic production.

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