

Chapter 7

Trends in the U.S. Food Supply, 1970-97

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This chapter summarizes the major trends since 1970 in U.S. per capita food and nutrient supplies. It notes that some trends are consistent with dietary and health recommendations, while other trends are contrary to recommendations. Per capita levels of most vitamins and all minerals increased from 1970 to 1994. Although historically, the nutrient levels in the food supply were deemed sufficient to meet the needs of most Americans, increases in recommended intakes for some nutrients—notably calcium and folate—translate into levels greater than those provided in the 1994 per capita food supply. As new recommendations are established for other nutrients, other nutrient shortfalls in the food supply may become apparent.

Introduction

Consistent with dietary and health recommendations, Americans now consume a half more grain products and a fourth more fruits and vegetables per capita than they did in 1970, eat leaner meat, and drink lower fat milk. Moreover, a steady increase in the proportion of refined flour that is enriched (from 65 percent in 1970 to more than 90 percent today), changes in flour-enrichment standards in 1974 and 1983, along with big increases in grain product consumption since 1984, have boosted per capita supplies of four of the nutrients lost in the milling process and approximately replaced by manufacturers—iron, niacin, thiamin, and riboflavin.

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But contrary to recommendations, Americans are consuming record-high amounts of caloric sweeteners and some high-fat dairy products, and near-record amounts of added fats, including salad and cooking oils and baking and frying fats. Moreover, the hefty increase in grain consumption reflects higher consumption of mostly refined, rather than high-fiber, whole-grain products—less than 2 percent of the 150 pounds of wheat flour consumed per capita in 1997 was whole wheat flour. (Most nutrients lost during processing, including fiber, vitamins, minerals, and phytochemicals, are not restored to refined flour.)

A variety of factors are responsible for the changes in U.S. consumption patterns in the last 25 years, including changes in relative prices, increases in real (adjusted for inflation) disposable income, and more food assistance for the poor. New products, particularly more convenient ones, also contribute to shifts in consumption, along with more imports, growth in the away-from-home food market, expanded advertising programs, and changes in food-enrichment standards and fortification policy. Sociodemographic trends also driving changes in food choices include smaller households, more two-earner households, more single-parent households, an aging population, and increased ethnic diversity. An expanded scientific base relating diet and health, new Dietary Guidelines for Americans (USDA and DHHS, 1980, 1985, 1990, 1995) designed to help people make food choices that promote health and prevent disease, improved nutrition labeling, and a burgeoning consumer interest in nutrition also influence marketing and consumption trends.

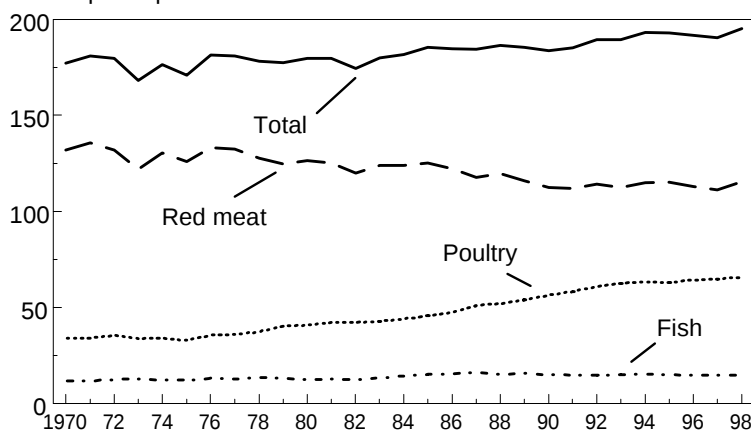
USDA's Economic Research Service (ERS) and Center for Nutrition Policy and Promotion (CNPP) estimate per capita food and nutrient supplies, based on food disappearance data (Putnam and Allshouse, 1997; Gerrior and Bente, 1997). These data are used as a proxy to estimate human consumption, even though the data may overstate what is actually eaten because they represent food supplies available in the market and do not account for waste (see "Food Supply Data Used to Measure Consumption" in Appendix). This chapter summarizes the major trends since 1970 in U.S. per capita food and nutrient supplies.¹ Appendix table 1 provides annual per capita consumption data for major food commodities. Appendix table 2 presents annual

¹ For most commodities, the latest year for which supply data are available is 1997; in the case of meats and eggs, 1998 forecasts are available. 1994 is the latest year for which data on the nutrient content of the food supply are available.

Figure 1

In 1998, total per capita meat consumption (196 pounds) was 19 pounds above the 1970 level--a new record high

Pounds per capita



Pounds per capita is boneless, trimmed equivalent.

Source: USDA/Economic Research Service.

estimates of the amounts per capita per day of food energy, and 24 nutrients and food components in the food supply. Appendix table 3 shows nutrient contributions from the major food groups for the years 1970 and 1994. (Appendix tables begin on page 424.)

Per Capita Meat Supply Larger and Leaner

Now more than ever, we are a Nation of meat eaters—but we are eating leaner meat. In 1997, total meat consumption (red meat, poultry, and fish) amounted to 190 pounds (boneless, trimmed-weight equivalent) per person, 13 pounds above the 1970 level (fig. 1). Each American consumed an average of 21 pounds less red meat (mostly less beef) than in 1970, 31 pounds more poultry, and 3 pounds more fish and shellfish.

Nutritional concern about fat and cholesterol has encouraged the production of leaner animals, the closer trimming of outside fat on retail cuts of meat, the marketing of lower-fat ground meat and processed meat products, and consumer substitution of poultry for red meat—significantly lowering the meat, poultry, and fish group's contribution

to total fat and saturated fat in the food supply. Despite near-record per capita consumption of total meat in 1994, the proportion of fat in the U.S. food supply contributed by meat, poultry, and fish declined from 35 percent in 1970 to 25 percent in 1994. Similarly, the proportion of saturated fat contributed fell from 37 percent to 26 percent.

Red meat (beef, pork, lamb, and veal) accounted for 58 percent of the total meat supply in 1997, compared with 74 percent in 1970. By 1997, chicken and turkey accounted for 34 percent of the total meat consumed, up from 19 percent in 1970. Fish and shellfish accounted for 8 percent of total meat consumption in 1997 and 7 percent in 1970.

The poultry industry has enjoyed great success, partly by catering to consumers. The industry has provided scores of new brand-name, value-added products processed for consumers' convenience, as well as a host of products for foodservice operators. Poultry has also benefited from health-related concerns about beef.

Year-to-year fluctuations in pork consumption are often quite large, but consumption has been fairly stable in the long run. In fact, annual per capita pork consumption averaged 47.6 pounds per person in 1970-74, and 47.8 pounds per person in 1994-98. The 1990's quantity, however, contained much more lean meat and much less fat. Through improved breeding and husbandry practices and greater trimming of outside fat on retail cuts, the pork industry has lowered the fat content of retail pork by more than 30 percent since the 1970's. The industry has capitalized on this accomplishment by portraying pork as a light and nutritious alternative to chicken with its "Pork: The Other White Meat" advertising campaign, which debuted in 1987. Research indicates that consumers now are less likely to perceive pork negatively in terms of fat, calories, and cholesterol than before the advertising began. The campaign focused on the industry's leaner cuts and lower-fat products.

Consumer concerns about cholesterol and saturated fat, inconsistent quality, and lack of convenience in preparation are behind the negative trend in beef demand. The mass entry of women into the paid labor force has drastically reduced consumption of beef roasts and other beef cuts requiring lengthy cooking times.

Beginning around 1960, in response to concerns about fat and cholesterol, beef producers began shifting production from the very fat English breeds like Hereford and Angus to the bigger, rangier, leaner,

faster growing exotic breeds. This shift led to increasing inconsistency in the quality of beef—a less tender, less juicy, less succulent product. By 1995, one of four steaks was too tough to chew, according to the 1995 National Beef Quality Audit (Cattlemen's Beef Promotion Board, 1996). In summer 1998, the beef industry initiated a 42-month, checkoff-funded study that will establish concrete evidence and standardize genetic characteristics for tenderness, marbling, and other qualities. Understanding and being able to selectively breed for any of these traits will help ensure a quality eating experience for consumers, and will likely spark marketing of branded beef like Certified Angus Beef, branded beef that is consistently tender.

In response to concerns about fat and cholesterol, supermarkets continue to make their retail beef cuts leaner, with less external fat. In 1985, most retail trim specifications called for three-quarters-inch of outside fat on retail cuts of beef. By 1994, less than 1 percent of retailers had fat-trim specifications exceeding a quarter-inch and 21 percent specified an eighth-inch or less.

Retailers also keep cutting fat from ground beef, which is required by Federal regulations to have at least 70 percent lean meat (no more than 30 percent fat by weight). The amount of fat in ground and processed beef dropped from 28 percent to 22 percent between 1975 and 1987, with most of the decline during 1986-87. This trend has continued. In a 1997 survey, top U.S. retailers indicated that 66 percent of the ground beef they sold in 1996 was 80 percent lean or greater, 28 percent was 86 percent lean or greater, and 10 percent was 91 percent lean or greater. Further, they expected that 75 percent of the ground beef they sell in 1999 will be 80 percent lean or greater, 39 percent will be 86 percent lean or greater, and 15 percent will be 91 percent lean or greater (Cryovac, 1998).

The average fat content of foodservice ground beef remains higher than that for retail ground beef, but has nonetheless declined as well. In 1997, the North American Meat Processors Association revised and updated its 1988 *Meat Buyers Guide* to foodservice meat buyers and cut the upper limit for fat content of ground beef, unless otherwise specified, by three percentage points to 22 percent. (The purchaser may, however, specify a different fat content provided it does not exceed 30 percent.)

Beef has lagged behind poultry and pork in marketing value-added, convenience items. Beginning January 1999, the beef industry will launch a new advertising campaign that uses the familiar “Beef, It’s What’s for Dinner” tagline and aims to inform consumers and beef industry channels about a new trend—beef dishes that are fully cooked and ready to microwave and serve in 10 minutes. Such dishes include traditional beef favorites like pot roasts, meat loaf, and beef ribs.

The next decade will undoubtedly bring more changes. Technological advances will mean a host of new products in the meat case. With little increase in overall consumption of meat products expected in the next decade, the beef, pork, poultry, and fish industries will try to capture a larger share of a stagnant market by offering more prepared products.

Long-Term Decline in Egg Consumption Levels Off in the 1990’s

Egg consumption has two components: shell eggs and egg products. Shell eggs are those eggs purchased in cartons in the grocery store. Egg products are eggs that have been processed and sold primarily to food manufacturers and foodservice operators in liquid or dried form. These pasteurized eggs reach consumers as ingredients in foodservice menu items and processed foods—such as pasta, candy, baked goods, and cake mixes—or directly as liquid eggs in grocery stores. These liquid egg products usually are made from egg whites and are used by consumers as a nonfat, no-cholesterol, and safer alternative to shell eggs.

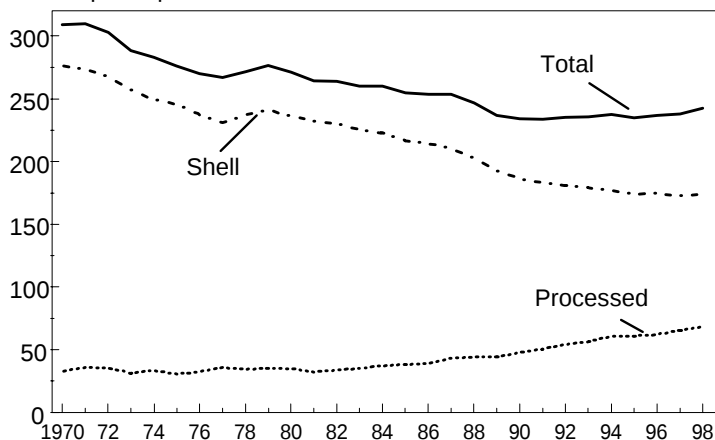
Between 1970 and 1989, total annual consumption of shell eggs and egg products steadily declined about 4 eggs per person per year, from 309 eggs to 237 (fig. 2). During the 1990’s, total egg consumption has leveled off, fluctuating between 234 and 238 eggs per person per year. The record high for U.S. per capita egg consumption was 403 eggs in 1945.

The decline in per capita egg consumption over the last few decades reflects two very different and somewhat counterbalancing trends: a dominating, nearly constant decline in consumption of shell eggs,

Figure 2

Long-term decline in total per capita egg consumption levels off in the 1990's

Number per capita



Source: USDA/Economic Research Service.

and a partially offsetting growth in consumption of egg products during the 1980's and 1990's.

Shell-egg consumption dropped from 276 eggs per capita in 1970 to 173 in 1997. The average annual rate of decline in per capita shell-egg consumption was 4 eggs per year in the 1970's and 5 eggs per year in the 1980's. In the 1990's, the rate of decline in per capita consumption of shell eggs has slowed to 2-1/2 eggs per year and is expected to slow even more.

Much of the decline in shell-egg consumption since 1970 was due to changing lifestyles (for example, less time for breakfast preparation in the morning as large numbers of women joined the paid labor force) and the perceived ill effects of the cholesterol intake associated with egg consumption. Total cholesterol in the U.S. per capita food supply declined 13 percent between 1970 and 1994, from 470 milligrams per person per day to 410 milligrams. Eggs contributed 39 percent of the total cholesterol in the food supply in 1970 and 34 percent in 1994.

Declining wholesale and retail egg prices may have spurred egg use in recent years. The average retail price for a dozen large, Grade A eggs declined from \$1.01 in 1990 to 86 cents in 1994. In 1997, it was \$1.06. The Consumer Price Index (CPI) for eggs increased 13 percent between 1990 and 1997. That compares with a 19-percent increase in the CPI for all food during the same period, and a 27-percent increase in the CPI for cereals and bakery products. Changing consumer attitudes toward eggs may also be responsible. New test results show eggs to contain less cholesterol than previously documented, leading the American Heart Association to increase its maximum recommended consumption from three eggs per week to four.

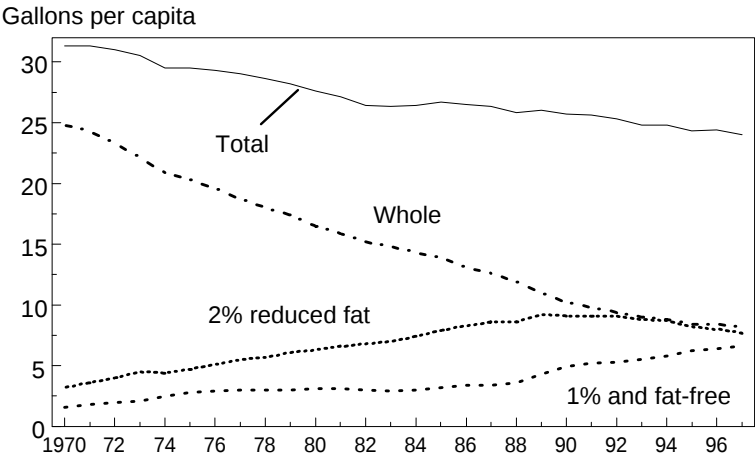
Consumption of egg products has nearly doubled since 1983, reaching the equivalent of 68 eggs per person by 1998. The growth period followed more than two decades of relatively constant consumption. Egg product consumption will continue to increase as consumers opt for more prepared foods.

Higher Use of Cheese Foils Efforts To Cut Average Milkfat Consumption

In 1997, Americans drank an average of 23 percent less milk and ate nearly 2-1/2 times as much cheese (excluding cottage types) as in 1970 (fig. 3). Annual per capita consumption of milkfat from fluid milk products (beverage milks and yogurt) has declined by half since 1970 due to lower milk consumption and a trend toward lower fat milks. Americans cut their average consumption of fluid whole milk by two-thirds between 1970 and 1997, and nearly tripled their use of lower fat milks. But because of the growing yen for cheese and fluid cream products, the Nation failed to cut the overall use of milkfat. (Annual average consumption of milkfat from some other dairy products—butter, frozen dairy products, condensed milk, evaporated milk, dry milk, and cottage-type cheeses—also declined during 1970-97 due to lower consumption of these products and increasing preference for lower fat versions.)

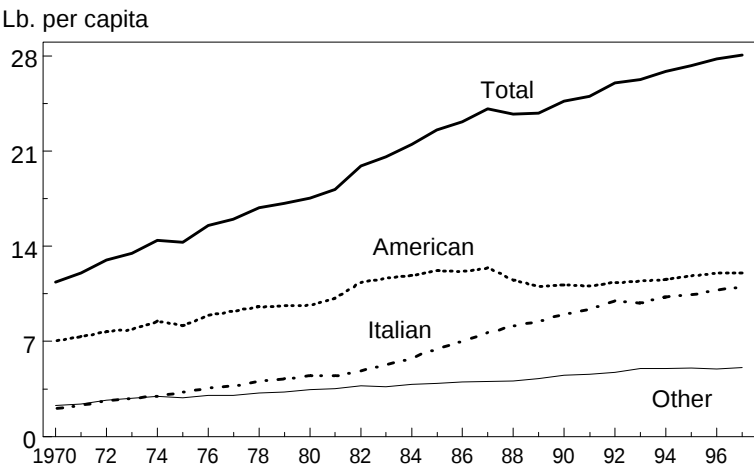
Annual per capita consumption of beverage milk declined from 31 gallons in 1970 to 24 gallons in 1997. A sixfold increase in per capita consumption of yogurt since 1970—to 9.5 half-pint servings per person in 1997—partially offset the decline in beverage milks. Consumption of soft drinks, fruit drinks and ades, and flavored teas

Figure 3
Americans are switching to lower-fat milks ...



Total includes flavored milk and buttermilk.

... but cheese consumption continues to rise



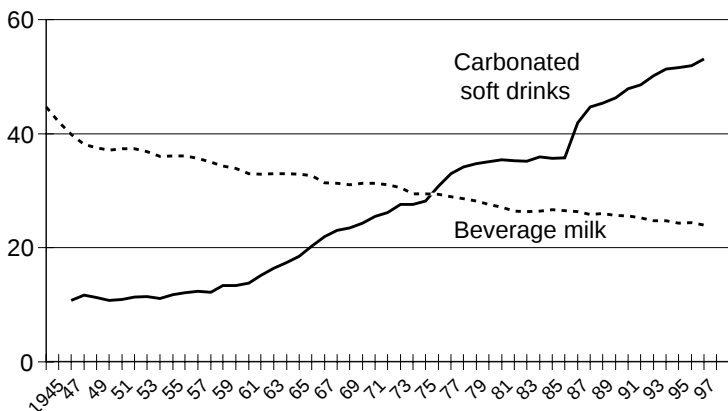
Natural equivalent of cheese and cheese products.
Excludes full-skim American and cottage-type cheeses.

Source: USDA/Economic Research Service.

Figure 4

In 1945, Americans drank more than four times as much milk as carbonated soft drinks; in 1997, they downed nearly two and a half times more soda than milk.

Gallons per capita



1947 is the earliest year for which data on soft drink consumption are available.

Per capita consumption of milk reached an all-time high in 1945 (data series dates from 1909).

Source: USDA/Economic Research Service.

may be displacing beverage milk in the diet (fig. 4). Big increases in eating away from home, especially at fast-food places, and in consumption of salty snack foods favored soft drink consumption.

The beverage milk trend is toward lower fat milk. While whole milk represented 81 percent of all beverage milk (plain, flavored, and buttermilk) in 1970, its share dropped to 35 percent in 1997. As a result, total beverage milk contributed 51 percent less fat to the average American's diet in 1997 than in 1970. In contrast, rising consumption of fluid cream products meant that they contributed two times as much milkfat to the average diet in 1997 as in 1970. (Per capita consumption of fluid cream products—half-and-half, light cream, heavy cream, eggnog, sour cream, and dips—jumped from 9.8 half-pints in 1970 to 17.0 half-pints in 1997.)

On balance, however, annual per capita consumption of milkfat from all fluid milk and cream products declined by 37 percent in 1970-97, from 9.1 pounds per person to 5.8 pounds. Of that 5.8 pounds, whole

milk contributed 2.4 pounds; lower fat milks, 1.7 pounds; and fluid cream products, 1.6 pounds. Skim milk added 0.05 pound of fat to the average diet in 1997, and yogurt (most of which is reduced-fat or fat-free) added 0.09 pound of fat.

These changes are consistent with increased public concern about cholesterol and animal fats. However, the decline in per capita consumption of fluid milk between 1970 and 1997 also may be attributed to declining numbers of U.S. teenage males and children age 5-12 years, an increasing prevalence of lactose intolerance among Americans due to the growing ethnic diversity and aging of the population, and increasing preference for soft drinks.

Price may also be behind the shift to lower-fat milks. Skim milk traditionally has been cheaper than whole milk, but this has not always been the case for 1-percent and 2-percent milks. However, since 1980, the retail prices for a half-gallon of 1-percent and 2-percent milks have averaged a few cents below that for whole milk.

Over time, this price break has enabled consumers to accept and prefer the lower fat milk. Evidence of such acceptance is McDonald's switch from whole milk to 2-percent in 1986 and from 2-percent milk to 1-percent in 1991. Starbucks and other coffee chains and foodservice operators now provide whole milk and fat-free milk in addition to half-and-half, cream, and coffee whiteners.

Advertising has influenced the shift to lower fat milks. A major print advertising program that features celebrities, models, and sports stars wearing "milk mustaches" has improved the overall image of milk, especially light and skim milks. Preliminary research, conducted by Roper Starch, an independent research firm, indicated that major contributing factors to a decline in total milk consumption were concern about fat and a belief that lower fat milks contain fewer nutrients than whole milk. Followup research, also conducted by Roper Starch, showed that more people now know that lower fat milks are as high as or higher than whole milk in calcium, vitamins, and other nutrients, except fat (see chapter 10 for more on the effect of dairy advertising on overall consumption of milk).

Average consumption of cheese (excluding full-skim American and cottage, pot, and baker's cheeses) increased 146 percent between 1970 and 1997, from 11 pounds per person to 28 pounds. Lifestyles

that emphasize convenience foods were probably major forces behind the higher consumption. In fact, two-thirds of our cheese now comes in commercially manufactured and prepared foods (including food-service) such as pizza, tacos, nachos, salad bars, fast-food sandwiches, bagel spreads, sauces for baked potatoes and other vegetables, and packaged snack foods. Advertising and new products—such as reduced-fat cheeses and resealable bags of shredded cheeses, including cheese blends tailored for use in Italian and Mexican recipes—also boosted consumption.

From 1970 to 1997, consumption of Cheddar cheese, America's favorite cheese, increased 65 percent to 9.6 pounds per capita. Per capita consumption of mozzarella—the main pizza cheese—in 1997 was 8.4 pounds, more than 7 times higher than in 1970, making it America's second favorite cheese. Cream cheese (including Neufchatel) overtook Swiss in the 1980's to become America's third favorite cheese, at 2.3 pounds per person in 1997. Despite the flurry of lower fat cheese introductions in the 1990's, these products still accounted for a fifth (reduced fat, 16 percent; nonfat, 4 percent) of supermarket sales for the 52 weeks ending July 11, 1998 (at 20 percent, that is down 2 percentage points from 2 years earlier), according to the International Dairy Foods Association. In the year ending July 11, 1998, sales of nonfat cheese fell 20 percent, while sales of reduced-fat and regular increased 3.3 percent and 4.0 percent. Lower-fat cheeses make up a much smaller proportion of the total cheese used by food manufacturers and foodservice operators.

Use of Added Fats Begins To Decline, But Remains Near Record-High Level

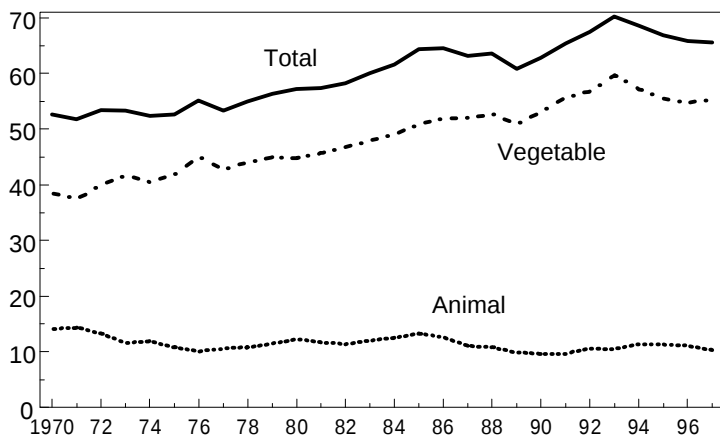
Americans' overriding nutrition concern in the mid-1990's with cutting dietary fat is apparent in the recent per capita food supply data, which shows a modest decline since 1993 in the use of added fats and oils (fig. 5). Annual per capita consumption of added fats and oils declined at least 7 percent between 1993 and 1997, from a record-high 70.2 pounds (fat-content basis) per person to 65.6 pounds.² However, average use of added fats and oils in 1997 remained a fourth above the 1970 level. Added fats and oils include

² ERS is in the process of adjusting the data to reflect the trend toward lower-fat margarine-type spreads.

Figure 5

Vegetable-based products represent an increasing share of total added fats and oils consumption

Pounds per capita



Source: USDA/Economic Research Service.

fats and oils used directly by consumers, such as butter on bread, as well as shortenings and oils used in commercially prepared cookies, pastries, and fried foods. Excluded is all fat naturally present in foods, such as in milk and meat.

Studies in the 1950's and 1960's showed that replacing saturated fatty acids (SFA's) and animal fat with polyunsaturated fatty acids (PUFA's) lowered serum cholesterol levels (Keys, Anderson, and Grande, 1957). Consequently, diets high in PUFA's were widely recommended for the prevention of heart disease. Within the added fats and oils group, animal fats declined roughly a fourth from 1970 to 1997, on a per capita basis, and vegetable fats increased roughly two-fifths. Per capita consumption of salad and cooking oils (high in PUFA's) nearly doubled between 1970 and 1997, from 15 pounds to 29 pounds.

However, concern developed about the safety of PUFA's, and interest in the health benefits of monounsaturated fatty acids (MUFA's) also increased. Some research suggests that replacing SFA's with PUFA's reduces LDL cholesterol but also reduces beneficial HDL cholesterol, while replacing SFA's with MUFA's lowers LDL cholesterol but

leaves HDL levels stable. In addition, PUFA's are more easily oxidized than MUFA's, making them more likely to contribute to atherosclerosis. Monounsaturated fatty acids are the most common fat in foods, but they are particularly plentiful in olive oil, canola oil, almonds, and avocados. In the 1997 food supply, olive oil and canola oil together accounted for 16 percent of total salad and cooking oils, up from 2 percent in 1985. Canola oil also is used in some soft, liquid-oil margarines.

In 1993, health concern about trans-fatty acids (or trans-fats) hit newspaper headlines. Trans-fats are created when liquid oils are hydrogenated to make them more solid and stable at room temperature; they raise LDL cholesterol and lower beneficial HDL cholesterol levels, and are associated with increased risk of coronary heart disease. Hydrogenated fats are used in everything from margarines, shortenings, crackers, cookies, baked goods, and peanut butter to foods fried in fast-food eateries, fried snack foods, and even some soups, beans, and cereals. From 1993 to 1997, consumption of margarine declined 23 percent per capita and consumption of shortening declined 17 percent per capita. About 40 percent of the margarine on supermarket shelves today is the old-fashioned stick variety, with the other 60 percent made up of tub or liquid margarines. In 1970, most margarine was the stick variety. In general, the softer the margarine, the lower its percentage of partially hydrogenated oils, and thus the lower the amount of trans-fats.

In 1970, the fats and oils group (composed of all added fats and oils) contributed the most fat to the food supply (43 percent), followed by the meat, poultry, and fish group (35 percent). By 1994, the fats and oils group's contribution to total fat had jumped 9 percentage points to 52 percent, probably due to the greatly expanded consumption of fried foods in foodservice outlets, the huge increase in consumption of high-fat snack foods, and the increased use of salad dressings. USDA food intake survey data show that, in 1989-91, the average woman age 19 to 50 got more fat from salad dressing than from any other food (Krebs-Smith and others, 1992).

In contrast, by 1994, the meat, poultry, and fish group's contribution to total fat had dropped 10 percentage points to 25 percent, reflecting changes in fat-trimming practices at processor and retail levels, improvements in animal husbandry, and increasing substitution of poultry and fish for red meats. Dairy products' contribution to total

fat declined from 12.6 to 12.3 percent between 1970 and 1994, even as total fat from dairy products increased from 19 to 20 grams per person per day.

Average Consumption of Fruits And Vegetables Rises

As Americans increasingly embrace national health authorities' recommendation of consuming at least five fruits and vegetables a day, their array of choices continues to widen. Fresh-cut fruits and vegetables, prepackaged salads, locally grown items, and exotic produce—as well as hundreds of new varieties and processed products—have been introduced or expanded since the early 1980's. Supermarket produce departments carry over 400 produce items today, up from 250 in the late 1980's and 150 in the mid-1970's. Also, the number of ethnic, gourmet, and natural foodstores—which highlight fresh produce—continues to rise.

Consumers increasingly have more access to fresh, local produce as well. The number of farmers' markets reported to State agriculture departments has grown substantially throughout the United States over the last several decades, numbering around 1,755 at the end of 1993 and eclipsing 2,746 in 1998. Some analysts say that the total number of farmers' markets, including those not reported, is more than double that figure.

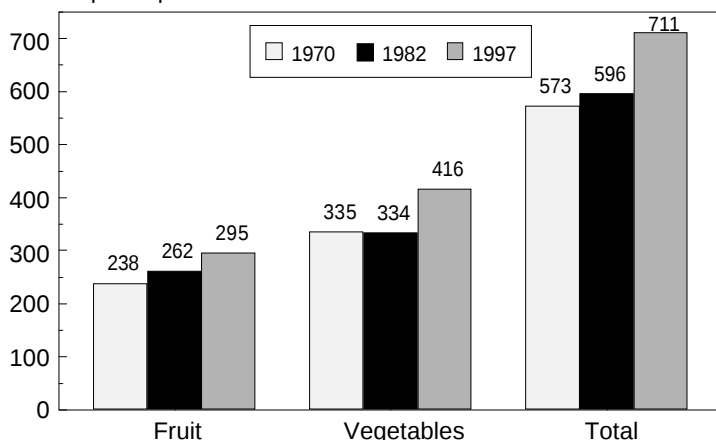
While the overall market for fruits and vegetables has expanded in the last 15 years, the mix has changed. Shifts have taken place among traditional produce items and between fresh and processed forms. Traditional varieties have lost market share to specialty varieties, and exotic produce has gained favor. For example, per capita consumption of iceberg lettuce fell by 4.4 pounds (or 15 percent) between 1989 and 1997, while per capita consumption of romaine and leaf lettuces increased 2.5 pounds (or 69 percent) during the same period. In addition, many specialty lettuces not yet tracked in USDA's food supply database—such as radicchio, frisee, arugula, and red oak—gained in popularity in the last several years because of inclusion in fresh-cut salad mixes and in upscale restaurant menus.

Total per capita use of the 129 commercially produced fruits and vegetables for which ERS has U.S. production data rose 24 percent,

Figure 6

Total per capita consumption of fruits and vegetables increased 24 percent between 1970 and 1997

Pounds per capita



Fresh-weight equivalent.

1982 saw the publication of "Diet, Nutrition, and Cancer," which emphasized the importance of fruits and vegetables in the daily diet.

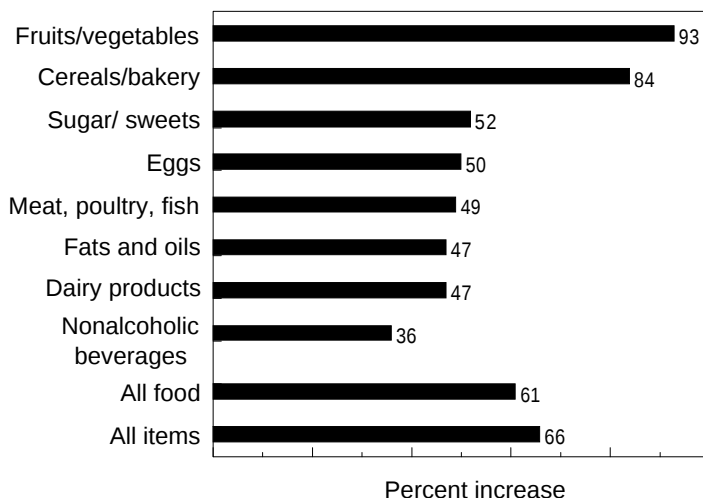
Source: Calculated by USDA/ERS from the Consumer Price Index.

from 573 pounds in 1970 to 711 pounds in 1997 (fig. 6). Four-fifths of this increase occurred since 1982, the year in which an expert scientific panel convened by the U.S. National Academy of Sciences published its landmark report *Diet, Nutrition, and Cancer*. The report emphasized the importance of including fruits (especially citrus fruits), vegetables (especially carotene-rich and cruciferous, or cabbage-family, vegetables), and whole-grain cereal products in the daily diet, noting that these dietary guidelines were consistent with good nutritional practices and likely to reduce the risk of cancer.

The 19-percent gain in fruit and vegetable consumption between 1982 and 1997 was probably tempered by the fact that fruits and vegetables led in retail price increases from 1982 to 1997 (fig. 7). Price increases for fresh fruits and vegetables were more than double those for processed. Despite the bigger price increases for fresh than processed, per capita consumption from 1982 to 1997 increased 24 percent for fresh fruit and 5 percent for processed fruit. Better quality, increased variety, and year-round availability have boosted con-

Figure 7

Fruits and vegetables have led in retail price increases, 1982-97



Source: Calculated by USDA/ERS from the Consumer Price Index.

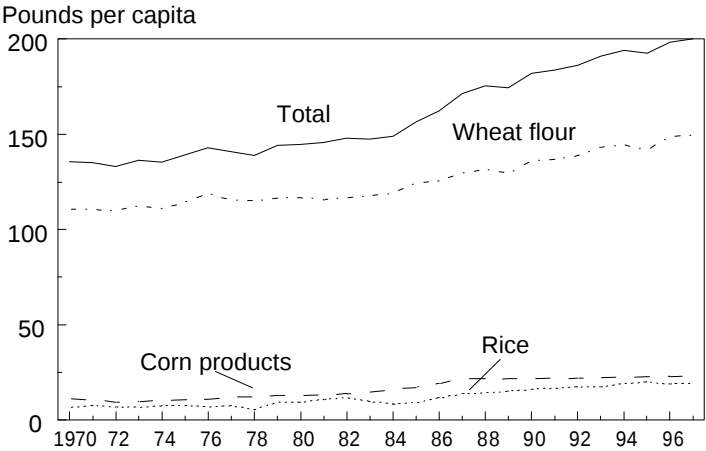
sumption of fresh fruits and vegetables. The increase between 1982 and 1997 in per capita consumption of processed vegetables nearly equaled that of fresh vegetables—24 percent versus 25 percent. Price, convenience, and increasing preference for fast-food eateries and ethnic foods have hiked consumption of frozen vegetables (especially french fries) and canned tomato products.

Grain Consumption Up From 1970's, But Far Below Early 1900's Highs

Per capita use of flour and cereal products reached 200 pounds in 1997 from an annual average of 145 pounds in 1980 and 136 pounds in 1970 (fig. 8). The expansion in supplies reflects ample grain stocks, strong consumer demand for variety breads and other instore bakery items, as well as grain-based snack foods, and increasing fast-food sales of products made with buns, doughs, and tortillas. Yet this consumption level is far below the 300 pounds consumed per person in 1909 (the earliest year for which data are available). In 1909, the

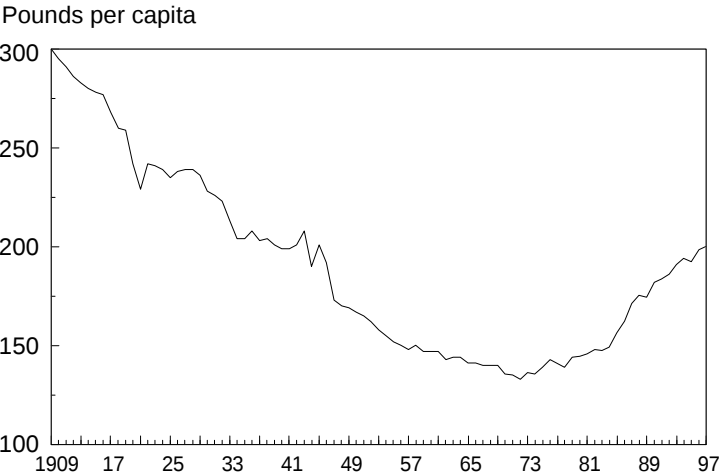
Figure 8

Consumption of flour and cereal products increased 34 percent between 1984 and 1997...



Total includes oat, rye, and barley products.

... but in 1997, it remained 100 pounds below the 1909 level



Source: USDA/Economic Research Service.

major source of protein in the American diet was grain products. By 1994, it was meat, poultry, and fish.

USDA's nationwide food consumption surveys confirm the food supply data, also indicating Americans are eating more grain products (see chapter 3). Consumption of grain mixtures—such as lasagna and pizza—increased 115 percent between 1977-78 and 1994. Snack foods—such as crackers, popcorn, pretzels, and corn chips—soared 200 percent, and ready-to-eat cereals were up 60 percent. One of the biggest changes within the grain mixture group was the explosion of ethnic foods, especially Mexican foods. Mexican foods were consumed four times more often in 1994 than in the late 1970's.

Yet Americans are still eating a serving or less a day of whole-grain foods, far below the minimum three per day the American Dietetic Association recommends. If a bread does not have whole wheat, oats, or some other whole grain as the first ingredient, much of its vitamin- and mineral-rich germ and bran have been milled away, along with most of its fiber. Enriched flour, from which most breads are made, is not a whole grain. The processor has simply added back three of the B-vitamins (niacin, thiamin, and riboflavin) and the iron that were lost when the flour was refined. Some companies that make "light" breads also add highly processed fiber to boost the fiber content and cut the calories. But nothing replaces the lost vitamin E, B-6, magnesium, manganese, zinc, potassium, copper, pantothenic acid, and phytochemicals.

Since January 1, 1998, all enriched grain foods—including ready-to-eat breakfast cereals, pasta, bread, rolls, flour, cakes, and cookies—have been fortified with folic acid (the synthetic form of folate, a B-vitamin). That should reduce the risk of neural tube birth defects like spina bifida. It may also protect adults from heart disease and reduce the chances of cervical cancer in women. Folic acid is found naturally in legumes; liver; many vegetables, especially green leafy ones like spinach; citrus fruits and juices; whole-grain products; and eggs.

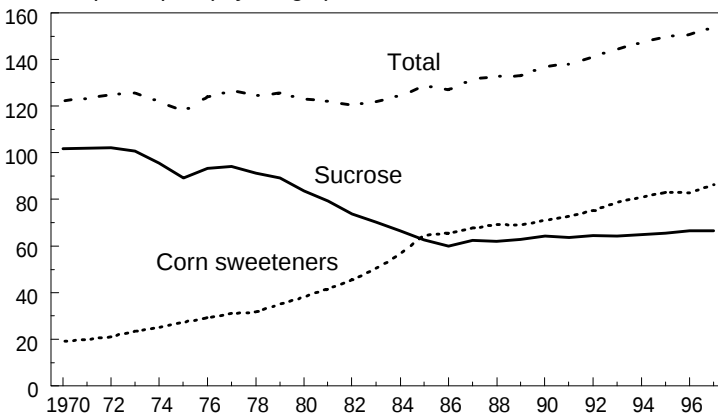
Average Consumption of Caloric Sweeteners Hits Record High

Americans have become conspicuous consumers of added sugars and sweet-tasting foods and beverages. Per capita consumption of caloric

Figure 9

In 1997, Americans consumed more than two-fifths of a pound of caloric sweeteners per day

Pounds per capita (dry weight)



Total includes honey, molasses, and other refiner's syrups.

Source: USDA/Economic Research Service.

sweeteners (dry-weight basis)—mainly sucrose (table sugar made from cane and beets) and corn sweeteners (notably high-fructose corn syrup, or HFCS)—increased 34 pounds, or 28 percent, between 1982 and 1997 (fig. 9). In 1997, each American consumed a record average 154 pounds of caloric sweeteners. That amounted to more than two-fifths of a pound—or 53 teaspoonfuls—of added sugars per person per day in 1997. USDA's Food Guide Pyramid suggests that people consuming 1,600 calories limit their intake of added sugars to 6 teaspoons per day. The daily suggested limit increases to 12 teaspoons for those consuming 2,200 calories, and to 18 teaspoons for those consuming 2,800 calories (USDA, 1992).

A striking change in the availability of specific types of sugar occurred in the past two decades. Sucrose's share of total caloric sweetener use dropped from 83 percent in 1970 to 43 percent in 1997, while corn sweeteners increased from 16 percent to 56 percent. All other caloric sweeteners—including honey, maple syrup, and molasses—combined to maintain a 1-percent share.

In 1997, Americans consumed three-fourths more caloric sweeteners per capita than in 1909. In 1909, two-thirds of the sugar produced went directly into the home, which meant control was in the hands of the person who bought it. The balance was used mostly by industry. In contrast, more than three-quarters of the refined and processed sugars produced today goes to food and beverage industries, and less than a quarter is brought home.

The steep rise in caloric sweetener consumption since the mid-1980's coincides with a 47-percent increase in annual per capita consumption of regular (nondiet) carbonated soft drinks, from 28 gallons per person in 1986 to 41 gallons in 1997 (that is 14.5 ounces per person per day, an amount that contains 11 teaspoonfuls of sugar).

Carbonated soft drinks provided more than a fifth (22 percent) of the refined and processed sugars in the 1994 American diet.

One quarter of the calories available from the 1994 per capita food supply (excluding alcoholic beverages) came from sugars. Lactose from milk and the sugars occurring naturally in fruit and vegetables accounted for one-fourth of this amount. The remaining three-fourths—more than 18 percent of total calories—was from sugars added to foods.

Sugar—including sucrose, corn sweeteners, honey, and molasses—is, in a sense, the number-one food additive. It turns up in some unlikely places, such as pizza, bread, hot dogs, boxed rice mixes, soup, crackers, spaghetti sauce, lunch meat, canned vegetables, fruit drinks, flavored yogurt, ketchup, salad dressing, mayonnaise, and some peanut butter.

The new food label, introduced in 1994, which lists the amount of sugars in grams (4 grams is equivalent to 1 teaspoon) in a serving of the food, can help people who are trying to moderate their sugar intake. This number includes both added sugars and those naturally present. Foods with natural sugars, such as milk and fruit, are also good sources of other nutrients, such as vitamins and minerals.

New sweeteners will likely enter the market in the next decade. With more alternative sweeteners, food processors can custom-blend caloric and high-intensity sweeteners to reduce calories and to achieve an optimum combination of taste, cost, and functional properties for specific applications.

Availability of Calories and Most Nutrients Also Increased

The level of food energy available in the food supply increased 15 percent between 1970 and 1994, from 3,300 to 3,800 calories per person per day. The proportion of calories from carbohydrates increased from 47 to 51 percent, while the share from fat decreased from 42 to 38 percent. Protein has consistently accounted for about 11 percent of calories.

Although the share of calories from fat declined, the amount of fat provided by the food supply increased between 1970 and 1994, from 154 grams to 159 grams per capita per day (table 1). Saturated fatty acids decreased due to the increased availability of leaner red meat and the substitution of poultry and fish for red meat. Cholesterol also declined, due largely to a 23-percent decline in egg consumption and, to a lesser extent, a drop in consumption of organ meats, such as liver, and a switch to lower fat dairy products.

Per capita levels of most vitamins and all minerals increased from 1970 to 1994. B-12 is the only vitamin with a per capita drop between 1970 and 1994. The 15-percent decrease was due to lower consumption of organ meats and egg yolks. While the 1994 value for vitamin B-12 was lower than earlier levels, it still exceeded the recommended dietary allowance (RDA) for a healthful diet by a generous margin.

Historically, the nutrient levels in the food supply were deemed sufficient to meet the needs of most Americans. However, a significant expansion of the research base and an increased understanding of nutrient requirements and food constituents in the 1990's have prompted increases in recommended intakes for some nutrients—notably calcium and folate—to levels greater than those provided in the 1994 per capita food supply. The RDA's, first developed by the National Academy of Sciences in 1941 and periodically updated, are being replaced by new recommendations, called Dietary Reference Intakes (DRI's), developed by the Institute of Medicine (IOM). Unlike RDA's, which were initially established to protect against diseases like rickets caused by nutrient deficiencies, DRI's aim to optimize health by also minimizing the risk of major chronic diseases, such as osteoporosis. The first two reports on DRI's review and provide recommendations for five bone-related nutrients (calcium, phos-

Table 1—Per capita food supply provides insufficient levels of calcium and folate¹

Nutrient	Unit	1970	1994	% change
Food energy	Calories	3,300	3,800	15
Carbohydrates	Grams	386	491	27
Protein	"	95	110	16
Total fat	"	154	159	3
Saturated fatty acids	"	54	52	-4
Monounsaturated fatty acids	"	63	65	2
Polyunsaturated fatty acids	"	26	31	19
Cholesterol	Milligrams	470	410	-13
Vitamin A	Micrograms, retinol equiv.	1,500	1,520	1
Carotenes	Micrograms, retinol equiv.	510	660	29
Vitamin E	Milligrams, alpha-tocopherol equiv.	13.7	16.9	23
Vitamin C	Milligrams	107	124	16
Thiamin	"	2.0	2.7	35
Riboflavin	"	2.3	2.6	13
Niacin	"	22	29	32
Vitamin B-6	"	2.0	2.3	15
Folate	Micrograms	279	331	19
Vitamin B-12	"	9.5	8.1	-15
Calcium	Milligrams	890	960	8
Phosphorus	"	1,460	1,680	15
Magnesium	"	320	380	16
Iron	"	15.4	21.2	38
Zinc	"	12.2	13.2	1
Copper	"	1.6	1.9	19
Potassium	"	3,510	3,780	8

¹ The level of calcium in the 1994 food supply was insufficient to meet the 1997 Dietary Reference Intake (DRI) values for calcium, which would require a population-weighted-average of 1,040 milligrams (not counting losses or waste) per person in 1994. The level of folate in the 1994 food supply was insufficient to support the Public Health Service's 1992 recommendation that all women of childbearing age consume 400 micrograms of folate, or folic acid, a day. However, implementation on January 1, 1998 of new FDA folate-fortification policy for all enriched grain foods should provide ample folate in the 1998 food supply.

Source: USDA/ERS.

phorus, magnesium, vitamin D, and fluoride) and the B vitamins (thiamin, riboflavin, niacin, vitamin B-6, folate, vitamin B-12, pantothenic acid, biotin, and choline) (Institute of Medicine, 1997, 1998).

Adequate intake of folate—one method to having healthier babies and possibly a healthier heart—is a public health concern. The 1994 food supply provided 331 micrograms of folate per person per day, an amount that exceeds the 1989 RDA's for all individuals except pregnant women. Since 1989, however, strong scientific research has shown that folate, or synthetic folic acid, reduces the risk of neural tube birth defects such as spina bifida when consumed in adequate amounts by women before and during early pregnancy. Mounting scientific evidence also suggests that folate may reduce the risk of heart disease by lowering levels of homocysteine in the blood. The U.S. Public Health Service recommended in 1992 that all women of childbearing age consume 400 micrograms of folic acid daily. The new IOM recommendation for both men and women is 400 micrograms of dietary folate equivalent daily (Institute of Medicine, 1998). For women capable of becoming pregnant, the IOM recommendation is to take 400 micrograms of synthetic folic acid daily, from fortified foods and/or supplements, in addition to consuming food folate from a varied diet. Folate levels in the per capita food supply prior to 1998 fell short of these recommendations. However, with implementation by January 1, 1998, of a new FDA folate-fortification policy for all enriched grain foods, the 1998 food supply should provide enough folate to meet the new recommendations.

The new IOM vitamin D recommendations are twice as high for adults 51-70 years and three times higher for adults above 70 than for younger people or previous recommendations (Institute of Medicine, 1997). The amount of vitamin D in the food supply is not estimated because data on the vitamin D content of foods are provisional and limited to selected foods. Since the main dietary source of vitamin D is fortified milk products for which consumption is low, food supply levels of vitamin D are likely insufficient to meet the new recommendations for the U.S. population.

Calcium intakes recommended by the IOM are increased to at least 1,000 milligrams a day (that is, the amount in three and a third servings of milk or other dairy foods) for all Americans over 8 years of age. Higher calcium intakes are recommended for adults over 50 (1,200 milligrams per day; 4 1/3 servings) and for teens 9-18 (1,300

milligrams per day; 4 servings) (Institute of Medicine, 1997). The 1994 per capita food supply provided an average 960 milligrams of calcium per person per day. Of that 960 milligrams, ERS estimates that 280 were lost to milk spill, plate waste, and discard of moldy cheese, old yellowed broccoli, edible bones in canned salmon, and the like. That estimate would put actual dietary consumption of calcium in 1994 at about 680 milligrams per person per day. The new IOM recommendations would have required a population-weighted-average 1,040 milligrams (not counting waste or losses) per person per day in 1994.

References

- Cryovac Division, W.R. Grace & Co.-Conn. *1997 Retail Case-Ready Fresh Red Meat Survey*. Duncan, SC, 1998.
- Gerrior, Shirley, and Lisa Bente. *Nutrient Content of the U.S. Food Supply, 1909-94*, Center for Nutrition Policy and Promotion, U.S. Department of Agriculture, Home Economics Research Report No. 53, 1997.
- Institute of Medicine, National Academy of Sciences. *Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. Washington, DC: National Academy Press, 1997.
- _____. *Dietary Reference Intakes: Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. Washington, DC: National Academy Press, 1998.
- Keys, A., J.T. Anderson, and F. Grande. "Prediction of Serum-Cholesterol Responses of Man to Changes in Fats in the Diet." *Lancet*, Vol. 2, pp. 959-66, 1957.
- Krebs-Smith, S.M., F.J. Cronin, D.B. Haytowitz, and D.A. Cook. "Food Sources of Energy, Macronutrients, Cholesterol, and Fiber in the Diets of Women," *Journal of the American Dietetic Association*, Vol. 92, pp. 168-74, 1992.
- Lutz, Steven M., David M. Smallwood, James R. Blaylock, and Mary Y. Hama. *Changes in Food Consumption and Expenditures in American Households During the 1980's*. U.S. Dept. Agr., Econ. Res. Serv., SB-849, Dec. 1992.

- National Cattlemen's Association. *Improving the Quality, Consistency, Competitiveness and Market-Share of Beef: The Final Report of the Second Blueprint for Total Quality Management in the Fed-Beef (Slaughter Steer/Heifer) Industry*. Conducted by Colorado State Univ., Texas A&M Univ., and Oklahoma State Univ. Dec. 1995.
- National Research Council. *Diet, Nutrition, and Cancer*. Washington, DC: National Academy Press, 1982.
- Purcell, Wayne D. *A Primer on Beef Demand*. Research Institute on Livestock Pricing, Agricultural and Applied Economics, Virginia Tech, Blacksburg, VA, Research Bulletin 2-98, April 1998.
- Putnam, Judith J., and Jane E. Allshouse. *Food Consumption, Prices, and Expenditures, 1970-94*, U.S. Dept. Agr., Econ. Res. Serv., SB-928, Aug. 1996.
- _____. *Food Consumption, Prices, and Expenditures, 1970-95*, U.S. Dept. Agr., Econ. Res. Serv., SB-939, Aug. 1997.
- Sacks, F.M. "Dietary Fats and Coronary Heart Disease." *Journal of Cardiovascular Risk*, Vol. 1, pp. 3-8, 1994.
- U.S. Department of Agriculture. *The Food Guide Pyramid*. Home and Garden Bulletin No. 252, Aug. 1992.
- U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Nutrition and Your Health: Dietary Guidelines for Americans*. Home and Garden Bulletin No. 232, First Edition, 1980; Second Edition, 1985; Third Edition, 1990; and Fourth Edition, 1995.

Appendix:

Food Supply Data Used To Measure Food Consumption

The USDA's Economic Research Service (ERS) food supply series measures the flow of several hundred commodities into the U.S. marketing system. Food consumption is normally not directly measured or statistically estimated. The availability of total food for human use is, therefore, a residual component after subtracting other uses (such as exports, seed, feed, industrial use, and ending inventories) from the available food supply (the sum of production, beginning inventories, and imports) and then dividing by population estimates.

The food supply series is the only continuous source of food and nutrient availability in the United States, providing researchers with a unique data set

with which to measure changes in food consumption trends over time. However, the data are only one of several different sources of dietary information in the United States. Food intake surveys, such as USDA's Continuing Survey of Food Intakes by Individuals (CSFII), provide data on food consumption reported by individuals. These surveys differ from the food supply series in that they record intake over a specific period of time ranging from 1 day to 1 week and they combine demographic information with food intake data.

Both the food supply and food intake data have strengths and limitations that affect their usefulness as a dietary assessment tool. For example, food intake surveys are subject to underreporting, although little is known about the extent to which underreporting may differ among food groups. The average caloric intakes reported by survey respondents are often well below those needed to maintain body weight, and research indicates that, when people are given a diet containing the calories reported in the intake surveys, they lose weight. In the 1989-91 CSFII, for example, the diets reported by women age 20-39 yielded an average caloric intake of 1,657 calories, compared with a Recommended Energy Allowance (REA) of 2,200 calories for the age group. Similarly, the average daily energy intake of 2,347 calories calculated from the foods reported by male respondents age 20-50 was about 20 percent below their REA of 2,900 calories. Because of these limitations, food intake surveys are considered an underrepresentation of actual food intakes.

On the other hand, the food supply data typically overstate actual human consumption because they capture food lost to waste, spoilage, and cooking, and include most food ingredients used in processed products that are exported. As a result, average caloric intake based on these data are often well above recommended levels. For example, the food supply provided an average of 3,800 calories per capita in 1994, the last year for which nutrient data are available for the food supply.

Despite these limitations, the aggregate approach used in the food supply series complements the individual intake data by capturing small quantities of foods used as ingredients in other products. For example, the food supply series measure per capita consumption of canning tomatoes rather than the actual intake of foods in which they are used, such as Italian and Mexican-style entrees, soups, stews, pizza, and sandwiches. This eliminates the problem—commonly associated with food intake survey data—of decomposing compound foods back to commodity ingredients. Also, because the food supply data are developed using similar methodologies across years, they provide researchers with a tool with which to measure long-term trends in food consumption relative to dietary guidance.

Food Supply Nutrient Availability Estimates. USDA's Center for Nutrition Policy and Promotion uses ERS data on the amount of food available for consumption and information on the nutrient composition of foods from USDA's Agricultural Research Service (ARS) to calculate the nutrients available in the food supply. The estimates reflect amounts available prior to moving through marketing channels—not the amounts actually consumed.

Basically, the nutrient estimates are calculated by multiplying the per capita amount of each food by the nutrient composition of that food. The results are then totaled for each nutrient and presented per day. The estimates exclude nutrients from the inedible parts of foods, such as bones, rinds, and seeds, but include nutrients from parts of food that are edible but not always eaten, such as the separable fat on retail cuts of meat.

As with the food supply estimates, the resulting nutrient estimates do not account for losses during processing, marketing, or home use. For example, vegetables generally lose nutrients, particularly water-soluble nutrients like vitamin C and thiamin, when cooked in water.

Nutrients not included in these values are those from vitamin and mineral supplements, alcoholic beverages (or the grains and sugar used to make alcoholic beverages), baking powder, yeast, and certain vitamins and minerals used for functional or flavoring agents in foods. Nutrients added through enrichment of flour and cereal products and through fortification of other foods are included in the nutrient values.