

A Dietary Assessment of the U.S. Food Supply: Comparing Per Capita Food Consumption with Food Guide Pyramid Serving Recommendations.

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Abstract

Most American diets do not meet Federal Food Guide Pyramid dietary recommendations. On average, people consume too many servings of added fats and sugars and too few servings of fruits, vegetables, dairy products, lean meats, and foods made from whole grains compared with a reference set of Food Guide Pyramid serving recommendations appropriate to the age and gender composition of the U.S. population. In addition, while the healthfulness of diets has improved over time, the pace of improvement has been uneven. For example, while Americans consumed record amounts of fruits and vegetables in 1996, consumption of caloric sweeteners also reached a 27-year high. This report is the first dietary assessment to use ERS's time-series food supply data to compare average diets with Federal dietary recommendations depicted in the Food Guide Pyramid. Food Guide Pyramid servings were estimated for more than 250 agricultural commodities for 1970-96. New techniques were developed to adjust the data for food spoilage and other losses accumulated throughout the marketing system and the home.

Keywords: Food, food consumption, CSFII, Food Guide Pyramid, Dietary Guidelines for Americans

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Summary

Most American diets do not meet Federal Food Guide Pyramid dietary recommendations. On average, people consume too many servings of added fats and sugars and too few servings of fruits, vegetables, dairy products, lean meats, and foods made from whole grains compared with a reference set of Food Guide Pyramid serving recommendations appropriate to the age and gender composition of the U.S. population. In addition, while the healthfulness of diets has improved over time, the pace of improvement has been uneven. For example, while Americans consumed record amounts of fruits and vegetables in 1996, consumption of caloric sweeteners also reached a 27-year high.

This report is the first dietary assessment to use ERS's time-series food supply data to compare average diets with Federal dietary recommendations depicted in the Food Guide Pyramid. Food Guide Pyramid servings were estimated for more than 250 agricultural commodities for 1970-96. New techniques were developed to adjust the data for food spoilage and other losses accumulated throughout the marketing system and the home.

Information on how diets differ from Federal dietary recommendations is key to Federal efforts to monitor the dietary and nutritional status of the population under the Ten-Year Comprehensive Plan for National Nutrition Monitoring and Related Research Program mandated by the National Nutrition and Related Research Act of 1990.

This study contributes to the existing dietary assessment literature by providing researchers and policymakers with the ability to measure changes in food consumption behavior over time relative to major nutrition education or policy initiatives. Also, because the servings estimates reported here are derived from consumption data for raw and semi-processed agricultural commodities, rather than for final food products, food servings can be readily converted back to farm-level data, easing the translation of dietary recommendations into production and supply goals for farmers and the food industry. Finally, the time-series estimates reported here can be used as a baseline to project future trends in food demand and for comparing these trends against Food Guide Pyramid serving recommendations.

The data are also useful for helping researchers better understand the differences and similarities between the food supply data and USDA's Continuing Survey of Food Intakes by Individuals (CSFII), which measures food products actually eaten by individuals. The servings estimates provided in this report allow researchers, for the first time, to compare the amount and types of food available in the food supply with information on actual food intakes by Americans.

A Dietary Assessment of the U.S. Food Supply

Comparing Per Capita Food Consumption with Food Guide Pyramid Serving Recommendations

Linda Scott Kantor

Federal Dietary Guidance Promotes Healthy Eating

Most American diets do not meet Federal dietary recommendations depicted in the Food Guide Pyramid. Diet-related chronic diseases, including coronary heart disease, cancer, stroke, and diabetes, account for nearly two-thirds of all deaths in the United States each year (Frazao, 1995). Healthy diets, such as those abundant in grains, vegetables, and fruits, and low in fat, saturated fat, and cholesterol, combined with moderate and regular physical activity, can reduce the risk for these diseases. USDA's Economic Research Service (ERS) estimates that improved diets could prevent \$48 billion in medical costs and lost productivity resulting from disability, and \$28 billion (in 1995 dollars) in the value of premature deaths (Frazao, forthcoming).

Growing scientific evidence about the relationship between diet and health has increased the need for information on the quality and composition of the American diet. The National Nutrition and Related Research Act of 1990 (Public Law 101-445) set in place the Ten-Year Comprehensive Plan for National Nutrition Monitoring and Related Research Program. Key to this program are Federal efforts to monitor the dietary and nutritional status of the population. ERS maintains one of two major information systems that contribute to this monitoring activity. The ERS information system provides detailed estimates of food available for domestic human consumption. This study is the first dietary assessment to use ERS's time-series food consumption data to compare average diets with Federal dietary recommendations presented in the Food Guide Pyramid. The analysis gives Federal policy officials and nutrition educators addi-

tional insights about the progress of our Nation in achieving healthier diets. More importantly, this research will allow ERS, for the first time, to directly link dietary recommendations to the U.S. food production and marketing system.

Federal dietary guidance outlined in the 1995 Dietary Guidelines for Americans¹ and illustrated graphically in the Food Guide Pyramid² (USDA, CNPP, 1996) is intended to help consumers choose diets that improve health and meet their nutritional needs.

The 1995 Dietary Guidelines summarize the most current scientific evidence on diet and health into recommendations for healthy Americans 2 years of age and older and serve as the basis for Federal nutrition and education programs. These guidelines outline seven dietary recommendations that consumers should adopt for better health:

- Eat a variety of foods
- Balance the food you eat with physical activity—maintain or improve your weight

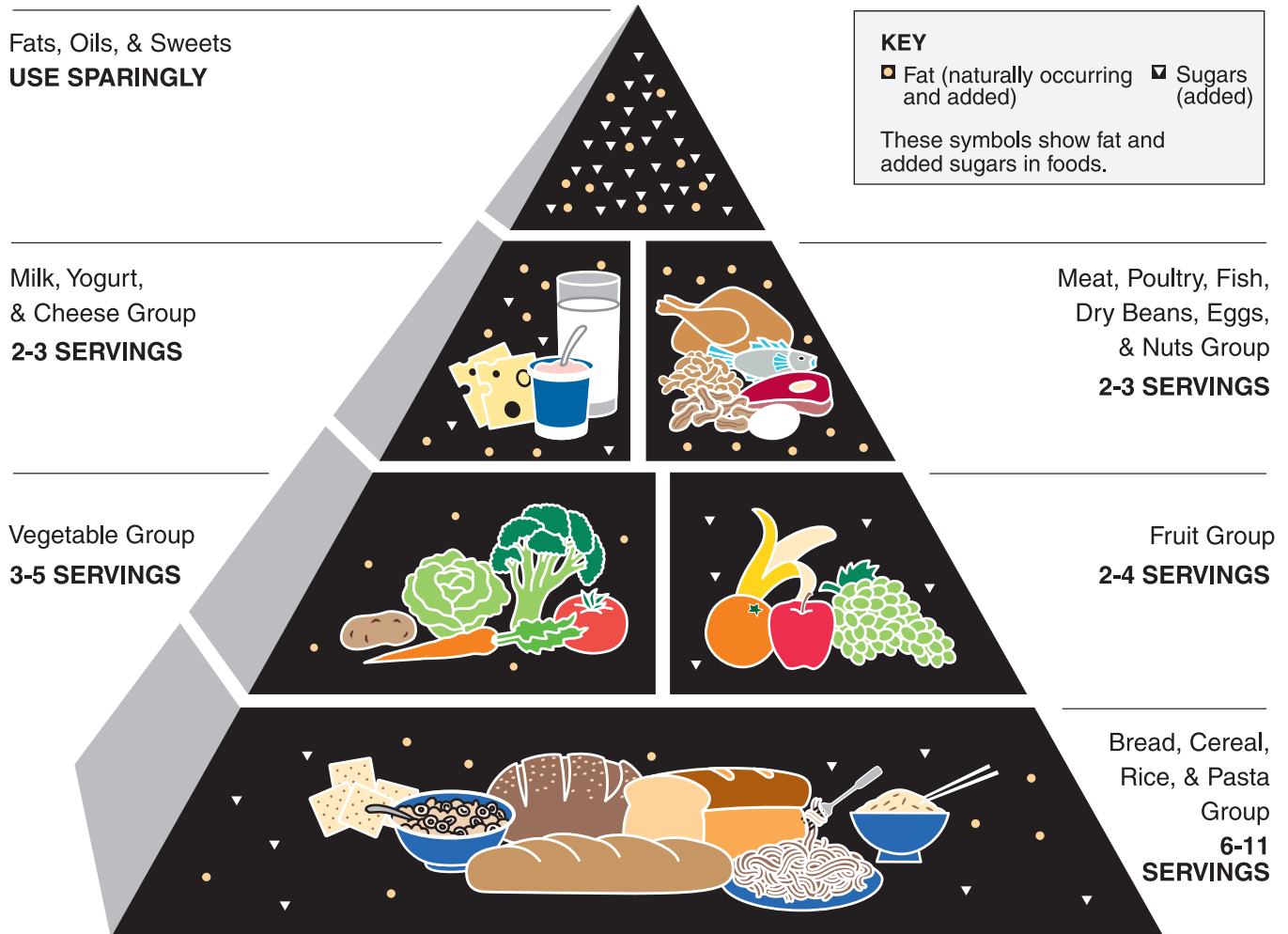
¹The full text of the 1995 Guidelines can be found in the publication, *Nutrition and Your Health: Dietary Guidelines for Americans*, 4th ed. 1995. In this report, references to the full text are italicized.

²The Food Guide Pyramid illustrates the research-based food guidance system developed by the U.S. Department of Agriculture (USDA) and supported by the Department of Health and Human Services (HHS). The Food Guide Pyramid graphic is published as part of a larger bulletin of dietary guidance published by the U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, *The Food Guide Pyramid*, Home and Garden Bulletin Number 252, October 1996. In this report references to *The Food Guide Pyramid* bulletin are italicized.

- Choose a diet with plenty of grain products, vegetables, and fruits
- Choose a diet low in fat, saturated fat, and cholesterol
- Choose a diet moderate in sugars
- Choose a diet moderate in salt and sodium
- If you drink alcoholic beverages, do so in moderation

The Food Guide Pyramid helps consumers put these guidelines into practice by recommending the type and quantity of foods to eat from five major food groups—bread, cereals, rice, and pasta; vegetables; fruit; milk, yogurt, and cheese; and meat, poultry, fish, dry beans, eggs, and nuts. It also suggests that consumers use fats, oils, and sweets sparingly (USDA, CNPP, 1996). *The Dietary Guidelines* recommend that Americans limit total fat intake to 30 percent of calories. A diet low in fat will reduce consumers' chances of getting certain diseases and help consumers to maintain a healthy weight. To avoid getting

Figure 1
The Food Guide Pyramid



Source: USDA, CNPP, 1996.

too many calories from sugars, *The Dietary Guidelines* suggest that consumers use sugars in moderation—and sparingly for persons whose calorie needs are low.

The Food Guide Pyramid shows a range of servings for each major food group (fig. 1). The number of

servings that are right for any one person varies depending on age, sex, and physiological status (table 1). Almost everyone should have at least the lowest number of servings in the ranges, except for preschool children who can eat smaller servings based on their lower calorie requirements. Sample serving sizes for each food group are listed in box 1.

Table 1—The Food Guide Pyramid serving recommendations vary with age, sex, and physiological status

Daily calorie intake ¹	Bread, cereals, rice, and pasta	Vegetables	Fruit	Milk, yogurt, and cheese ²	Meat, poultry, fish, dry beans, eggs, and nuts	Total fats ³	Added sugars ⁴
	-----Number of daily servings-----				Ounces	Grams	Teaspoons
1,600 calories: Many sedentary women, and some older adults	6	3	2	2-3	5	53	6
2,200 calories: Most children, teenage girls, active women, and many sedentary men	9	4	3	2-3	6	73	12
2,800 calories: Teenage boys, many active men, and some very active women	11	5	4	2-3	7	93	18

¹Sample diets for a day at three calorie levels. Calorie levels are based on Recommended Energy Allowances (National Research Council, 1989) and average calorie intake reported in national food consumption surveys.

²Three servings of milk, yogurt, and cheese are appropriate for teenagers and young adults to age 24 and for pregnant and breastfeeding women. Two servings are recommended for other adults and children.

³The 1995 Dietary Guidelines recommend that consumers choose a diet that provides no more than 30 percent of total calories from fat. The upper limit on the grams of fat in a consumer's diet will depend on calorie intake. For example, for a person consuming 2,200 calories per day, the upper limit on total daily fat intake is 660 calories. Seventy-three grams of fat contribute about 660 calories (73 grams x 9 calories per gram of fat = 660 calories).

⁴To avoid getting too many calories from sugar, dietary guidance suggests that consumers try to limit added sugars to the daily quantities listed.

Source: *The Food Guide Pyramid*, USDA/CNPP, Home and Garden Bulletin Number 252, October 1996.

Box 1—What Is a Recommended Serving?

To guide consumers in their daily food choices, *The Food Guide Pyramid* bulletin suggests a range of servings for different levels of calorie intake. Most consumers should have at least the minimum number of servings each day, except for preschool children who can eat smaller servings based on their lower calorie requirements. Sample serving sizes for each food group are listed below.

Bread, cereal, rice, and pasta

1 slice of bread
½ cup cooked cereal, rice, or pasta
1 oz. ready-to-eat cereal
½ English muffin or bagel
1 tortilla
3-4 small crackers
2 4" pancakes

Fruit

1 whole fruit (medium apple, orange, banana)
½ cup chopped, cooked, or canned fruit
¾ cup fruit juice
½ grapefruit
¼ cup dried fruit
½ cup berries

Meat, poultry, fish, dry beans, eggs, and nuts

2-3 oz. cooked lean meat, poultry, or fish are 1 serving;
1 egg; 2 tablespoons of peanut butter; ½ cup cooked dry beans, peas, or lentils; ⅓ cup of nuts count as 1 oz. of meat (about ⅓ serving)

Vegetables

1 cup of raw leafy vegetables
½ cup cooked or canned vegetables
7-8 carrot sticks
1 medium potato
¾ cup vegetable juice

Milk, yogurt, and cheese

1 cup milk
8 oz. plain or flavored yogurt
1-½ oz. natural cheese
2 oz. process cheese

Sources: Adapted from USDA, CNPP, *The Food Guide Pyramid*, Home and Garden Bulletin No. 252, October 1996; *Choose a Diet with Plenty of Vegetables, Fruits, and Grain Products*, Home and Garden Bulletin No. 253-5, July 1993; and *Eat a Variety of Foods*, Home and Garden Bulletin No. 253-2, July 1993.

Monitoring Food Consumption Relative to Dietary Guidance

Information on how eating patterns differ from Federal dietary guidance is useful to many. For example, consumers use this information to make dietary adjustments, while policymakers and nutrition educators use it to target educational messages to specific audiences. Federal researchers use this information to monitor the dietary and nutritional status of the population under the Ten-Year Comprehensive Plan for National Nutrition Monitoring and Related Research Program (mandated by the National Nutrition and Related Research Act of 1990 (Public Law 101-445)) (Life Sciences Research Office, 1995).

The Food Guide Pyramid as a Dietary Assessment Tool

Researchers are using the Food Guide Pyramid as a tool for assessing U.S. dietary health—one that goes beyond the traditional approach which emphasized the adequacy of individual nutrients—to a food-based approach that recognizes the link between diet and chronic disease risk (Krebs-Smith and others, 1997; Cleveland and others, April 1997). This new approach led to the development of methods for assessing food consumption data in terms of Food Guide Pyramid serving recommendations. To date, researchers have used these methods to assess food-intake data from USDA's Continuing Survey of Food Intake by Individuals (CSFII) (Bowman and others, 1998; Cleveland and others, January 1995, April 1997; Krebs-Smith and others, 1995, 1996, 1997; Munoz and others, 1997; USDA, CNPP, 1995).

Intake-based Dietary Assessment

The CSFII measures foods eaten by individuals. The survey records food intake over a specific period of time (2 nonconsecutive days in the 1994-96 survey) and collects demographic information, such as household size, income, race, age, and sex, in addition to food-intake data (USDA, ARS, March 1997). It is a key component of Federal efforts to monitor nutrition (such as the *National Nutrition Monitoring Plan*). The demographic information is particularly valuable because it allows researchers to assess dietary status among population subgroups, which helps policymakers to develop effective nutrition policies, and nutrition educators to target nutrition education programs for specific socioeconomic groups.

Numerous studies have suggested that food-intake surveys, such as the CSFII, which collect food consumption data through recalls or food records over short periods of time, are subject to underreporting of consumption when measured in terms of energy intake (Bingham, 1994; Black and others, 1993; Mertz and others, 1991; Schoeller, 1990). Little is known about how much underreporting varies across food groups. However, in one study of 79 people in Cambridge, England, Bingham reported that those subjects that underreported energy intake also had significantly lower intakes of fat, total sugar, and added sugars, but not Vitamin C, starch, and fiber, compared with nonunderreporters (Bingham, 1994). Cleveland and others report that this finding “lends some support to the idea that nutrient-dense food groups may be less likely to be underreported than the foods in the tip of the pyramid” (Cleveland and others, April 1997). A 1995 study conducted by the United Fresh Fruit and Vegetable Association that compared food diaries from 2,000 households with consumers' self-reported food intake found that consumers overestimated fruit and vegetable consumption by up to one-third and underestimated consumption of fats and sweets by one-half (United Fresh Fruit and Vegetable Association, 1995).

While improved probing methods in the 1994-96 CSFII may have reduced underreporting compared with previous surveys, food-intake surveys, and hence the dietary assessments on which they are based, probably reflect a lower limit on actual food intake. Consequently, these assessments may also tend to understate the number of Food Guide Pyramid servings actually consumed by individuals at least for some food groups. In addition, because the CSFII reports cross-sectional data, which measure food consumption at one specific point in time, using methodologies that differ by survey period, it is difficult to separate methodological effects from true consumption changes.

Food Supply Dietary Assessment

Federal efforts to monitor nutrition (such as the *National Nutrition Monitoring Plan*) rely on food supply and use data that are collected and published annually by ERS. The food supply series estimates the quantity of food available for human consumption in the U.S. food marketing system by tracking commodity flows from production to end uses (Putnam and Allshouse, 1997). The series is the only continu-

ous source of food and nutrient availability in the United States with data extended back to 1909 for most commodities. The data are developed using similar methods across years, and thus complement the single point in time estimates reported in the CSFII.

Like most time series data, the food supply estimates are most often used as indicators of trends over time. They are typically used to measure the average annual level of food available for consumption in the country, to determine the approximate nutrient content of the food supply, and to show year-to-year variations in the quantity of particular foods available for consumption.

Up to now, however, the usefulness of the food supply data for comparing food consumption with Federal dietary guidance has been limited. The food supply data measure commodity supplies as they move through marketing channels for domestic consump-

tion. Consequently, the data overstate the amount of food actually ingested by humans by capturing substantial quantities of nonedible food portions and food lost to human use through waste and spoilage in the home and marketing system. The series also includes unknown quantities of foods that are used as ingredients in processed foods that are exported—soft drinks, baked goods, cereal products. For example, the food supply series for caloric sweeteners includes some high fructose corn syrup used by U.S. beverage manufacturers to make soft drinks for export (see “Discussion” on page 26). As a result of this and other overcounting, the average calories provided by the food supply are well-above those needed to meet the energy needs of the U.S. population. In 1994, for example, the food supply provided 3,800 calories per capita compared to a population-weighted Recommended Energy Allowance (REA) of 2,247 calories for the U.S. population (National Research Council, 1989).

Data and Methods

ERS has developed new methods to adjust the food supply series for some of the data limitations mentioned in the previous chapter and to convert the aggregate food consumption estimates into food servings comparable with those in *The Food Guide Pyramid*. ERS can now use food supply data to compare diets with Food Guide Pyramid serving recommendations over a continuous time period. Also, because the food supply series is commodity-based, servings estimates developed from this data set can be readily converted back to the farm level, easing the translation of dietary recommendations into production and supply goals for the agricultural sector (Young and Kantor, forthcoming). This overcomes the difficulties—encountered in food-intake surveys—of separating foods as eaten (like lasagna) into the food commodities that they are made from (tomatoes, beef, cheese, wheat flour).

This study describes the data and methodology behind these conversion techniques, reports servings estimates generated from 1970 to 1996 food supply data, and compares these estimates with CSFII servings data for 1996.

The Food Supply Data

The ERS food supply and utilization data series measures the national supply of more than 250 foods based on records of commodity flows from production to end uses (Putnam and Allshouse, 1997). The amount of food available for domestic consumption is estimated by developing supply and utilization data sets for raw and semi-processed agricultural commodities—wheat, corn, red meat, and fluid milk, for example—from which final food products are made. Human food use is not directly measured or statistically estimated. Rather, the amount of food available for human consumption is calculated as the difference between available commodity supplies (the sum of production, beginning inventories, and imports) and nonfood and other uses (exports, ending stocks, seed, feed, and industrial consumption). These components are either directly measurable or estimated by Government agencies using sampling and statistical techniques (fig. 2).

Estimates of the amount of food available for consumption are reported in pounds per capita and are

prepared at two levels for most commodities: a primary weight (manufacturing, milling, carcass weight) and a retail-weight equivalent. The basic consumption estimate is made at the primary distribution level, which is dictated for each commodity by the structure of the marketing system and data availability (box 2).

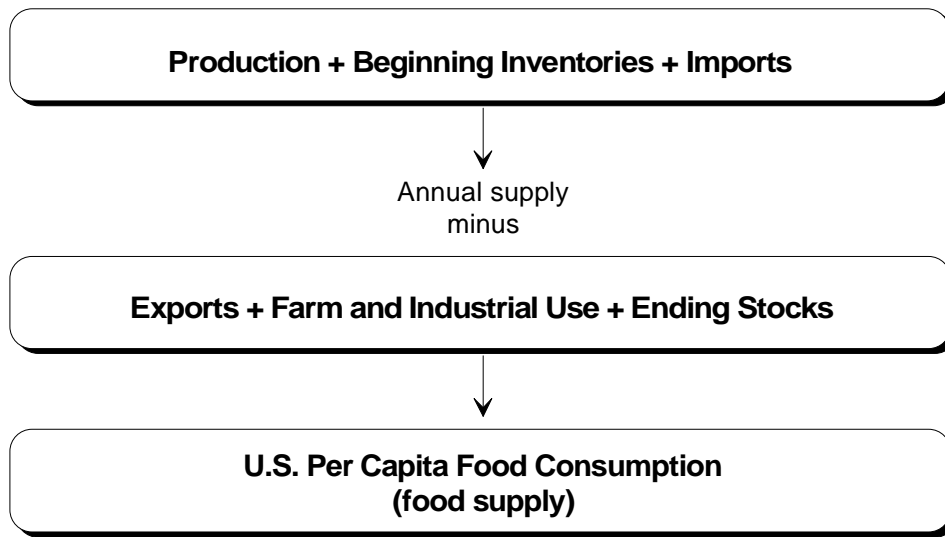
For some commodities (for example, fresh fruits, fresh vegetables, and processing vegetables) the primary distribution level is the farmgate. Most processed commodities—canned fruits, wheat flour, meat, poultry, and dairy products—are measured at the processing or manufacturing plant. In other words, the farmgate would be the primary weight of measurement for corn, but for cheddar cheese, the primary weight is the quantity of product shipments reported by dairy food processors in the U.S. Census of Manufacturers (U.S. Department of Commerce, 1995).

Once the primary level of distribution has been selected, conversion factors that account for subsequent processing, trimming, shrinkage, or loss between the farm and retail levels are used to adjust the data from a primary weight to a retail-weight equivalent. For most commodities, even the retail-weight equivalent is an aggregate measure defined at the basic commodity level. Final product forms and marketing channels are not usually known and little or no data exist on supplies of further processed products. In short, relatively good data exist for many food ingredients—flour, beef, canned tomatoes—but not for foods as usually eaten—bread, meatloaf, or lasagna (Putnam and Allshouse, 1997).

For example, the food supply series for beef is converted from a primary or carcass weight measured at the slaughtering plant, to a boneless, trimmed, equivalent weight measured at the retail or wholesale level. This conversion captures the 30-percent reduction in weight that occurs as the bones are removed and the meat is trimmed and divided into retail cuts. However, measuring the quantity of beef available for consumption at the boneless weight provides no information on how the beef was consumed—hamburger, frozen entree, steak; how it was prepared—baked, broiled, fried; where the beef was distributed for consumption—supermarket, hospital, school, restaurant, or food processor; or the socioeconomic characteristics of the consumer that ate the food.

Figure 2

Estimating U.S. food consumption



Source: Putnam and Allshouse, 1997.

Box 2—Final Marketing Stage at which Food Supplies Are Measured

Grains: white and whole wheat flour, durum flour, rye flour; corn, oat, and barley products (manufactured weight); rice (milled basis).

Vegetables: fresh (retail-weight equivalent); freezing and canned (farm-weight), dehydrated (farm-weight); dry beans, peas, and lentils (cleaned basis).

Fruit: fresh (retail-weight equivalent); frozen and canned (product weight); dried (processed weight); fruit juices (single-strength equivalent).

Milk, yogurt, and cheese: product-basis, manufactured weight.

Meat, poultry, fish, dry beans, eggs, and nuts: meat, poultry, fish (boneless-weight equivalent); eggs (retail weight equivalent); peanuts (kernel basis); peanut butter (product weight); tree nuts (shelled weight).

Fats and oils: fat basis, manufactured weight.

Added sugars: dry-basis, manufactured weight.

Also, since many farm-to-retail conversion factors are unchanged since 1970, the food supply data may not capture some changes in quality, marketing, and yield of product that have occurred since then. For example, food supply data for margarine assume an 80-percent fat content despite the proliferation of low and reduced-fat margarine and spreads in retail markets in recent years (Allshouse, Putnam, and Sanford, forthcoming). Although ERS is continually conducting research on these issues and annually adjusts the food supply series for changes of this type when data availability permits, all such changes are not reflected in current food supply estimates (Putnam and Allshouse, 1997).

Translating Food Supply Data into Food Servings

A multistage process was used to convert aggregate food supply estimates into food servings comparable with those specified in *The Food Guide Pyramid*. Servings were estimated for more than 250 individual food commodities or commodity groups that were divided into the five major Pyramid food groups or separate groups for fats and oils and added sugars (box 3).

Annual per capita food supply estimates were then converted into daily servings and compared with the serving recommendations depicted in the Food Guide Pyramid. The food supply data were converted from pounds and ounces into grams to ease comparison with serving weights for different foods identified in USDA's Nutrient Database for Standard Reference, Release 11-1 (Nutrient Data Base) (USDA, ARS, October 1997).

Next, the food supply data were adjusted for spoilage and other waste by subtracting food losses from the final marketing weight (primary or retail-equivalent) reported for that commodity in the food supply series (box 4). Depending on the commodity, several different types of losses were identified and estimated including retail and foodservice and consumer losses, changes in weight due to cooking, and the discard of nonedible food parts. Losses averaged 27 percent across all food groups and were assumed to be constant over time. Loss rates varied among subsets of some food groups—for example, loss rates for fresh vegetables were different from loss rates for processed vegetables—but loss shares were the same for individual foods within subgroups; that is, loss shares for fresh broccoli were the same as loss shares for fresh snap beans.

Estimation of Serving Weights

A single serving weight, consistent with sample servings identified in *The Food Guide Pyramid* bulletin Food Choices Chart (USDA, CNPP, 1996) and other USDA dietary guidance materials, was defined for each food supply commodity, using serving weights identified in the Nutrient Data Base. For each commodity, the selected food portion was that which most closely resembled the serving size defined for that commodity or commodity type (for example, fresh fruit, cooked vegetables, fluid milk) in the *Food Guide Pyramid*.

For most commodities, serving weights were dictated by data availability and the marketing level at which consumption was reported in the food supply series. For some commodity groups—milk, yogurt, and cheese, fruits, vegetables, and added sugars—serving weights matched those defined in *The Food Guide Pyramid* bulletin. On the other hand, because some Food Guide Pyramid serving recommendations—particularly those in the grains and meat groups—are product-based, rather than ingredient-based, this meant that serving weights for some foods were not consistent with standard serving sizes defined by dietary guidance. Additional detail on the methods used to estimate serving weights for individual commodities is available in Appendix 2.

Comparison with Food Guide Pyramid Serving Recommendations

Once representative serving weights were identified for each food supply commodity, daily per capita consumption was divided by the assigned serving weight to calculate average servings for that commodity. Individual food servings were then aggregated to determine total daily servings for each Pyramid food group. The difference between the total number of daily servings provided by the food supply and Food Guide Pyramid serving recommendations was measured by comparing the total number of edible servings provided for each food group, with recommended intake.

The recommended servings used in this study were the midpoint of the recommended Pyramid servings for each food group, which are based on a sample diet of 2,200 calories. A 2,200-calorie diet was chosen as a standard because it approximates the daily Recommended Energy Allowance (REA) of 2,247

Box 3—Food Supply Servings Were Estimated for More Than 250 Commodities Shown Here Classified According to Food Guide Pyramid Food Groups

Bread, Cereals, Rice, and Pasta Group

White and whole wheat flour; durum flour; rye flour; rice; corn flour and meal; corn hominy and grits; corn starch; oat products (rolled oats, ready-to-eat-cereals, oat flour, and oat bran); barley products (barley flour, pearl barley, and malt and malt extract used in food processing).

Vegetable Group

Fresh: Artichokes, asparagus, bell peppers, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, sweet corn, cucumbers, eggplant, escarole, endive, garlic, head lettuce, romaine and leaf lettuce, mushrooms, onions, potatoes, radishes, snap beans, spinach, sweet potatoes, and tomatoes.

For freezing: Asparagus, snap beans, broccoli, carrots, cauliflower, sweet corn, green peas, potatoes, other (blackeyed peas, collards, kale, mustard greens, okra, pumpkin, rhubarb, summer squash, turnip greens, turnips, and other miscellaneous vegetables).

For canning: Asparagus, snap beans, cabbage (for sauerkraut), chile peppers, carrots, sweet corn, cucumbers, green peas, mushrooms, potatoes, tomatoes, other (beets, lima beans, and spinach).

Legumes and vegetables for dehydrating and chips: Dry edible beans (black beans, blackeyed peas, cranberry, garbanzo, Great Northern, light and dark red kidney beans, large and baby lima, navy, pinto, small red, small white, other), dry field peas and lentils (Austrian winter peas, split green peas, whole green peas, regular lentils, other lentils, split yellow peas, whole yellow peas); dehydrating (onions and potatoes), for chips and shoestrings (potatoes).¹

Fruit Group

Fresh: Apples, apricots, avocados, bananas, cantaloupe, cherries, cranberries, grapes, grapefruit, honeydew, kiwifruit, lemons, limes, mangos, nectarines, oranges and temples, peaches, pears, pineapples, papayas, plums, prunes, strawberries, tangelos, tangerines, and watermelon.

Frozen: Apples, apricots, blackberries, blueberries, cherries, peaches, raspberries, strawberries, other berries (boysenberries, loganberries).

Canned: Apples and applesauce, apricots, cherries (tart and sweet), olives, peaches, pears, pineapples, plums and prunes.

Dried: Apples, apricots, dates, figs, peaches, pears, prunes, raisins.

Fruit juices: Apple, grape, grapefruit, lemon, lime, orange, pineapple, and prune.

Milk, Yogurt, and Cheese Group

Fluid milk products: Whole, plain; 2-percent reduced fat, plain; light (0.5-1 percent), plain; fat-free (skim), plain; whole, flavored; lower fat, flavored; buttermilk; yogurt, and eggnog.

Box 3—Food Supply Servings Were Estimated for More Than 250 Commodities Shown Here Classified According to Food Guide Pyramid Food Groups—Continued

Cheese: Cheddar, Colby, washed curd, stirred curd, Monterey Jack, Provolone, Mozzarella, Ricotta, Other Italian, Swiss (includes Gruyere and Emmenthaler); Brick, Muenster, Blue, Other; processed cheese, foods and spreads.

Other dairy products: Cottage cheese, regular; cottage cheese, lowfat; ice cream; ice milk; other frozen dairy products (mellorine, frozen yogurt and other nonstandardized dairy products); canned whole milk; bulk whole milk; bulk and canned skim milk; dry whole milk; dry buttermilk.

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group

Meat, poultry, and fish: Beef, veal, pork, lamb, chicken, turkey, fresh and frozen fish and shellfish, salmon, canned, sardines, canned, pitchards and herrings, canned, tuna, canned, shellfish, canned, other fish, canned, cured fish.

Meat alternates: Eggs; peanuts, snack, peanuts, cleaned in shell; peanut butter; tree nuts, almonds, filberts, pecans, walnuts, macadamias, pistachios, other tree nuts (Brazil nuts, pignolias, chestnuts, cashews, and miscellaneous); coconuts, dessicated.¹

Fats and Oils

Butter, margarine, lard (direct use), edible beef tallow (direct use), shortening (soybean oil, cottonseed oil, palm oil, lard, edible tallow); salad and cooking oils (soybean oil, cottonseed oil, corn oil, peanut oil, olive oil); other edible fats and oils (includes specialty fats used mainly in confectionary products and nondairy creamers); half and half, light cream, heavy cream, sour cream, cream and neufchatel cheeses.

Added Sugars

Cane and beet sugars, High Fructose Corn Syrup, glucose, dextrose, honey, edible syrups (sorgo, maple, and sugarcane syrup, edible molasses, and edible refiner's syrup).

¹Dry beans, peas, and lentils can be counted in either the vegetable or meat, poultry, fish, dry beans, eggs, and nuts groups. In this study, they were counted in the vegetable group.

calories for the United States, derived from a population-weighted average of REA's for different age and sex groups of the population (National Research Council, 1989). *The Food Guide Pyramid* bulletin identifies a daily energy intake of 2,200 calories as appropriate for most children, teenage girls, active women, and sedentary men.

Although the choice of a recommended calorie intake does not affect the magnitude of the servings esti-

mates themselves, it does affect the size of the gap between average estimated servings and dietary recommendations. Using another serving recommendation, one based on a different level of caloric intake, would change the size of the gap between reported consumption and serving recommendations for all food groups.

Box 4—Estimating Food Losses

The accuracy of the food supply servings estimates reported in this study depends in part on the estimated amount of available food supplies that are wasted, spoiled, or otherwise not eaten by consumers. See "Discussion" on page 26 for additional detail on the impact of alternative loss rates on the food supply servings estimates.

In this study, food loss was defined as the average reduction in weight that occurs to an agricultural commodity as that commodity leaves the farm, is processed into final food products, and purchased for consumption in supermarkets and eating places. Food loss was estimated by applying existing loss coefficients, gathered from published literature and discussions with commodity experts, to the amount of food available for human consumption in the United States in 1970-96. Losses were estimated for the more than 250 individual foods listed in box 3. They are itemized by food group in Appendix 2. The causes and nature of food losses and loss estimates for aggregate food groups for the retail, consumer, and foodservice sectors, have been previously reported (Kantor and others, 1997).

Where appropriate, the data were also adjusted for changes in weight due to cooking. Cooking adjustments were made for meat, poultry, fish, processed vegetables, and fresh vegetables not normally eaten raw—asparagus, artichokes, Brussels sprouts, eggplant, onions, potatoes, snap beans, sweet corn, and sweet potatoes—and were based on cooking yields identified by USDA (USDA, ARS, 1975). Average changes in weight due to cooking were 25 percent for meat, poultry, and fish and ranged from 3 to 36 percent for fresh and processed vegetables.

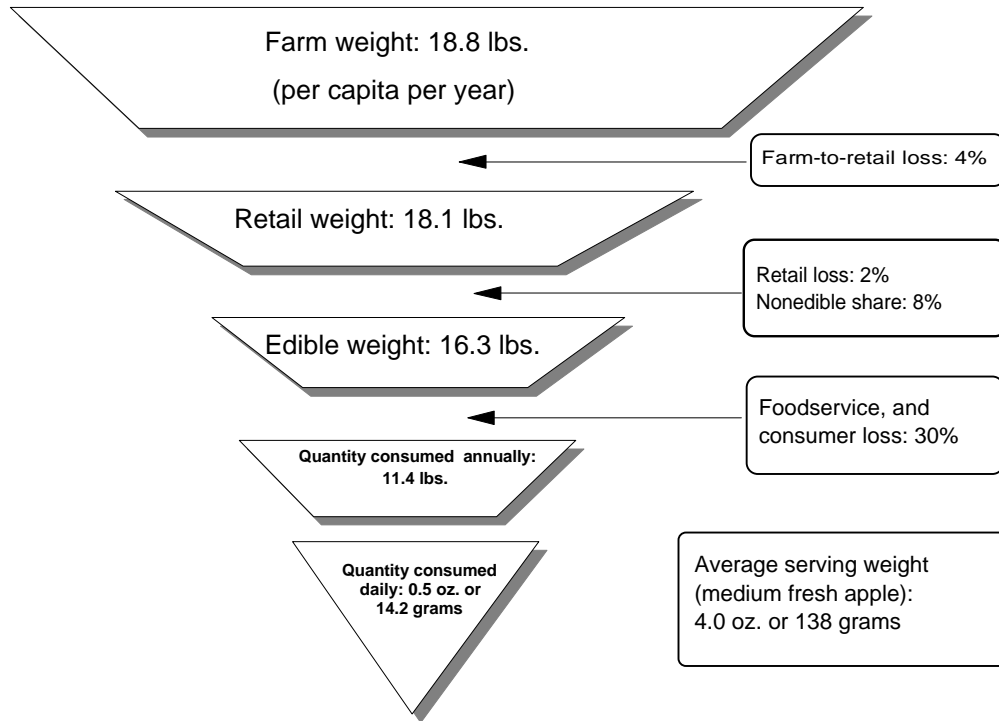
The data were also adjusted for the discard of nonedible food parts—peels, rinds, seeds, skins, cores, and stems—which were estimated for most commodities using the average refuse share for each commodity identified in USDA's Nutrient Data Base. Figure 3 illustrates an example for fresh apples.

Food supply estimates for shortening, lard, and edible beef tallow were adjusted for the discard of deep-frying fats by foodservice establishments. A 1987 study by SRI International indicated that used frying fat disposed of by restaurants and processed by renderers for use in animal feeds, pet foods, and industrial operations and for export amounts to about 6 pounds per capita, or about 9 percent of the total amount of fats and oils available for human consumption in 1995. A 1993 study estimated that 50 percent or more of the deep frying fats used by fast food places and other foodservice establishments were eventually discarded after use and were not available for human consumption (Hunter and Applewhite, 1993).

ERS does not know the share of total frying fats foodservice establishments use. Some of these products, for example, are sold at the retail level for home baking or are used by manufacturers of prepared bakery products. For this study, ERS overestimated losses of fats and oils by foodservice establishments by assuming that 100 percent of the total shortening, lard, and tallow provided in the food supply was used by foodservice establishments for deep-fat frying. Thus, total foodservice losses for these three commodities were assumed to be 50 percent.

Figure 3

Estimating food supply servings for fresh apples



Average daily servings = (0.5 oz or 14.2 grams) / (4.9 oz. or 138 grams) = 0.10 servings
Source: U.S. Department of Agriculture, Economic Research Service.

Findings

Estimated food supply servings for 1996 suggest that the average American diet is out of balance with Food Guide Pyramid serving recommendations (fig. 4).

Average consumption is heavily weighted toward the added fats and added sugars at the tip of the Pyramid while falling short of serving recommendations for fruits, vegetables, dairy products, and lean meats. At the same time, the mix of foods provided by the bread, cereals, rice, and pasta groups may need to change for most consumers to meet recommendations for dietary variety and selected food components such as fiber, total fat, saturated fat, and cholesterol.

Comparing food supply servings over 27 years with Food Guide Pyramid serving recommendations also suggests that while many consumers have made positive dietary changes, the pace of change has been slow (table 2). While the average number of servings for several food groups—grains, vegetables, and fruits—has moved closer to Food Guide Pyramid serving recommendations since 1970, the grains group is the only food group where total servings met recommendations for a 2,200-calorie diet in 1996. Limited movement in the average consumption of

dairy products and fruits since 1970 contrasts with a sharper increase in servings of added fats and sugars over the same time period.

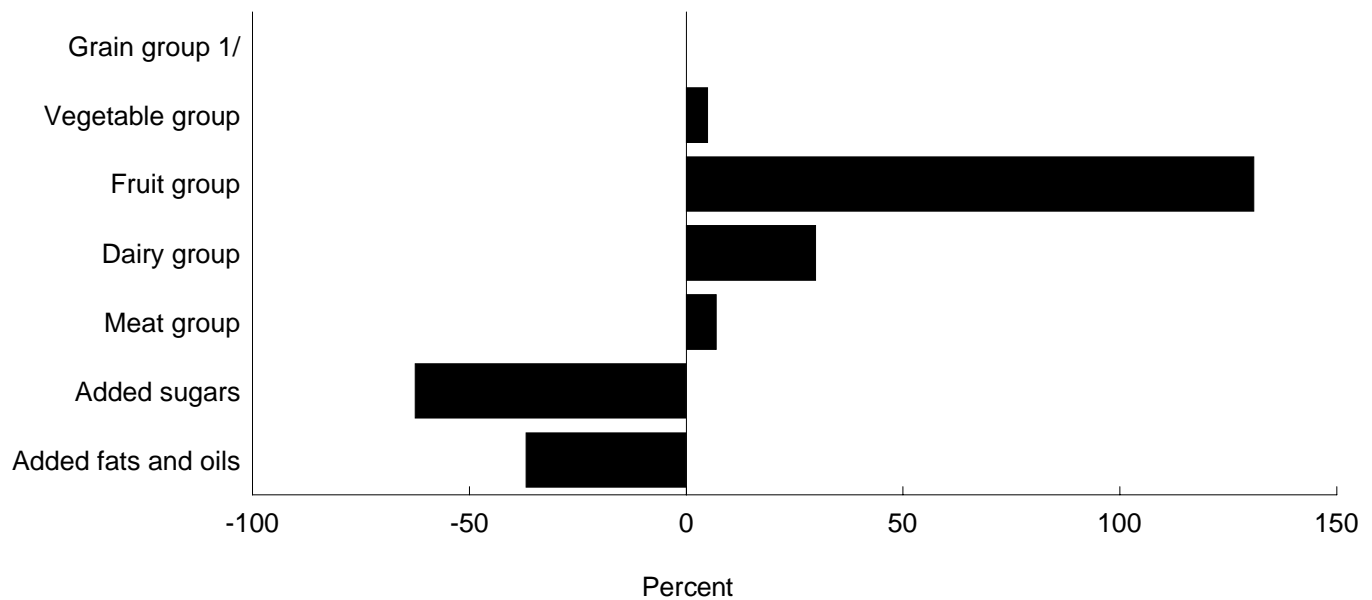
Bread, Cereals, Rice, and Pasta Group

The food supply provided an estimated 9.7 daily servings of grain products in 1996, at the mid-range of the 6-11 daily servings recommended for all Americans aged 2 and older (table 3). This result suggests that many consumers met the Food Guide Pyramid serving recommendation for this group appropriate to a 2,200-calorie diet. Total daily servings were more than a third higher—or the flour equivalent of about 2.5 servings of bread—than the 6.8 servings consumed in 1970. This result suggests that many consumers are heeding nutrition education messages to increase their consumption of grain products (fig. 5).

Almost half of the 20-year serving increase was accounted for by higher consumption of white and whole wheat flour. A twofold increase in durum flour (used for pasta) and corn products (mostly corn meal and corn flour probably used for snack chips and Mexican-style foods such as tortillas), and a threefold increase in rice consumption, accounted for the

Figure 4

Change in food supply servings needed to meet Food Guide Pyramid serving recommendations for a 2,200-calorie diet, 1996



1/ Grain group servings meet the recommendation for a 2,200-calorie diet.
Source: U.S. Department of Agriculture, Economic Research Service.

Table 2—Average food supply servings for 1970-96 compared with Food Guide Pyramid serving recommendations

Food group	Servings				Food Guide Pyramid serving recommendation ¹
	1970-75	1980-85	1990-95	1996	
Grains	6.8	7.5	9.2	9.7	9
Vegetables	3.1	3.2	3.6	3.8	4
Fruits	1.1	1.2	1.3	1.3	3
Milk, yogurt, and cheese ²	1.6	1.5	1.6	1.7	2.2
Meat, poultry, fish, dry beans, eggs, and nuts (ounces)	5.4	5.5	5.6	5.6	6.0
Added fats and oils (grams of fat) ³	49	55	62	60	38
Added sugars (teaspoons) ⁴	27	26	31	32	12

¹Recommendation based on a 2,200-calorie diet. A 2,200-calorie diet is close to the 2,247 calories recommended as an average caloric intake for the population in 1995. Recommended servings for other years may differ.

²Three servings of milk, yogurt, and cheese are appropriate for teenagers and young adults to age 24 and for pregnant and breastfeeding women. Two servings are recommended for other adults.

³The 1995 Dietary Guidelines recommend that consumers choose a diet that provides no more than 30 percent of total calories from fat. The upper limit on the grams of fat in a consumer's diet will depend on calorie intake. For example, a person consuming 2,200 calories per day, the upper limit on total daily fat intake is 660 calories. Seventy-three grams of fat contribute about 660 calories (73 grams x 9 calories per gram of fat = 660 calories). According to food supply data for 1994, added fats and oils account for 52 percent of the total fat provided by the food supply in that year. The recommendation shown here assumes that added fats and oils account for 52 percent of total fat intake for a daily upper limit of 38 grams of added fats and oils (73 * 0.52) = 38.

⁴To avoid getting too many calories from sugar, dietary guidance suggests that consumers on a 2,200-calorie diet try to limit added sugars to the daily quantity listed.

Source: USDA, Economic Research Service.

Table 3—Food supply bread, cereals, rice, and pasta group servings, 1996

Item	Servings
Total grains	9.7
White and wheat flour	7.2
Durum flour	.4
Rice	.5
Rye flour	*
Corn products	1.3
Corn flour and meal	.9
Corn grits and hominy	.1
Cornstarch	.3
Oat products	.3
Barley products	*

* = less than 0.1 servings. Totals may not add due to rounding.

Source: USDA, Economic Research Service.

remainder of the increased grain group servings.

While the food supply data suggest that average grain consumption meets Food Guide Pyramid serving recommendations, many consumers may need to change the type of foods selected from this group to meet dietary recommendations for fiber, fat, cholesterol, and added sugars. *The Food Guide Pyramid* bulletin recommends that consumers choose several servings per day of foods made from whole grains such as

whole-wheat breads and whole-grain cereals (USDA, CNPP, 1996). However, many grain products are relatively high in fats, oils, and added sugars depicted at the tip of the Pyramid and contribute little in the way of fiber and micronutrients found in whole-grain breads, cereals, and other grain products.

In 1992, for example, the latest year for which data on selected whole grains are available for the food supply,³ whole wheat flour accounted for less than 2 percent of total white and wheat flour provided by the food supply, or the flour equivalent of about one-tenth of a slice of bread per person per day. While the food supply data does not report consumption of other whole-grain products, brown rice for example, the CSFII servings data confirm that consumption of foods made with whole grains is indeed low. Mean daily intake of foods made from whole grains was 1 serving in 1996, well-below the several daily servings suggested by dietary guidance (USDA, ARS, Oct. 1998).

Vegetable Group

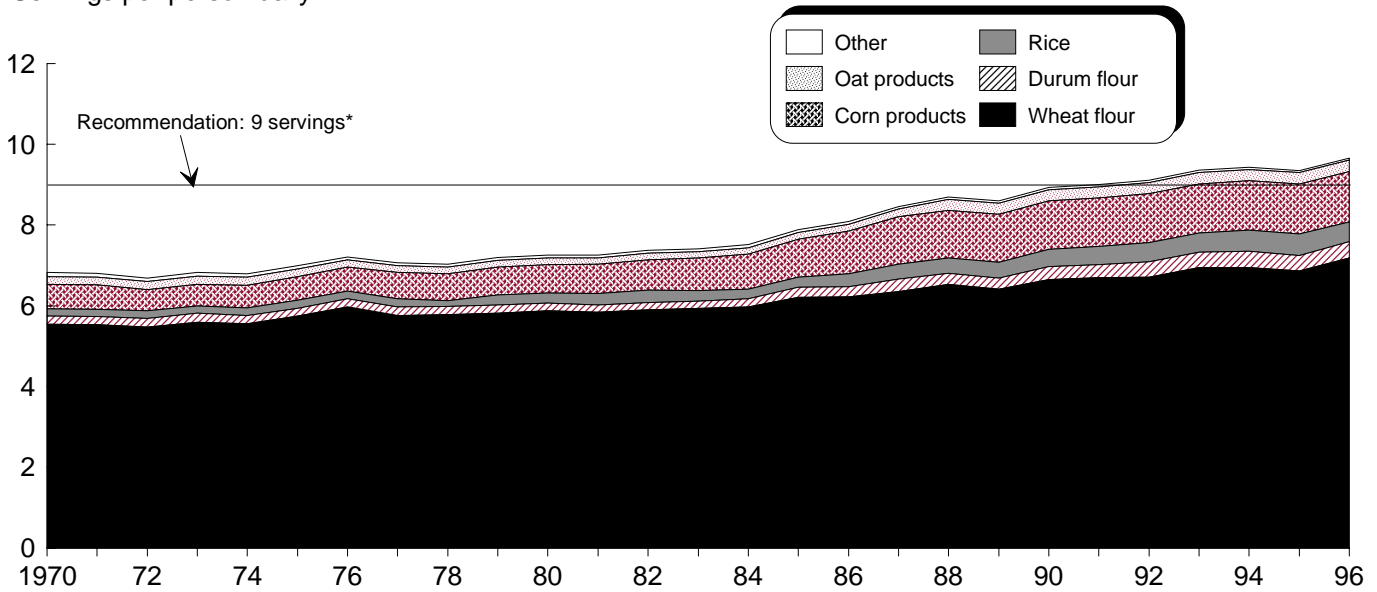
The food supply provided a daily average of 3.8 servings of fresh, frozen, canned vegetables, and dry beans, peas, and lentils in 1996, close to the 4 daily servings recommended for a 2,200-calorie diet (table 4).

³Data for whole wheat flour is from the 1992 U.S. Census of Manufacturers (U.S. Department of Commerce, 1995).

Figure 5

Bread, cereals, rice, and pasta group: Food supply servings, 1970-96

Servings per person daily



*Recommended servings for a 2,200-calorie diet.
Source: U.S. Department of Agriculture, Economic Research Service.

Table 4—Food supply vegetable group servings, 1996

Item	Servings
Total vegetables	3.8
Dark-green vegetables	.1
Deep yellow vegetables	.2
Dry beans, peas, and lentils	.2
Other starchy vegetables	1.4
Fresh potatoes	.4
Potatoes for freezing	.5
Potatoes for chips/shoestrings	.2
Other vegetables	1.9

Source: USDA, Economic Research Service.

Average consumption grew by about 20 percent, or half a daily vegetable serving between 1970 and 1996 (fig. 6). Half a daily vegetable serving is equivalent to about a one-quarter cup of cooked vegetables, one-quarter of a baked potato, or about five french fries. Supporting documentation for the Food Guide Pyramid suggests that consumers should divide their daily vegetable servings into three vegetable subgroups—dark-green leafy and deep yellow vegetables; starchy vegetables, including dry beans, peas, and lentils; and other vegetables (Cronin and others, 1987). Thus, for a 2,200-calorie diet with a minimum serving recommendation of 4 servings daily, consumption

would be expected to be evenly divided at 1.3 servings for each subgroup. Within these groups, dark-green leafy vegetables and dry beans, peas, and lentils should account for 0.6 servings or about three-sevenths of total subgroup consumption and deep yellow and other starchy vegetables should account for 0.8 servings or four-sevenths of their subgroups, respectively.

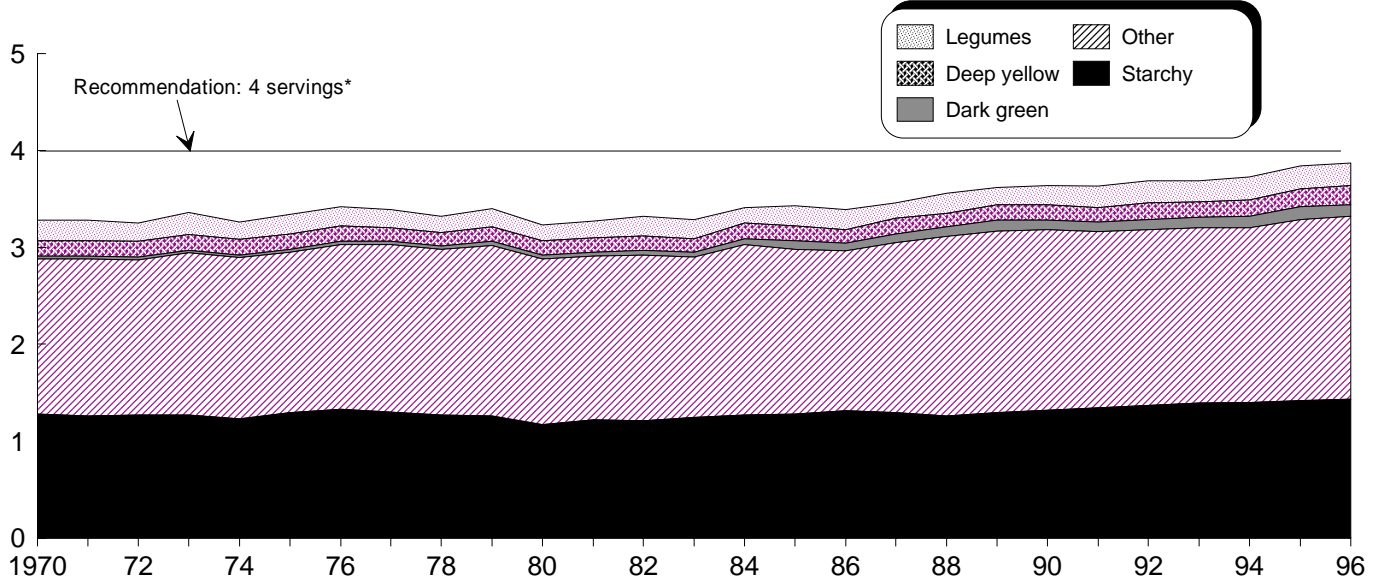
However, in 1996, average vegetable consumption differed from these recommendations with vegetable servings heavily weighted toward other starchy vegetables, especially white potatoes. Consumption of dark-green and deep yellow vegetables, and dry beans, peas, and lentils was well below recommendations.

The concentration of consumption in a small number of foods within these groups also suggests that consumers may not be incorporating adequate variety into their daily vegetable choices. Although the food supply data for this group include consumption estimates for about 80 different vegetables, only 5 commodities (head lettuce, potatoes for freezing, fresh potatoes, potatoes for chips and shoestrings, and tomatoes for canning) accounted for half of total 1996 vegetable servings (fig. 7). Another 15 percent of total vegetable servings came from potatoes for dehydration, fresh tomatoes, fresh garlic, and fresh carrots. Dry

Figure 6

Vegetable group: Food supply servings, 1970-96

Servings per person daily

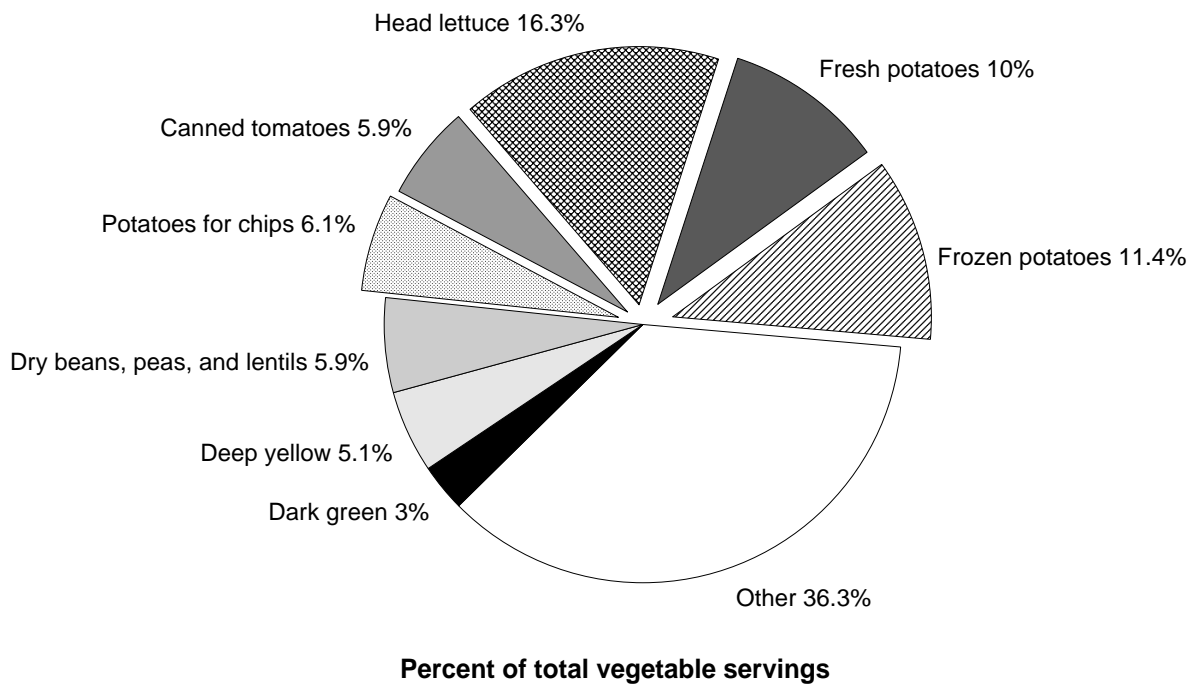


*Recommended servings for a 2,200-calorie diet.

Source: U.S. Department of Agriculture, Economic Research Service.

Figure 7

Five foods accounted for half of total vegetable servings in 1996



Source: U.S. Department of Agriculture, Economic Research Service.

beans, peas, and lentils combined made up a 6-percent share of total consumption. No other single commodity accounted for more than 3 percent of total vegetable servings or 0.1 servings.

Dark-Green Leafy and Deep Yellow Vegetables

Consumers are not incorporating dark-green leafy vegetables into their daily vegetable choices. In 1996, for example, the food supply provided just one-tenth of a daily serving of dark-green leafy vegetables, including broccoli, spinach, Romaine, and other leafy lettuce, less than one-quarter of recommended daily servings.

The shortfall in dark-green leafy vegetable consumption occurred despite a threefold increase in broccoli consumption since 1970. Broccoli and Romaine lettuce accounted for most of the total dark-green leafy vegetable servings provided by the food supply in 1996. Several other vegetables of this type, including fresh collards, kale, chard, mustard, turnip, and beet greens, and frozen and canned spinach, are either not reported at all or are grouped together in an “other” category in the food supply data—suggesting that actual use of these foods may be higher than reported here (see Appendix 2). Efforts are currently underway at ERS to improve these data.

Despite these data limitations, food-intake data confirm that total consumption of dark-green leafy vegetables is below recommendations. According to the 1996 CSFII servings data, mean daily intake of dark-green leafy vegetables was about 0.2 daily servings, or about 6 percent of total vegetable servings (USDA, ARS, Oct. 1998).

The food supply provided less than one-fourth of a daily serving of deep yellow vegetables, or about one-third of recommended servings. More than three-quarters of deep yellow vegetable servings were from fresh, frozen, and canned carrots.

Dry Beans, Peas, and Lentils and Other Starchy Vegetables

The food supply provided 1.6 servings of starchy vegetables (potatoes, corn, dry beans, peas, and lentils, and green peas) in 1996, 19 percent above recommended servings for this subgroup. Consumption was heavily weighted toward white potatoes and other starchy vegetables, which together accounted for 1.4

servings daily. Frozen potatoes—used mainly for french fries—and potatoes for potato chips and shoestrings, accounted for more than one-third of total starchy vegetable servings and along with dehydrated potatoes, accounted for most of the growth in starchy vegetable consumption between 1980 and 1996.

Average consumption of dry beans, peas, and lentils was one-third of recommended levels with the food supply providing about one-quarter serving of cooked legumes per day. More than 90 percent of total servings were from dry beans, with recent growth led by increased consumption of pinto beans for Mexican-style foods (USDA, ERS, June 1997).

Fruit Group

The food supply provided 1.3 servings per person per day of fresh and processed fruits and fruit juices in 1996, just under half the Food Guide Pyramid’s 3-serving recommendation for a 2,200-calorie diet (table 5). This shortfall is particularly troublesome given scientific studies linking frequent consumption of fruits and vegetables with substantially lower risk of many chronic diseases, including certain types of cancer (USDA/HHS, 1995).

Like vegetables, the number of fruit servings provided by the food supply has increased about 20 percent since the early 1970’s, or about one-quarter of a serving (fig. 8). One-quarter of a fruit serving is equal to about one-quarter of a medium banana or apple per person per day, one and a half ounces of fruit juice, or one-eighth of a cup canned or frozen fruit.

Consistent with recommendations, total fruit servings were almost evenly divided between two fruit sub-

Table 5—Food supply fruit group servings, 1996

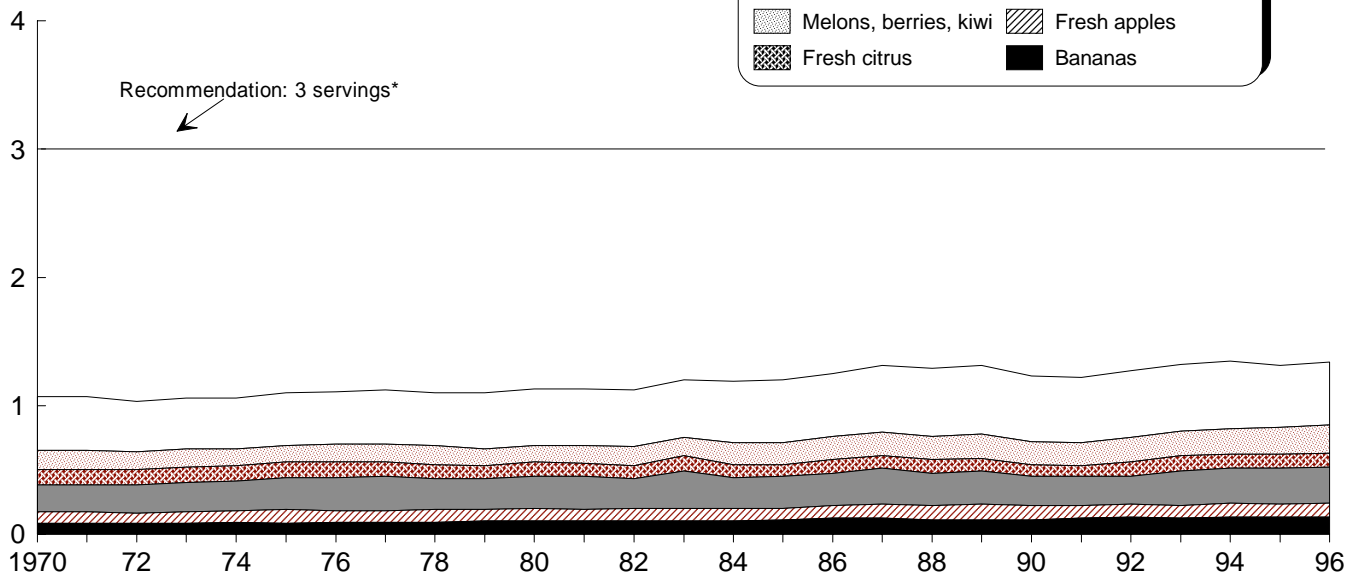
Item	Servings
Total fruit	1.3
Citrus, melons, and berries	.6
Fresh citrus	.1
Melons, berries, kiwi	.2
Citrus juice	.3
Other fruits	.7
Fresh apples	.1
Fresh bananas	.1

Source: USDA, Economic Research Service.

Figure 8

Fruit group: Food supply servings, 1970-96

Servings per person daily



*Recommended servings for a 2,200-calorie diet.

Source: U.S. Department of Agriculture, Economic Research Service.

groups—citrus, melons, and berries, including kiwifruit (0.6 servings) and other fruit (0.7 servings). However, with half of total fruit servings coming from six foods—orange juice (18 percent), bananas (9.8 percent), fresh apples (7.9 percent), watermelon (6.5 percent), apple juice (5.8 percent), and fresh grapes (5.1 percent)—the data suggest that many consumers may not be incorporating adequate variety into their daily fruit choices.

Milk, Yogurt, and Cheese Group

Milk, yogurt, cheese, and other dairy products are the primary source of calcium in most people's diets, accounting for 73 percent of the calcium available in the food supply in 1994 (USDA, CNPP, 1997). Other sources of dietary calcium included fruits and vegetables (9 percent), grain products (5 percent), and other foods (12 percent). Calcium is essential for the formation of bones and teeth, and requirements increase significantly during adolescence, early adulthood, pregnancy, and lactation. Inadequate calcium intake appears to be an important risk factor for osteoporosis, a disease that weakens the body's bone structure and is responsible for more than 1 million fractures of the hip, wrist, and spine each year (Frazao, 1995).

As a result, the dairy group is the only food group for which Food Guide Pyramid serving recommendations are based on age and physiological status rather than energy intake. Three servings—the equivalent of three 8-ounce glasses of milk per day—are suggested for teenagers, young adults up to 24 years of age, and pregnant and lactating women. Two daily servings of dairy foods are recommended for children and most other adults.

In this study, average servings were compared with a daily recommended intake of 2.2 servings. This target was based on a weighted average of recommended servings for different age groups of the U.S. population (excluding the higher needs of pregnant and lactating women). In 1996, the food supply provided 1.7 servings of dairy foods (excluding cream cheese and fluid cream which are counted as added fats depicted at the top of the Pyramid), suggesting that most Americans are not meeting this target (table 6). Total servings have remained nearly constant since 1970 (fig. 9).

Many dairy foods, however, are naturally high in fat and saturated fat. Thus, consumers may need to balance any increased dairy consumption with total fat intake. More than half of the dairy servings in the

Table 6—Food supply servings for the milk, yogurt, and cheese group, 1996

Item	Servings
Total milk, yogurt, and cheese	1.7
Fluid milk	.8
Cheese	.6
Yogurt	*
Frozen dairy	.1
Condensed and evaporated milk	*
Dry milk	.1

* = less than 0.1 servings.

Source: USDA, Economic Research Service.

food supply in 1996 came from two dairy products that are naturally high in fat—cheese (natural and processed) (38 percent) and whole milk (including dry and condensed) (16 percent), while skim milk (including dry and condensed) (16 percent), 1-percent milk (5 percent), and buttermilk and yogurt (mostly lowfat) (2 percent) accounted for nearly one-quarter of total dairy servings. Reduced-fat, 2-percent milk accounted for 15 percent of dairy servings, while ice cream and other frozen dairy desserts made up another 4 percent of the total.

Sharp changes over time in consumption patterns for fluid milk and cheese also suggest that many consumers may simply be substituting one high-fat dairy food for another with little net reduction in total dairy fat intake (fig. 10). For example, between 1982-86 and 1992-96, Americans reduced their average daily consumption of whole milk by more than one-third to just over one-quarter cups. Consumption of lowfat milk (skim and 1-percent) nearly doubled during this same period, but consumption is still relatively low, at less than one-fifth of a cup per person daily. Consumption of reduced-fat, 2-percent milk increased by 13 percent to just over one-quarter cups. However, during the same time period, declining whole milk consumption was accompanied by a sharp 20-percent increase in per capita consumption of cheese, most of which is nearly as high or higher in total and saturated fat per serving as whole milk. This is consistent with food supply nutrient data that show that total fat and saturated fat from dairy products remained constant between 1970 and 1994 (USDA, CNPP, 1997).

The food supply data do not measure how much rising cheese consumption is due to the increased use of reduced-fat and nonfat cheese. However, a recent ERS study of supermarket scanner data reported that

consumption of nutritionally improved cheese increased from 12 to 19 percent of total cheese volume between 1989 and 1993 (Frazao and Allshouse, 1996), suggesting that more than three-fourths of total cheese servings continue to come from full fat products. This is consistent with servings estimates from the 1989-91 CSFII, which indicated that 80 percent of total cheese servings consumed by adults were regular, rather than low-fat products (Cleveland and others, 1995).

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group

Total consumption of foods in the meat, poultry, fish, dry beans, eggs, and nuts group (meat group) in 1996 was close to the level needed to provide most consumers with their recommended intake for this group for a 2,200-calorie diet. The Food Guide Pyramid recommends that average meat group consumption should equal 6 ounces of cooked lean meat per person per day for a 2,200-calorie diet. According to *The Food Guide Pyramid* bulletin, consumers should count meat, poultry, and fish in total ounces. Other foods in this group—1 egg, 2 tablespoons of peanut butter, or one-third cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat.

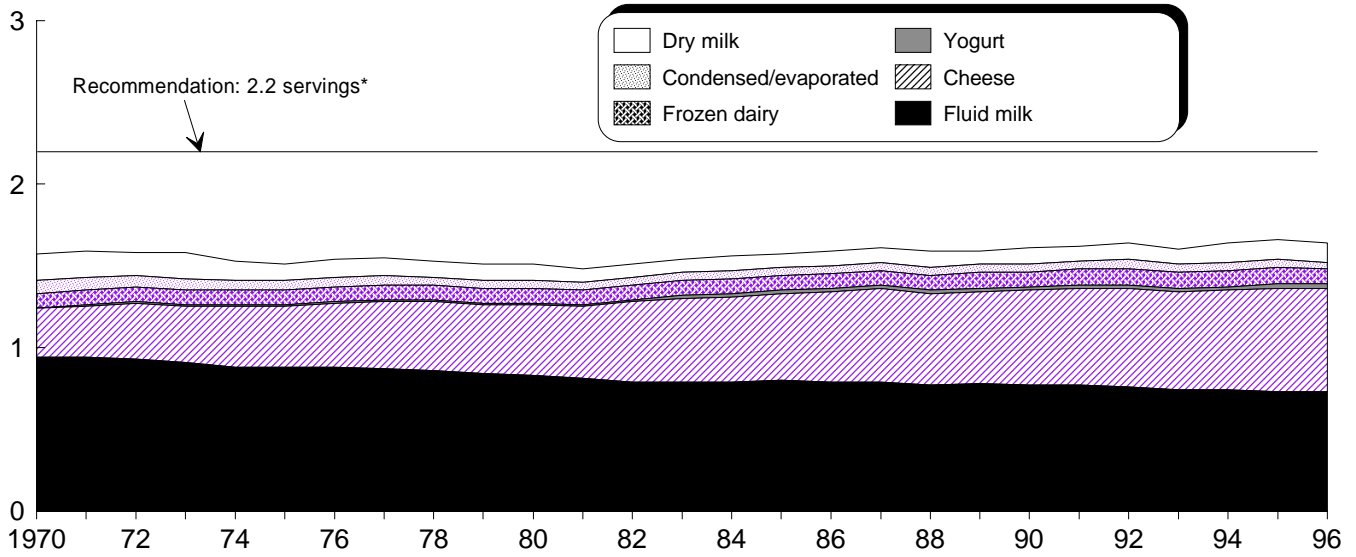
After adjusting for waste and cooking losses, the food supply provided the equivalent of 5.6 ounces of cooked meat (lean and fat portion) per day—unchanged since the mid 1980's (fig. 11). Even though total meat group servings were close to the recommended 6 daily ounces, many people may need to adjust the type of foods consumed from this group in order to choose diets with less total fat, saturated fat, and cholesterol (USDA/HHS, 1995). According to the 1995 Dietary Guidelines, choosing lower fat options among foods in the meat and dairy groups allows consumers to eat the recommended servings from these groups and increase the amount and variety of grain products, fruits, and vegetables in their diets without going over their calorie needs (USDA/HHS, 1995).

Because the food supply estimates for meat and poultry include both the lean and fat portion of these products, they likely overstate lean meat consumption and are not directly comparable with the Food Guide Pyramid recommendation (table 7). Also, the food supply series does not report supplies of individual meat products such as steaks or hot dogs, or the amount of lean meat vs. meat fat consumed.

Figure 9

Milk, yogurt, and cheese group: Food supply servings, 1970-96

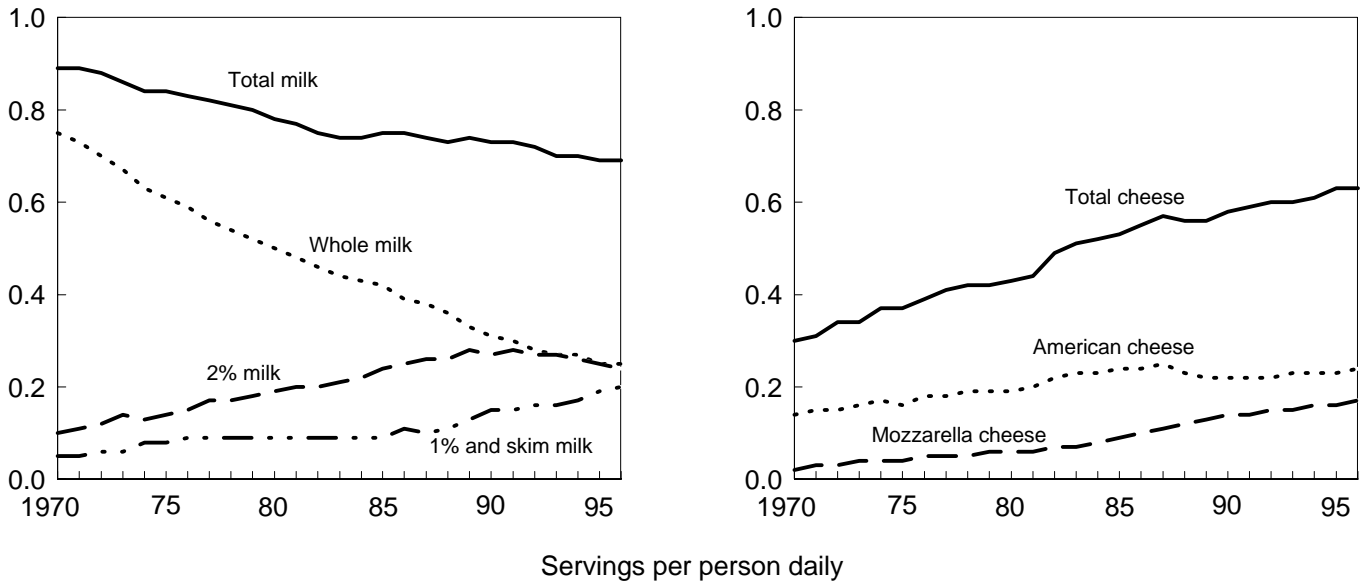
Servings per person daily



*Recommended servings based on weighted average of recommended servings for different age groups of the U.S. population, excluding the higher needs of pregnant and lactating women.
 Source: U.S. Department of Agriculture, Economic Research Service.

Figure 10

Selected dairy products: Food supply servings, 1970-96



Source: U.S. Department of Agriculture, Economic Research Service.

Figure 11

Meat, poultry, fish, dry beans, eggs, and nuts group: Food supply servings, 1970-96

Ounces of cooked meat equivalents per person daily



*Recommended servings for a 2,200-calorie diet.
Source: U.S. Department of Agriculture, Economic Research Service.

Table 7—Food supply servings for the meat, poultry, fish, dry beans, eggs, and nuts group, 1996

Item	Ounces
Total meat group	5.6
Meat, poultry, and fish	4.9
Red meat	2.9
Poultry	1.6
Fish and seafood	.4
Eggs	.5
Peanuts and peanut butter	.1
Tree nuts	.1
Dry beans, peas, and lentils ¹	

¹Counted in the vegetable group.
Source: USDA, Economic Research Service.

However, the aggregate commodity data suggest that on average, the food supply provided larger quantities of foods, that relative to others in the group, are naturally high in fat, saturated fat, and cholesterol. For example, despite a nearly 36-percent increase in poultry meat (chicken and turkey) servings since 1982-86, red meat (beef, veal, pork, and lamb) accounted for 52 percent of total meat equivalent servings in 1996, double the 27-percent poultry share. Fish and shellfish accounted for 7 percent of total supplies, while

about 9 percent of meat group servings came from eggs. Another 2 percent of meat group servings came from peanut butter.

In recent years, meat producers and meatpackers, responding to consumer demand for lower fat meats, have made strides in reducing the fat content of their products. Production practices that incorporate advanced breeding techniques are resulting in leaner cattle and hogs. Meatpackers and food retailers are trimming more external fat, often leaving only one-quarter inch or less on the retail product, compared with an average of one-half inch to 1 inch 10 years ago. As a result, beef and pork are now significantly leaner than they were in 1980. Although these changes in fat trim are reflected in the food supply data (Duewer, Krause, and Nelson, 1993; Putnam and Allshouse, 1997; Putnam and Duewer, 1995), red meat's fat content is widely variable; only the leanest cuts are as low in fat as broiled fish or skinless chicken breast.

The addition of dry beans, peas, and lentils to the meat group would increase total daily meat group servings slightly from 5.6 to 5.8 ounces. *The Food Guide Pyramid* bulletin states that consumers should choose several servings per week of these foods as

vegetable servings and select them often as choices from the meat group (USDA, CNPP, 1996). Previous dietary assessments have implied that the “several” recommendation is equal to about one-seventh of total daily vegetable servings, or about 0.6 daily servings for a 2,200-calorie diet (Cleveland and others, 1997) (see “Vegetable Group,” page 15). However, with total daily consumption of less than one-quarter of a daily serving, supplies were well below the 0.6 daily servings to meet the vegetable group recommendation and were even further short of the combined quantity needed to also supply regular servings of these foods as a protein choice from the meat group.

Dry beans, peas, and lentils offer consumers a relatively low-cost, low-fat, and high-fiber alternative to meat, poultry, and fish. Together with nuts and seeds, these products are naturally high in several vitamins and minerals, including magnesium and folate, which are present in relatively small quantities in animal products and seafood.

The Pyramid Tip: Added Fats and Oils

After adjusting for waste, the food supply provided 60 fat grams of added fats and oils in 1996, a 6-percent increase from the 56 grams available for consumption daily in 1982-86 (table 8).

Added fats and oils are added in cooking and at the table and food manufacturers use them in many processed food products, including baked goods, french fries, snack foods, and peanut butter. They include margarine, shortening, salad oils and dressings, lard, edible tallow, and dairy fats (butter, sour cream, cream and neufchatel cheese, light cream, heavy cream, and half and half). These fats are consumed in addition to those that occur naturally in foods like meats, fish, nuts, eggs, and dairy foods.

Although some dietary fat is essential for good health, excessive fat intake is associated with increased blood cholesterol, heart disease, and some cancers. The *1995 Dietary Guidelines* recommend that people limit total fat consumption to no more than 30 percent of daily energy intake—about 73 grams for a 2,200-calorie diet (USDA/HHS, 1995). Mono- and polyunsaturated fats, such as those found in high quantities in most vegetable oils, should account for at least two-thirds of this intake. Saturated fats—which are found in larger amounts in animal fats such as butter, lard,

Table 8—Food supply servings of added fats and oils, 1996

Item	Fat grams
Total nutrient fat from added fats and oils	60.2
Margarine	7.1
Shortening	17.8
Salad and cooking oils	25.6
Lard	1.4
Edible tallow	1.4
Other	1.6
Dairy fats	5.3
Butter	3.3
Heavy cream	.5
Light cream	.1
Sour cream	.5
Half and half	.3
Cream and neufchatel cheese	.6

Source: USDA, Economic Research Service.

and fluid cream products—should account for no more than one-third of total fat consumption.

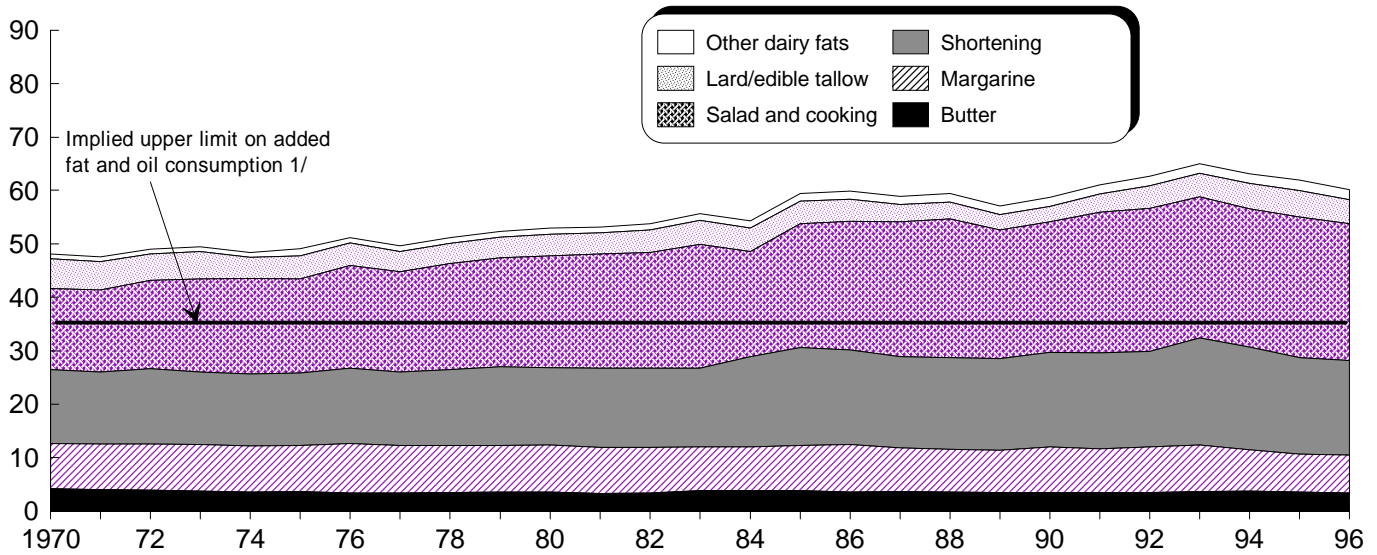
The food supply data suggest that most consumers are not meeting these recommendations. In 1996, fat grams from added fats and oils alone accounted for 82 percent of the recommended upper daily limit for total fat intake—or about 33 percent of total calories for a 2,200-calorie diet. Salad and cooking oils and shortening accounted for more than two-thirds of total added fat and oil servings and for nearly all of the increase in added fat and oil consumption since the early-1980’s (fig. 12). Animal fats—butter and other dairy fats, lard (direct use), and edible tallow—accounted for 16 percent of total servings. Lard and edible tallow, together with shortening, are used largely for deep-fat frying by fast-food restaurants and other foodservice establishments.

According to food supply nutrient data for 1994, added fats and oils accounted for 52 percent of the total fat provided by the food supply (Putnam and Allshouse, 1997). Assuming that added fats continue to account for about 52 percent of the total fat provided daily by the food supply, the quantity of added fats and oils available for human consumption would have to decline by more than one-third to bring added fat consumption to 38 grams (73 grams of total fat x 0.52 = 38 grams of added fats) and total fat consumption close to the recommended upper limit of 30 percent of calories per day.

Figure 12

Added fats and oils: Food supply servings, 1970-96

Fat grams per person per day



1/Implied upper limit assumes 2,200-calorie diet and that added fats account for 52 percent of suggested upper limit on total fat intake of 73 grams or 30 percent of calories.

Source: U.S. Department of Agriculture, Economic Research Service.

The Pyramid Tip: Added Sugars

The food supply data for added sugars and other caloric sweeteners measure the delivery of caloric sweeteners (refined cane and beet sugar, corn sweeteners, and edible syrups) to U.S. food and beverage manufacturers (table 9).

These sweeteners are subsequently used in processed products such as baked goods, breakfast cereals, candy, and soft drinks, and are distributed by food wholesalers and retailers for individual and household use. Except for table sugar, the data do not measure the consumption of individual products, like cola or chocolate bars, identified as “sweets,” in *The Food Guide Pyramid* bulletin.

The food supply provided an average of 32 teaspoons of caloric sweeteners (dry-weight basis) daily in 1996, or the sweetener equivalent of about three and one-half 12-ounce regular soft drinks per person per day (table 10). Average consumption was more than two and one-half times the 12 teaspoons of added sugars suggested as an upper limit for a 2,200-calorie diet in *The Food Guide Pyramid* bulletin. A sharp rise in the use of High Fructose Corn Syrup and other sweeteners beginning in the mid-1980’s was largely offset by declining use of refined cane and beet sugar, resulting

Table 9—U.S. sweetener deliveries for human consumption by type of user, 1995

Item	Million pounds
Cane and beet sugar (refined value):*	
Bakery, cereal, and allied products	3,810
Confectionary and related products	2,744
Ice cream and dairy products	904
Beverages	338
Canned and bottled and frozen foods	558
All other food uses	1,726
Corn sweeteners (dry-weight basis):**	
Cereal and bakery products	910
Confectionary and related products	112
Processed foods	1,640
Dairy products	474
Beverages	11,274
All other food uses	1,054

*Includes refined, liquid, edible molasses, sugar and cane syrups.

**HFCS-42, HFCS-55.

Source: USDA, Economic Research Service, *Sugar and Sweetener Yearbook*, 1996.

in a 16-percent increase in caloric sweetener consumption from the 27 teaspoons provided by the food supply in 1982-86 (fig. 13).

Although the human body cannot distinguish between naturally occurring and added sugars, dietary guid-

ance focuses on added sugars because foods high in added sugars often supply additional calories but few nutrients. For example, the *1995 Dietary Guidelines* caution consumers about eating sugars in large amounts and about frequent snacks of food and beverages containing sugars that supply unnecessary calories and few nutrients (USDA/HHS, 1995; USDA, CNPP, 1996). To the extent that consumers substitute the calories from less nutrient dense sugary snacks,

sweetened soft drinks, and baked goods, for nutrient-rich foods like fruits, vegetables, and whole grains, dietary intake of fiber, and vitamins, minerals, and other nutrients found in these foods may be reduced. To maintain nutritious diets and healthy weights, the 1995 Dietary Guidelines suggest that sugars be used in moderation by most healthy people and sparingly by people with low caloric needs (USDA/HHS, 1995).

Consumers' ability to moderately consume foods high in sugars and to limit amounts of added sugars to levels suggested by dietary guidance is complicated because many added sugars are likely to be "hidden" in prepared foods. Although the new food label mandated by the National Nutrition Labeling and Education Act (U.S. Department of Health and Human Services, Food and Drug Administration, 1997) requires manufacturers to disclose the total sugar content of food, the label does not distinguish total from added sugars, which may sometimes make it difficult for consumers to determine how much added sugar they are actually consuming.

Table 10—Food supply servings of added sugars, 1996

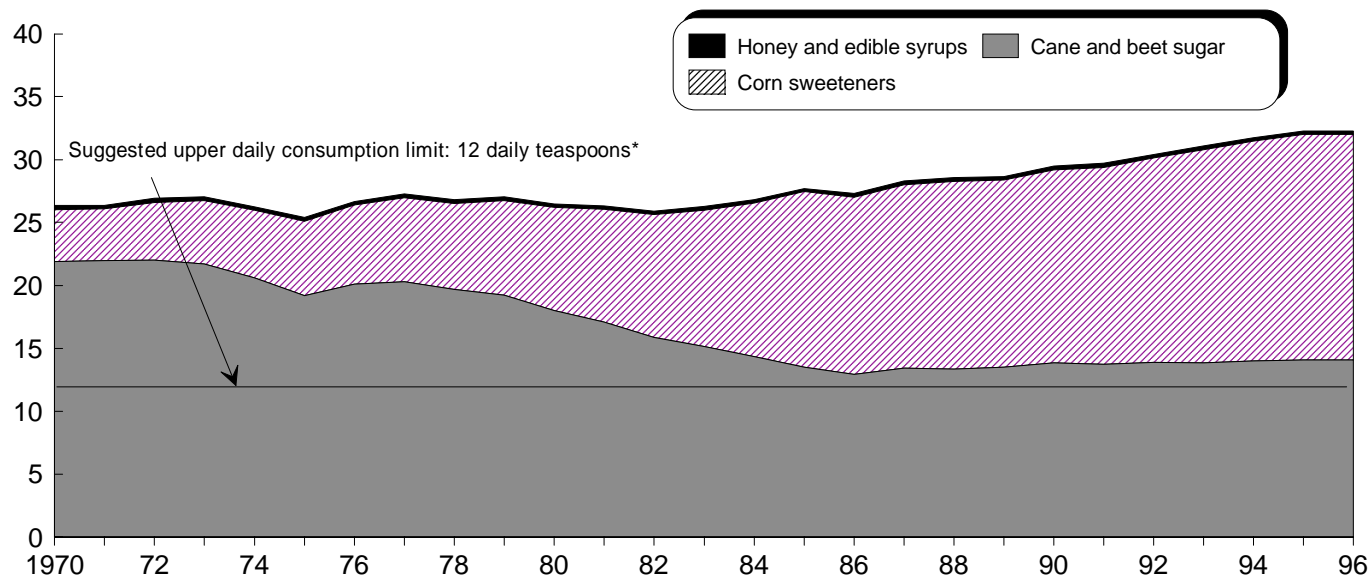
Item	Teaspoons
Total caloric sweeteners	32
Cane and beet sugar	14
High Fructose Corn Syrup	13
Glucose	4
Dextrose	.8
Edible syrups	.1
Honey	.2

Source: USDA, Economic Research Service.

Figure 13

Added sugars: Food supply servings, 1970-96

Teaspoons per person per day



*Recommended upper limit for a 2,200-calorie diet.

Source: U.S. Department of Agriculture, Economic Research Service.

Discussion

As mentioned earlier in this report, the ERS food supply data is only one component of the Federal Government's efforts to monitor nutrition. USDA's Continuing Survey of Food Intakes by Individuals (CSFII) is the Government's main source of data on individual food intakes. Comparing the similarities and differences between the food supply and CSFII servings estimates may lead to improved understanding of both data series and therefore the populations' food and nutrient intake. Such information, may, for example, improve the food supply data by (1) helping to refine estimates of food loss and other factors used to generate the food supply servings, (2) highlighting data gaps for certain food sub-groups, including dark-green and deep yellow vegetables, and (3) identifying food groups for which underreporting of energy intake by CSFII respondents may impact intake estimates.

Comparing CSFII Servings Estimates

Comparing servings estimates generated from the 1996 CSFII with food supply data for the same year yields conflicting results about the number of servings consumed from each food group (table 11). The largest differences were observed for the grains and meat groups and added sugars while smaller differences were observed for the vegetable, fruit, and dairy groups. However, the consumption of various subsets of foods—dark-green leafy vegetables, white potatoes, dry beans, peas, and lentils, and citrus, melons, and berries—within most of these groups was similar. Within the meat group, red meat, poultry, and fish accounted for a similar share of total servings for both data sets. Data for fats and oils were not comparable because of methodological differences.

A portion of the gap between the food supply and CSFII servings estimates is attributed to methodological differences such as the choice of serving weights for some foods—especially grain products—and the extent to which ingredient use of foods—especially dairy products—was measured. For the meat, poultry, fish, dry beans, eggs, and nuts group, for example, most of the difference between the two servings estimates can likely be explained by the way in which meat servings were estimated. The food supply servings estimates for meat, poultry, and fish include both the lean and fat portions (poultry skin, trimmable fat). The CSFII servings estimates, however, include the

lean meat only, with the fat portion counted as discretionary fat (USDA, ARS, March 1997).

Some of the differences in dairy servings between the two data sets may be explained because the CSFII servings data omitted small quantities of dairy products used as ingredients in other products, and classified some dairy products in other food groups. In the CSFII servings data, for example, milk ingredients (including nonfat dry milk solids) used in home or commercially prepared grain products were counted in the grains group, while dairy products used in processed meats and meat analogs were not measured due to data limitations.

Differences between the two servings estimates for added sugars are more difficult to explain. The CSFII servings data for added sugars omit sweeteners used in cream substitutes, soy-based imitation milk, processed meats such as cured ham and luncheon meats, meat analogs, and processed cheeses because recipes for these foods were not available when the CSFII data files were developed (USDA, ARS, March 1997). However, since total consumption of these foods is small, this methodological difference is not sufficient to explain the large gap between the added sugar servings reported in the two data sets.

Caloric Intake

Differences in daily energy intake reported by the two data sets may also explain some of the gap between the food supply and CSFII servings estimates for some foods. For example, the mean intake of 1,969 calories reported for individuals aged 2 and older in the CSFII servings data is two-thirds of the 2,666 daily calories imputed from the food supply data after adjusting the data for waste, cooking, and the discard of nonedible portions (see Appendix 2 for calories implied by the adjusted food supply data). Given the differences in caloric intake reported in the two data series, one would expect that average food supply servings, at least for some food groups, would be higher than those reported for the lower levels of average caloric intake reported in the CSFII servings data. The number of Food Guide Pyramid servings that are right for any one person varies depending on age, sex, and physiological status.

Although the food supply servings estimates imply a total caloric intake substantially higher than the 2,247

Table 11--Food supply servings compared with intake data from the Continuing Survey of Food Intakes by Individuals (CSFII), 1996¹

Food group	Food supply	CSFII
		Servings
Bread, cereals, rice, and pasta group	9.7	6.8
Whole-grain products	--	1.0
Nonwhole grain products	--	5.8
Vegetable group	3.8	3.4
Dark green leafy	0.1	.2
Deep yellow	.2	.2
Dry beans, peas, and lentils	.2	.2
Starchy vegetables	1.4	1.3
White potatoes	1.0	1.1
Other starchy	.4	.2
Tomatoes	.4	.5
Other vegetables	1.5	1.0
Fruit group	1.3	1.5
Citrus fruits, melons, berries	.6	.7
Other fruits	.7	.8
Milk, yogurt, cheese	1.7	1.5
Milk	.9	1.0
Yogurt	*	*
Cheese	.6	.5
		Ounces
Meat, poultry, fish, dry beans, eggs and nuts group	5.6	4.5
Meat	2.9	1.9
Poultry	1.6	1.0
Fish	.4	.4
Organ meat	--	--
Frankfurters and luncheon meat	--	.7
Eggs	.5	.3
Soybean products	--	*
Nuts and seeds	.2	.1
		Fat grams
Fats and oils—		
Total fat	--	--
Discretionary fat	--	55.7
Added fats and oils	60.2	--
		Teaspoons
Added sugars	32.0	20.1

-- = not available.

* = less than 0.1 servings.

¹Differences in methodology may affect comparability of the servings estimates.
Sources: USDA, Economic Research Service; USDA, ARS, 1998.

calories estimated as the Recommended Energy Allowance for the population, the data suggest that most consumers could meet the Food Guide Pyramid serving recommendations for a 2,200-calorie diet while maintaining energy intake close to suggested levels. Reducing average added fat and sugar consumption to target levels, for example, would reduce total energy intake to about 2,150. While a portion of this reduction would be offset by increased servings from other food groups, were these increased servings to come mostly from lowfat choices within each group, as suggested by *The Food Guide Pyramid* bulletin, the data suggest that the calorie goal could be achieved.

The higher total caloric intake implied by the food supply servings estimates, however, does not explain why differences in servings estimates between the two data sets are larger for some food groups than for others. One possible explanation may be that underreporting by food-intake survey respondents is greater for some foods or food groups—added sugars for example—than for other food groups for which food supply and CSFII servings estimates are similar. For example, if the excess added sugar servings estimated from the food supply data represent consumption of less nutrient-dense foods such as candy bars or soft drinks, this could support previously reported research that suggests that food-intake survey respondents are less likely to report intake of such foods accurately compared with foods like fruits and vegetables perceived as more “healthy” or nutrient-dense.

Other Methodological Issues Related to the Food Supply Estimates

In calculating food supply servings for certain food groups, like grains and added sugars, in which many of the commodities are consumed indirectly as ingredients in processed food products, there was a concern that the servings estimates may be overstated due to the use of some of these commodities in food products that are exported. Examples of such foods may include flour, fats, and sweeteners used in cookies, crackers, and other baked goods and added sweeteners used in candy, confectionary products, and regular soft drinks.

Export Use

Many exported foods are excluded from the food supply consumption series and are not counted in the

servings estimates reported here (Putnam and Allshouse, 1997). These foods include red meat, poultry, and fish; milk, cheese, and most other dairy products; fresh and processed fruits and vegetables (including potatoes for french fries and potato chips and tomato products); and durum flour used in macaroni and other pasta products.

Consumption of many other foods, however, is estimated at the primary or semi-processed level (flour mills, sugar beet processors, oilseed crushers) before the commodities are released into the marketing system for additional processing. Since ingredient use of these foods at additional manufacturing stages is not measured, it is not possible to determine what share of these products eventually end up in the export market and should thus be excluded from the food supply servings estimates measuring domestic consumption.

Although a precise measure of export ingredient use was not available, trade data were examined in an attempt to determine the impact that these exports may have on the food supply servings estimates. Trade data were examined for food categories most likely to account for exported ingredients—all grain products, jams and jellies, confectionary products (including chocolate and chewing gum), carbonated soft drinks, sweetened waters, other nonalcoholic beverages including fruit drinks, and ready-to-eat puddings (USDA, ERS, unpublished, 1997). These data were examined for approximate sugar and grain content.

Carbonated soft drinks and other nonalcoholic beverages excluding fruit juice were assumed to contain 1 teaspoon of sweetener per fluid ounce based on added sugar contents for fruit ades and colas listed in *The Food Guide Pyramid* bulletin. To estimate an extreme level of sweetener use, grain products were assumed to contain 50-percent sweetener. Using this method, the total impact on food supply servings estimates was judged to be small. For example, the total sweetener content of the food exports reported in the trade categories listed above was estimated to be less than 2 teaspoons per person per day. Grain use in exported foods was estimated at less than half of a grain serving by ERS commodity experts. However, these estimates lack precision and additional research is needed to completely understand the effect of unmeasured food exports on food supply consumption and servings estimates. In addition, fat ingredient use in exported foods was not measured.

Food Loss

The food supply servings estimates reported in this study are in part determined by the assumptions used to estimate the amount of available food supplies lost to human consumption because of waste, cooking, and other discard. However, such losses, particularly food discard at the consumer level, are by nature difficult to measure. Previous studies of food loss have reported consumer waste rates ranging from 7 to 35 percent (Gallo, 1980). Differences in the way that waste is defined, differences in study methodology, and differences in characteristics of sample households partially explain the wide range of these estimates.

A recent ERS study reported that 27 percent of available food supplies are lost at the retail, consumer, and foodservice levels (Kantor and others, 1997). However, most existing studies of food waste date from the 1970's or before, and the more recent ERS estimates rely largely on coefficients generated from these older studies. The U.S. marketing system has dramatically changed since these coefficients were originally estimated, suggesting that actual waste rates, and hence the servings estimates on which they depend, may differ from those reported here.

These same data limitations also meant that the loss estimates were held constant across the entire time series of data. However, loss rates may have changed dramatically over time for some food groups. For example, there is evidence that the waste portion of added fats and oils has increased during the past two decades with the growth in consumption of food away-from-home. Foodservice establishments that deep-fry foods can generate significant amounts of waste grease known as "restaurant grease." Many of these used frying fats are disposed of by restaurants and processed by renderers for use in animal feeds, pet foods, and industrial operations. While ERS is working with industry groups, including the prepared-foods and fast-food industries, to improve the added fats and oils data, the old coefficients used to measure losses of added fats and oils in this paper may not accurately reflect current consumption and marketing patterns.

Due to the uncertainties associated with these waste estimates, a sensitivity analysis was conducted to

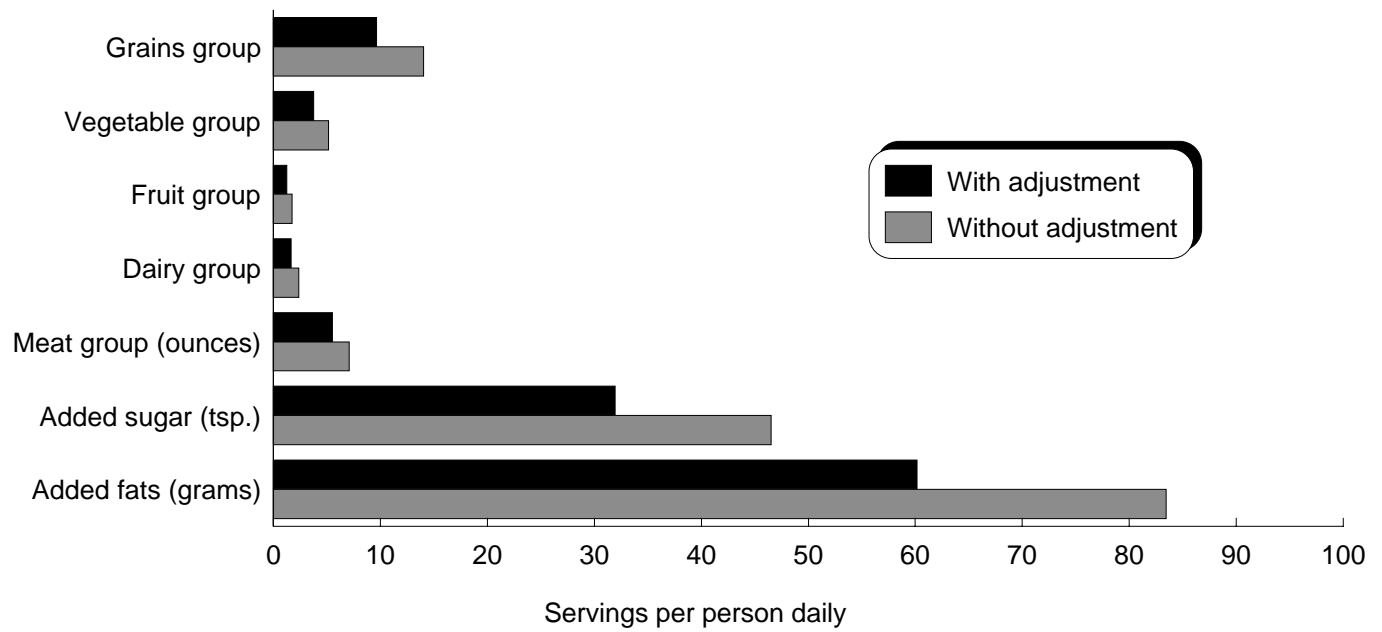
evaluate the impact of the selected waste factors on the food supply servings estimates. For the three groups where the food supply servings estimates differed the most from the CSFII servings data—bread, cereals, rice, and pasta; meat, poultry, fish, dry beans, eggs, and nuts; and added sugars—it was also determined how much the loss factors would have to change in order to reconcile the differences between the two servings estimates.

To close the gap between the food supply and CSFII servings estimates for these food groups, an additional 2.9 servings of grain products, 12 teaspoons of caloric sweeteners, and about three-quarters of an ounce of meat or meat equivalents per person would have to be lost from the food supply each day. This is the flour equivalent of about three slices of bread, the caloric sweetener in one 16-ounce regular soft drink, or about one egg or one slice of luncheon meat per person daily. Total grain group losses would have to grow to 50-percent of edible food supplies. A total of 20 percent of the edible meat and meat alternates (boneless weight equivalent) provided by the food supply would have to be thrown away or otherwise lost to human use for food supply servings to approach the CSFII servings estimates, however, some of this "loss" is likely to be fat trim not counted in the CSFII estimates. Total caloric sweetener losses would need to increase to nearly 55 percent of available food supplies for food supply servings to decline to the 20 teaspoons reported in the 1996 CSFII.

To further test the validity of the waste and other loss factors used in this study, food supply servings were calculated without adjusting the data for retail, household, or institutional losses. Adding these losses back to the food supply consumption series moves the servings estimates for several food groups—meats, vegetables, and dairy products—from below to above Food Guide Pyramid serving recommendations for a 2,200-calorie diet (fig. 14). However, average fruit servings remain well-below minimum recommended intake at 1.8 servings. Total energy intake implied by the servings estimates increases by nearly 40 percent to about 3,700 calories.

Figure 14

Food supply servings measured with and without loss adjustment*



*Losses include retail, household, and institutional losses of edible food portions.
Source: U.S. Department of Agriculture, Economic Research Service.

Conclusions

Despite the numerous data limitations discussed throughout this study, the food supply servings estimates reported here represent the first attempt to measure changes in food consumption over a continuous time period using the Food Guide Pyramid as a dietary assessment tool. These results build on recent similar research which estimated Food Guide Pyramid servings from food-intake data collected from individuals over 2 nonconsecutive days during 1994-96. Both studies consistently conclude that most consumers have a long way to go in bringing their diets closer to Food Guide Pyramid serving recommendations. However, substantial differences between the servings estimates for the two data sets for some food groups suggest the need for additional research to determine the reasons behind these differences.

Information on how much average diets differ from Federal dietary recommendations is key to Federal efforts to monitor the dietary and nutritional status of the population under the Ten-Year Comprehensive Plan for National Nutrition Monitoring and Related Research Program mandated by the National Nutrition and Related Research Act of 1990. Also, because the servings estimates reported in this study are generated from commodity-based food supply data, food servings can be readily converted back to farm-level data, easing the translation of dietary recommendations into production and supply goals for farmers and the food industry. Finally, the time-series estimates reported here can be used as a baseline to project future trends in food demand and for comparing those trends against Federal dietary recommendations.

References

- Allshouse, Jane E., Judy Putnam, and Scott Sanford. "Trends in Fats and Oils Consumption," *FoodReview*. U.S. Department of Agriculture, Economic Research Service, forthcoming.
- Bingham, Sheila A. "The Use of 24-h Urine Samples and Energy Expenditure to Validate Dietary Assessments," *American Journal of Clinical Nutrition*. 59 (suppl): 227S-31S. 1994.
- Black, Alison E., Andrew Prentice, Gail Goldberg, Susan Jebb, Sheila Bingham, M. Barbara Livingstone, and W. Andrew Coward. "Measurements of Total Energy Expenditure Provide Insights Into the Validity of Dietary Measurements of Energy Intake," *Journal of the American Dietetic Association*. Vol. 93, No. 5. pp. 572-579. May 1993.
- Bowman, S.A., M. Lino, S.A. Gerrior, P.P. Basiotis. *The Healthy Eating Index: 1994-96*. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, July 1998.
- Cleveland, L.E., S.M. Krebs-Smith, D.A. Cook, J. Friday, and L. Kahle. *Assessing Food Intake in Terms of Food Guidance Based Servings*. Presented at the Second International Conference on Dietary Assessment Methods, Boston, MA, January 24, 1995.
- Cleveland, L.E., S.M. Krebs-Smith, D.A. Cook, J. Friday, L. Kahle. "Method for Assessing Food Intakes in Terms of Food Guidance," *American Journal of Clinical Nutrition*. 1997; 65 (supplement): April 1997.
- Cronin, Frances J., Anne M. Shaw, Susan M. Krebs-Smith, Patricia M. Marsland, and Luise Light. "Developing a Food Guidance System to Implement the Dietary Guidelines," *Journal of Nutrition Education*. 19(6), 1987.
- Duewer, Lawrence A., Kenneth R. Krause, and Kenneth E. Nelson. *U.S. Poultry and Red Meat Consumption, Prices, Spreads, and Margins*. AIB-684. U.S. Department of Agriculture, Economic Research Service. October 1993.
- Frazao, Elizabeth. *The American Diet: Health and Economic Consequences*. AIB-711. U.S. Department of Agriculture, Economic Research Service. February 1995.
- Frazao, Elizabeth. "The Health and Economic Consequences of the American Diet," in *America's Eating Habits: Changes and Consequences*, Elizabeth Frazao, ed., U.S. Department of Agriculture, Economic Research Service, forthcoming.
- Frazao, Elizabeth, and Jane E. Allshouse. *Size and Growth of the Nutritionally Improved Foods Market*. AIB-723. U.S. Department of Agriculture, Economic Research Service. April 1996.
- Gallo, Anthony E. "Consumer Food Waste in the United States," *National Food Review*. Fall 1980.
- Hunter, J. Edward, and Thomas H. Applewhite. "Correction of Dietary Fat Availability Estimates for Wastage of Food Service Deep-Frying Fats," *Journal of the American Oil Chemists' Society*, 70 (6): June 1993.
- Kantor, Linda Scott. "Comparison with the Food Guide Pyramid," in *America's Eating Habits: Changes and Consequences*, Elizabeth Frazao, ed., U.S. Department of Agriculture, Economic Research Service, forthcoming.
- Kantor, Linda Scott, Kathryn Lipton, Alden Manchester, and Victor Oliveira. "Estimating and Addressing America's Food Losses," *FoodReview*, Vol. 20, Issue 1, Jan-April, 1997, pp. 2-12.
- Krebs-Smith, S.M., D.A. Cook, A.F. Subar, L. Cleveland, and J. Friday. "US Adults' Fruit and Vegetable Intakes, 1989 to 1991: A Revised Baseline for the Healthy People 2000 Objective," *American Journal of Public Health*. Vol. 85, No. 12. pp. 1623-29. December 1995.
- Krebs-Smith, S.M., D.A. Cook, A.F. Subar, L. Cleveland, J. Friday, L.L. Kahle. "Fruit and Vegetable Intakes of Children and Adolescents in the United States," *Archives of Pediatric Adolescent Medicine*. 1996; 150: 81-86.
- Krebs-Smith, S.M., L.E. Cleveland, R. Ballard-Barbash, D.A. Cook, and L.L. Kahle. "Characterizing Food Intake Patterns of American Adults," *American Journal of Clinical Nutrition*. 65(suppl): 1264S-8S, 1997.

Life Sciences Research Office, Federation of American Societies for Experimental Biology. *Third Report on Nutrition Monitoring in the United States*. Interagency Board for Nutrition Monitoring and Related Research, December 1995.

Mertz, W., J.C. Tsui, J.T. Judd, S. Reiser, J. Hallfrisch, E.R. Morris, P.D. Steele, and E. Lashley. "What are people really eating? The relation between energy intake derived from estimated diet records and intake determined to maintain body weight," *American Journal of Clinical Nutrition*. 1991; 54:291-5.

Munoz, Kathryn A., Susan M. Krebs-Smith, Rachel Ballard-Barbash, and Linda E. Cleveland. "Food Intakes of US Children and Adolescents Compared with Recommendations," *Pediatrics*. 100 (3), September 1997, pp. 323-329.

National Research Council, *Recommended Dietary Allowances*, 10th ed., National Academy Press, Washington, DC, 1989.

O'Brien, Patrick. "Dietary Shifts and Implications for U.S. Agriculture," *American Journal of Clinical Nutrition*. Vol. 61 (suppl.), pp. 1390S-6S, 1995.

Putnam, Judith Jones, and Jane E. Allshouse, *Food Consumption, Prices, and Expenditures, 1970-95*, SB-939. U.S. Department of Agriculture, Economic Research Service. August 1997.

Putnam, Judith Jones, and Lawrence A. Duewer. "U.S. Per Capita Food Consumption: Record-High Meat and Sugars in 1994," *FoodReview*. Vol. 18 (2), May-August 1995.

Schoeller, Dale A. "How Accurate is Self-Reported Dietary Energy Intake," *Nutrition Reviews*. Vol. 48 No. 10. pp. 373-79. October 1990.

United Fresh Fruit and Vegetable Association. *Fruit and Vegetable Consumption: Consumer Attitudes vs. Behavior*, 1995.

United States Department of Agriculture, Agriculture Research Service (ARS). *Food Yields Summarized by Different Stages of Preparation*. Agriculture Handbook No. 102. Revised September 1975.

United States Department of Agriculture, Agriculture Research Service. *1994 Continuing Survey of Food Intakes by Individuals and the 1994 Diet and Health Knowledge Survey*. National Technical Information Service, Springfield, VA. CD-ROM. Accession No. PB97-502058. 1996.

United States Department of Agriculture, Agriculture Research Service. *1994 Continuing Survey of Food Intakes by Individuals and Pyramid Servings*. National Technical Information Service, Springfield, VA. CD-ROM. Accession No. PB96-501010. March 1997.

United States Department of Agriculture, Agriculture Research Service. *Nutrient Database for Standard Reference Release 11-1*. <<http://www.nal.usda.gov/fnic/foodcomp/>>, October 1997.

United States Department of Agriculture, Agriculture Research Service. *Pyramid Servings Data: Results from 1995 and 1996 Continuing Survey of Food Intakes by Individuals and Pyramid Servings*. [Online]. ARS Food Surveys Research Group. Available (under "Releases"): <<http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>>[1998, October 30].

United States Department of Agriculture, Center for Nutrition Policy and Promotion (CNPP). *The Healthy Eating Index*. CNPP-1, October 1995.

United States Department of Agriculture, Center for Nutrition Policy and Promotion. *The Food Guide Pyramid*. Home and Garden Bulletin Number 252. October 1996.

United States Department of Agriculture, Center for Nutrition Policy and Promotion. *Nutrient Content of the U.S. Food Supply, 1909-1994*. Home Economics Research Report No. 53, October 1997.

United States Department of Agriculture, Economic Research Service. "Foreign Agricultural Trade of the United States," unpublished data, 1997.

United States Department of Agriculture, Economic Research Service. "U.S. Dry Edible Bean Briefing Room." <<http://www.econ.ag.gov/Briefing/drybean/>> June 13, 1997.

United States Department of Agriculture and U.S. Department of Health and Human Services (HHS). *Nutrition and Your Health: Dietary Guidelines for Americans*, Fourth edition, Home and Garden Bulletin, No. 232. 1995.

United States Department of Commerce, Economics and Statistics Administration, Bureau of the Census. *1992 Census of Manufacturers, Industry Series: Grain Mill Products*, MC921-1-20D, June 1995.

United States Department of Health and Human Services, Food and Drug Administration. *The New Food Label*. <<http://vm.cfsan.fda.gov/~lrd/newlabel.html>>. 1997.

Young, C. Edwin, and Linda Scott Kantor. "What Healthy Diets Could Mean for Agriculture," U.S. Department of Agriculture, Economic Research Service, forthcoming.

Appendix 1: Foods Measured in Food Supply Servings Estimates and CSFII Servings Data

Grains

Food supply servings:

White and whole wheat flour; durum flour; rye flour; rice; corn flour and meal; corn hominy and grits; corn starch; oat products (rolled oats, ready-to-eat cereals, oat flour, and oat bran); and barley products (barley flour, pearl barley, and malt and malt extract used in food processing).

CSFII servings:

Yeast breads and rolls; quick breads such as muffins, biscuits, pancakes, and tortillas; rice; pasta; breakfast cereals; grain-based snacks; such as crackers, pretzels, popcorn, and corn chips; and baked goods made from flour, such as cakes, cookies, croissants, doughnuts, pastries, and pie crust.

Vegetables

Food supply servings:

Fresh: Artichokes, asparagus, bell peppers, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, sweet corn, cucumbers, eggplant, escarole/endive, garlic, head lettuce, romaine and leaf lettuce, mushrooms, onions, potatoes, radishes, snap beans, spinach, sweet potatoes, and tomatoes.

For freezing: Asparagus, snap beans, broccoli, carrots, cauliflower, sweet corn, green peas, potatoes, other (lima beans, spinach, collards, kale, mustard greens, okra, blackeyed peas, pumpkin, and rhubarb, summer squash, turnip greens, turnips, and other miscellaneous vegetables).

For canning: Asparagus, snap beans, cabbage (for sauerkraut), carrots, chile peppers, sweet corn, cucumbers, green peas, mushrooms, potatoes, tomatoes, and other (lima beans, beets, and spinach).

Legumes, and vegetables for dehydrating and chips: Dry edible beans (large and baby lima, navy, Great Northern, small white, pinto, light and dark red kidney, pink, small red, cranberry, black beans, black-

eyed peas, garbanzo, other), dry field peas and lentils (whole green peas, split green peas, whole yellow peas, split yellow peas, Austrian winter peas, regular lentils, other lentils); and dehydrating (onions, potatoes), for chips and shoestrings (potatoes).

CSFII servings:

Dark-green leafy vegetables: Arugula, beet greens, broccoli, chard, chicory, collard greens, dandelion greens, endive, escarole, grape leaves, kale, lambs-quarters, mustard greens, parsley, poke greens, romaine lettuce, spinach, taro leaves, turnip greens, and watercress.

Deep-yellow vegetables: Carrots, carrot juice, pumpkin, sweetpotato, and winter squash.

Starchy vegetables: Blackeyed peas (not dried), breadfruit, cassava, sweet corn, cowpeas (not dried), green peas, hominy, lima beans (immature), parsnips, white potato, rutabaga, and taro.

Dry beans and peas: Bayo beans, black beans, black-eyed peas, broadbeans, calico beans, chickpeas (garbanzos), cowpeas, kidney beans, lentils, lima beans (mature), mung beans, navy beans, pinto beans, pink beans, red Mexican beans, split peas, soybeans (mature), and white beans.

Other vegetables: Artichoke, asparagus, balsam-pear pods, bamboo shoots, bean and alfalfa sprouts, broccoflower, beets, Brussels sprouts, cabbage (green and red), cactus, capers, cauliflower, celery, chayote, Chinese cabbage, chives, christophene, coriander, cucumber, eggplant, garlic, ginger root, green beans, horseradish, leek, lettuce, mushrooms, okra, olives, onions (mature and green), peppers (green, red, hot, banana), pimiento, radicchio, radishes, sauerkraut, seaweed, snow peas, summer squash, tomatillos, tomatoes, tomato juice, turnips, water chestnuts, wax beans, and zucchini.

Fruit

Food supply servings:

Fresh: Apples, apricots, avocados, bananas, cantaloupe, cherries, cranberries, grapes, grapefruit, honeydew, kiwifruit, lemons, limes, mangoes, nectarines, oranges and temples, peaches, pears, pineapples,

papayas, plums, prunes, strawberries, tangerines, and watermelon.

Frozen: Apples, apricots, blackberries, blueberries, cherries, peaches, raspberries, strawberries, and other berries (boysenberries, loganberries).

Canned: Apples and applesauce, apricots, cherries (tart and sweet), olives, peaches, pears, pineapples, and plums and prunes.

Dried: Apples, apricots, dates, figs, peaches, pears, prunes, and raisins.

Fruit juices: Orange, grapefruit, lemon, lime, apple, grape, pineapple, and prune.

CSFII servings:

Citrus fruits, melons, and berries: Acerola, blackberries, blueberries, boysenberries, calamondin, cantaloupe, cassaba, melon, cranberries, elderberries, gooseberries, grapefruit, honeydew melon, juneberries, kiwifruit, kumquat, lemon, lime, loganberries, mulberries, orange, raspberries, strawberries, tangelo, tangerine, ugli fruit, watermelon, and juices made from these fruits.

Other fruits: Apple, apricot, asian pear, avocado, banana, cherries, currants, dates, figs, genip, guava, quince, grapes, jackfruit, japanese pear, jobo, lychee, mamey, mango, nectarine, papaya, passion fruit, peach, pear, persimmon, plantain, pineapple, plum, pomegranate, prickly pear, prunes, raisins, rhubarb, sapodilla, soursop, star fruit sweetsop, tamarind, wi- apple, and juices made from these fruits.

Milk, Yogurt, and Cheese

Food supply servings:

Fluid milk products: Whole, plain; 2% reduced fat, plain; light (0.5 - 1%), plain; fat free (skim), plain; whole, flavored; lower fat, flavored; buttermilk, and yogurt.

Cheese: Cheddar, Colby, washed curd, stirred curd, Monterey Jack, Provolone, Mozzarella, Ricotta, Other Italian; Swiss (includes Gruyere and Emmenthaler); Brick, Muenster, Blue, Other Misc; and processed cheese, foods and spreads.

Other dairy products: Cottage cheese, regular; cottage cheese, lowfat; ice cream, ice milk; sherbet; other frozen dairy products (mellorine, frozen yogurt and other nonstandardized dairy products); canned whole milk; bulk whole milk; bulk and canned skim milk; dry whole milk; and dry buttermilk.

CSFII servings:

Includes most dairy foods except those that are primarily fat—butter, cream, sour cream, and cream cheese.

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts

Food supply servings:

Meat, poultry, and fish: Beef; veal; pork; lamb; chicken; turkey; fish, fresh and frozen; fresh and frozen shellfish; salmon, canned; sardines, pitchards and herrings, canned; tuna, canned; shellfish, canned; other fish, canned; and cured fish.

Eggs and nuts: Eggs (fresh and shell-egg equivalent of processed eggs); peanuts, snack; peanuts cleaned in shell; peanut butter; almonds; filberts; pecans; walnuts; macadamias; pistachios; other tree nuts (Brazil nuts, pignolias, chestnuts, cashews, and miscellaneous); and coconuts, dessicated.

CSFII servings:

Meat, poultry, fish/shellfish, organ meat, frankfurters, luncheon meats, eggs, tofu, and simulated meat products made from soy, nuts, seeds.

Fats and Oils

Food supply servings:

Dairy and animal fats: Butter, lard (direct use and in baking and frying fats), edible beef tallow (direct use and in baking and frying fats), half and half, light cream, heavy cream, sour cream, cream cheese, and baking and frying fats (lard and edible tallow, indirect use).

Vegetable fats: Margarine, baking and frying fats (soybean oil, cottonseed oil, palm oil), salad and cooking oils (soybean oil, cottonseed oil, canola oil, corn oil, peanut oil, olive oil), other edible fats and oils (includes specialty fats used mainly in confectionary products and nondairy creamers).

CSFII servings:

All “excess” fat from the five major Pyramid food groups beyond amounts that would be consumed if only the lowest fat forms were eaten and fats added to foods in preparation or at the table, including cream, butter, margarine, regular or lowfat cream cheese, oil, lard, meat drippings, cocoa, and chocolate.

Added Sugars

Food supply servings:

Cane and beet sugars, high fructose corn syrup, glucose, dextrose, honey, and edible syrups (sorgo, maple

and sugarcane syrup, edible molasses, and edible refiner’s syrup).

CSFII servings:

Brown sugar, raw sugar, corn syrup, corn syrup solids, high fructose corn syrup, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, anhydrous dextrose, crystal dextrose, saccharin, and aspartame.

Appendix 2: Estimation of Serving Weights for Individual Commodities

A single serving weight, consistent with sample servings identified in *The Food Guide Pyramid* bulletin Food Choices Chart and other USDA dietary guidance materials (USDA, CNPP, 1996; USDA, March 1997) was defined for each food supply commodity, using serving weights identified in the USDA Nutrient Data Base (NDB) (USDA, ARS, October 1997). For each commodity, the selected food portion was that which most closely resembled the serving size defined for that commodity or commodity type (for example, fresh fruit, cooked vegetables, fluid milk) in the Food Guide Pyramid.

For most commodities, serving weights were dictated by data availability and the marketing level at which consumption was reported in the food supply series. For some commodity groups—milk, yogurt, and cheese; fruits; vegetables; and added sugars—serving weights closely matched those defined in *The Food Guide Pyramid* bulletin. On the other hand, because some Food Guide Pyramid serving recommendations—particularly those in the grains and meat groups—are product-based, rather than ingredient-based, this meant that serving weights for some foods were not consistent with standard serving sizes defined by dietary guidance.

Grains

The food supply data for foods in the bread, cereals, rice, and pasta group are a mixture of semi-processed ingredients and final food products, making it difficult to identify serving weights consistent with Food Guide Pyramid definitions. *The Food Guide Pyramid* bulletin defines a serving from this food group in terms of final products—one slice of bread, 1 ounce of breakfast cereal, two 4-inch pancakes, or two medium cookies. However, food supply consumption estimates are reported mostly for semi-processed commodities—white and wheat flour, durum flour (used for pasta and couscous), rice (milled basis), oat products (rolled oats, ready-to-eat oat cereals, oat flour, and oat bran), corn products (corn flour and meal, hominy and grits, corn starch), barley (barley flour, pearl barley, barley malt and malt extract used in food processing), and rye flour. Changes in weight due to cooking and processing are particularly difficult to identify.

Since it is not possible to determine the end uses of these semi-processed commodities, serving weights were determined using a “grain-equivalent” approach; that is, a serving was defined as the average weight of the grain-ingredient used to make an end product (appendix table 1). For example, the serving weight for white and wheat flour (excluding durum flour used for pasta) was 16 grams, or the average quantity of flour in a regular slice of commercial white bread. Servings of flour used in all other flour-based products (cakes, cookies, hamburger rolls, doughnuts) were thus indirectly measured as a fraction of a bread serving. Servings of all other ingredients used to make bread or other bakery products—including eggs, milk, fats and oils, and sweeteners—were measured in their respective food groups (meat, dairy, fats and oils, and added sugars).

For ready-to-cook products like rice, barley, and oatmeal, a food supply serving was defined as the dry amount that would yield 1/2 cup of the product cooked; about 32 grams for rice, 20 grams for oatmeal, and 25 grams for pearl barley. For semolina and durum flour (used in pasta and couscous), a serving was defined as the amount of dry pasta that would yield a half cup of macaroni cooked, about 29 grams. For corn products, serving weights were assigned for each of the three product types identified in the food supply data. For corn flour and meal and cornstarch, a serving was the amount of product that had the same amount of carbohydrate as a serving of wheat flour, 16 grams for corn flour and meal and about 20 grams for cornstarch. The serving weight for corn hominy and grits was the dry weight of 1/2 cup of cooked grits.

Vegetables

Vegetable group serving weights were based on sample serving sizes defined in *The Food Guide Pyramid* bulletin Food Choices Chart, 1/2 cup cooked vegetables, 1 cup raw leafy vegetables, 1/2 cup raw, chopped, nonleafy vegetables (USDA, CNPP, 1996). These serving sizes were then used as the basis for selecting appropriate serving weights for different uses of vegetables reported in the food supply data—fresh, canning, freezing, chips and shoestrings, and dehydrating (appendix table 2).

For most fresh vegetables, serving weights were defined as the weight of 1/2 cup of the product, raw, except for dark-green leafy vegetables for which a

Appendix table 1—Serving weights for the grains group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight	Loss from primary to consumer weight ²	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
White and whole wheat flour	20081	Flour in one regular slice of commercially prepared white bread	16	--	--	2	20	58	
Durum flour	20099	Dry weight of 1/2-cup macaroni, cooked	29	--	--	2	20	106	
Rye flour	20064	Medium rye flour in one slice of rye bread	16	--	--	2	20	57	
Rice (milled basis)	20044, 20050, 20052	Dry weight of 1/2-cup white long grain, medium grain, or short grain, cooked	32	--	--	2	20	117	
Corn products:									
Corn flour and meal ³	20022, 20016, 20017, 20018, 20020	Corn flour or meal, enriched or unenriched	16	--	--	2	20	58	
Corn hominy and grits ⁴	08159	Dry weight of 1/2-cup corn grits, cooked	20	--	--	2	20	74	
Comstarch ⁵	20027	Dry weight of 1/2-cup cooked corn grits	13	--	--	2	20	50	
Oat products	08120	Dry weight of 1/2-cup cooked, regular, quick or instant	20	--	--	2	20	77	
Barley products	20005	Dry weight of 1/2-cup cooked barley	25	--	--	2	20	88	

-- = not estimated.

¹USDA, ARS, October 1997.

²Grain group food supply data are all on a consumer weight or product basis.

³Corn flour and meal are used in a variety of grain products including corn bread, tortillas, corn chips—servings were calculated based on a grain equivalent.

⁴Dry weight of 1/2-cup cooked corn grits.

⁵Quantity equal to carbohydrates in one slice of bread.

Source: U.S. Department of Agriculture, Economic Research Service.

Appendix table 2—Serving weights for the vegetable group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight ²	Loss from primary to consumer weight ³	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving	
										Grams
Fresh vegetables:										
Artichokes	11008	1 medium (globe or french) cooked, boiled, drained	120	7	60	6	2	30	60	
Asparagus	11012	1/2-cup, cooked, boiled, drained	90	9	47	7	2	30	22	
Beans - snap	11053	1/2-cup, green snap beans, cooked, boiled, drained	63	6	12	2	2	30	22	
Broccoli	11090	1/2-cup chopped or diced, raw	44	8	39	--	2	30	12	
Brussels sprouts	11099	1/2-cup, cooked, boiled, drained	78	8	10	+9	2	30	30	
Cabbage	11109	1/2-cup chopped or shredded, raw	80	7	20	--	2	30	17	
Carrots	11124	1/2-cup chopped, grated, strips, or slices, raw	62	3	11	--	2	30	26	
Cauliflower	11135	1/2-cup, raw	50	8	61	--	2	30	12	
Celery	11143	1/2-cup diced or strips, raw	61	7	11	--	2	30	10	
Corn - sweet	11168	1/2-cup, yellow, cooked, boiled, drained, cut from cob	82	8	64	12	2	30	89	
Cucumbers	11206	1/2-cup pared, chopped or sliced	63	8	27	--	2	30	8	
Eggplant	11210	1/2-cup cubes, cooked, boiled, drained	45	10	19	7	2	30	14	
Escarole/endive	11213	1 cup endive chopped, raw	50	7	14	--	2	30	4	
Garlic	11215	1/2-cup, raw	68	19	13	--	2	30	13	
Lettuce-head	11252, 11250	1/2-cup shredded or chopped, iceberg or butterhead, raw	28	7	16	--	2	30	3	
Lettuce-Romaine/leaf	11251, 11253	1-cup Cos, Romaine or looseleaf, shredded, raw	56	7	21	--	2	30	4	
Mushrooms	11260	1/2-cup pieces or slices, raw	35	na	3	--	2	30	9	
Onions	11283	1/2-cup cooked, boiled, drained	105	6	10	15	2	30	46	
Peppers - bell	11333	1/2-cup sliced or chopped, raw	61	8	18	--	2	30	16	
Potatoes	11363, 11367	1/2-cup flesh, without skin, boiled; 1/2-cup flesh, baked	70	4	23	10	2	30	62	
Radishes	11429	1/2-cup slices, raw	58	3	10	--	2	30	12	
Spinach	11457	1-cup, raw	30	15	28	--	2	30	7	
Sweetpotatoes ⁴	11367	1/2-cup flesh, without skin, boiled; 1/2-cup flesh, baked	70	4	25	11	2	30	62	
Tomatoes	11529	1/2-cup chopped or sliced, raw	90	15	9	--	2	30	19	
Vegetables for canning:										
Asparagus	11015	1/2-cup canned, drained solids	121	18	0	--	1	15	23	
Snap beans	11056	1/2-cup green, canned, regular pack, drained solids	68	+40	0	--	1	15	13	
Cabbage for sauerkraut	11439	1/2-cup sauerkraut, canned, solids and liquids	71	56	0	--	1	15	22	
Carrots	11128	1/2-cup, canned, regular pack, drained solids, sliced	73	25	0	--	1	15	18	
Chile peppers	11329	1/2-cup chopped or diced	68	27	0	--	1	15	14	
Corn, sweet	11172	1/2-cup, yellow, canned, whole kernel, drained solids	82	27	0	--	1	15	66	
Cucumbers for pickling	11907, 11940	1/2-cup dill or sweet, diced, chopped, or sliced	79	60	0	--	1	15	55	
Green peas	11308	1/2-cup, canned, regular pack, drained solids	85	+34	0	--	1	15	59	
Mushrooms	11264	1/2-cup, canned, drained solids, pieces	78	+35	0	--	1	15	19	
Potatoes	11376	1/2-cup, canned, drained solids	90	29	0	--	1	15	54	
Tomatoes	11885	1/2-cup, canned, red ripe, whole	120	59	0	--	1	15	23	
Other (beets, spinach)	11084, 11461	1/2-cup beets, or spinach, chopped or diced, sliced or whole, canned	107	24	0	--	1	15	39	

See notes at end of table.

—Continued

Appendix table 2—Serving weights for the vegetable group—Continued

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight ²	Loss from primary to consumer weight ³	Nonedible share (refuse)	Percent			Calories per serving
						Grams	Cooking loss	Retail loss	
Vegetables for freezing:									
Asparagus	11018	1/2-cup, frozen, cooked, boiled, drained	90	48	0	20	1	15	25
Beans - snap	11061	1/2-cup green, frozen, cooked, boiled, drained	68	15	0	10	1	15	19
Broccoli	11093	1/2-cup, frozen, cooked, boiled, drained, chopped	92	25	0	6	1	15	26
Carrots	11131	1/2-cup, frozen, cooked, boiled, drained, sliced	73	45	0	2	1	15	26
Cauliflower	11138	1/2-cup, frozen, cooked, boiled, drained, pieces	90	30	0	7	1	15	17
Corn - sweet	11179	1/2-cup, yellow, frozen kernels cut off the cob, boiled, drained	82	73	0	4	1	15	66
Peas, green	11313	1/2-cup, frozen, cooked, boiled, drained	80	70	0	7	1	15	62
Potatoes	11403	Cooked potato portion of 10 strips, frozen, home-prepared, heated in oven, w/o salt	50	50	0	22	1	15	66
Other	11038, 11164, 11196, 11273, 11281, 11464, 11474, 11567, 11575, 11791, 11867	1/2-cup, frozen, cooked, boiled, drained, chopped, sliced, or mashed; lima beans; collards; blackeyed peas; mustard greens; okra; spinach; summer squash; crookneck and straight; turnips; turnip greens; kale; winter squash, butternut	87	30	0	13	1	15	39
Vegetables for dehydrating and chips and shoestrings:									
Onions (dehydrated)	11284	1/4-cup dehydrated flakes	14	89	0	--	1	15	49
Potatoes (dehydrated)	11378	1/4-cup dehydrated flakes	12	86	0	--	1	15	42
Potatoes for chips and shoestrings	19410	Potato portion in 1 ounce of potato chips	18	75	0	--	1	15	60
Dry beans, peas, and lentils:									
Dry edible beans	16015, 16025, 16033, 16041, 16043, 16046, 16057, 16072, 16075, 11192, 16070, 16086	Dry-weight of 1/2-cup cooked, boiled, drained	37	0	0	--	1	15	126
Dry peas and lentils		Dry-weight of 1/2-cup cooked, boiled, drained	37	0	0	--	1	15	126

na = not available.

-- = not estimated.

¹USDA, ARS, October 1997.

²All serving weights are without refuse unless otherwise noted.

³Primary weights are farm weights for fresh, canned, frozen, and dehydrated vegetables. Primary weight is "cleaned basis" for dry beans, peas, and lentils.

Consumer weights are retail weight for fresh, canned, frozen, and dehydrated vegetables. Consumer weight for dry beans, peas, and lentils is "cleaned basis."

⁴Serving weight was not available for sweetpotatoes, serving weight for fresh potatoes was used.

Source: U.S. Department of Agriculture, Economic Research Service.

serving is defined as 1 cup, raw. The raw-value serving weight was chosen to eliminate the need to estimate changes in weight due to cooking which can vary markedly for vegetables depending on preparation methods. However, an exception was made for nine vegetables that, while purchased fresh by the consumer in the supermarket, are normally cooked prior to consumption. Serving weights for eight of these vegetables—*asparagus, Brussels sprouts, eggplant, onions, potatoes, snap beans, sweet corn, and sweet potatoes*—were defined as the weight of 1/2 cup of these products, cooked. An artichoke serving was one medium artichoke, cooked.

A serving weight for vegetables for canning was defined as 1/2 cup of drained solids. The serving weight for most vegetables for freezing was the weight of 1/2 cup, cooked. A serving of dehydrated vegetables was the dry weight that would yield 1/2 cup of the product cooked. In some cases, the weight for a 1/2 cup portion of the same vegetable varied depending on whether the vegetables had been chopped, sliced, cubed, etc. For these commodities, the serving weight was an average of these multiple portion weights. The case of potatoes illustrates the way that servings were calculated for all vegetables.

The food supply series reports five different sets of consumption data for potatoes; potatoes for fresh use, potatoes for canning, potatoes for freezing, potatoes for dehydrating, and potatoes for chips and shoestrings. The selection of serving weights for each of these commodities was dictated by the manner in which consumption was reported. For example, the serving weight for fresh potatoes was the weight of 1/2 cup of the product cooked, or 70 grams. This serving weight reflects an average of two different cooking methods for fresh potatoes listed in the Nutrient Data Base—*fresh potatoes boiled, flesh only, or fresh potatoes, baked, flesh only*. For canning potatoes, a serving was the weight of 1/2 cup of drained canned potatoes. Since most potatoes for freezing are made into french fries, a serving was defined as the weight of 10 (2-3 1/2-inch) frozen strips, oven-baked, minus the added fat. The serving weight for dehydrated potatoes was the dry weight of 1/2 cup cooked, or 12 grams, while for potato chips and shoestrings, a serving was equal to the amount of potato used in 1 ounce of potato chips, minus the added fat, or 18 grams. Fat added during the manufacture of

potato chips or french fries is captured in the servings estimates for added fats and oils.

Dry Beans, Peas, and Lentils

Dry beans, peas, and lentils are unique commodities in that they can be counted as either a vegetable serving or a protein serving in the meat, poultry, fish, dry beans, eggs, and nuts group. Like other vegetables, dry beans, peas, and lentils are valuable sources of starch, dietary fiber, and other nutrients frequently low in American diets, B-6, folacin, iron, and magnesium. However, they are also good sources of protein and in earlier dietary guidance had been grouped with meat and other animal proteins in the meat group. Since most Americans consume meat, dietary guidance encouraged the use of these foods as a starchy vegetable (Cronin and others, 1987). *The Food Guide Pyramid* bulletin suggests that consumers eat dry beans, peas, and lentils several times per week as part of their regular vegetable servings. However, the bulletin also suggests that consumers include them often as protein choices from the meat group (USDA, CNPP, 1996).

For consistency with the methods used in the CSFII servings estimates, dry beans, peas, and lentils were counted as vegetable servings in this study. A serving of dry beans, peas, and lentils was defined as the dry weight needed to yield 1/2 cup of the product cooked, or about 37 grams.

Fruit

Serving weights for fruit were based on serving sizes defined in the *Food Guide Pyramid* bulletin—one medium whole fruit, 1/2 cup of raw or canned fruit, or 3/4 cup of unsweetened fruit juice (USDA, CNPP, 1996). For each commodity, appropriate serving weights were identified based on the form in which consumption was reported in the food supply series—*fresh, canned, frozen, dried, or single-strength equivalent juice* (appendix table 3).

For fresh fruits, serving weights were defined as one medium whole fruit or 1/2 cup of chopped or diced fruit, raw. For whole fruits where several serving sizes were defined in the Nutrient Data Base—that is, small, medium, large—a serving was the weight of one medium-sized fruit. This method is consistent with serving sizes for whole fruits defined in *The*

Appendix table 3—Serving weights for the fruit group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight ²	Loss from primary to consumer weight ³	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving	
										Grams
Fresh fruit:										
Fresh citrus fruit—										
Oranges/temples	09200	Raw, all commercial varieties; 1 medium fruit (2 5/8")	131	3	27	0	2	30	62	
Tangerines/tangelos	09218	Raw, 1/2-cup sections	98	5	28	0	2	30	43	
Grapefruits	09111	Raw, all varieties; 1/2 medium fruit (4 1/2")	128	3	50	0	2	30	41	
Lemons	09150	Raw, 1/2-cup sections	106	4	47	0	2	30	31	
Limes	09159	Raw, 1 fruit (2")	67	5	16	0	2	30	20	
Fresh noncitrus fruit—										
Apples	09003	Raw, medium with skin (2 3/4")	138	4	8	0	2	30	81	
Apricots	09021	Raw, 1/2-cup halves; 1/2-cup sliced	80	9	7	0	2	30	38	
Avocados	09037	Raw, all commercial varieties; 1/2-cup cubes; 1/2-cup sliced	74	6	26	0	2	30	119	
Bananas	09040	Raw, 1 medium (7-7 7/8" long)	118	0	36	0	2	30	109	
Cantaloupe	09181	Raw, 1/2-cup balls; 1/2-cup cubes; 1/2-cup diced pieces	82	8	49	0	2	30	29	
Cherries	09070	Raw, 1/2-cup sweet, whole, pitted	73	8	10	0	2	30	52	
Cranberries	09078	Raw, 1/2-cup chopped	55	4	5	0	2	30	27	
Grapes	09131	Raw, European type (adherent skin), 1/2-cup seedless	80	9	4	0	2	30	57	
Honeydew melon	09184	Raw, 1/2-cup balls, 1/2-cup diced pieces	87	8	54	0	2	30	30	
Kiwifruit	09405	Raw, 1 medium fruit without skin	76	0	14	0	2	30	46	
Mangoes	09176	Raw, 1/2-cup sliced	83	0	31	0	2	30	54	
Peaches/nectarines	09191	Raw, 1 medium (2 1/2") peach; 1 medium (2 1/2") nectarine	117	5	11	0	2	30	54	
Pears	09252	Raw, 1 medium (2 1/2") fruit	166	5	8	0	2	30	98	
Pineapple	09266	Raw, 1/2-cup diced, pieces	78	5	48	0	2	30	38	
Papayas	09226	Raw, 1/2-cup cubed pieces	70	0	33	0	2	30	27	
Plums/prunes	09279	Raw, 1 fruit (2 1/8")	66	5	6	0	2	30	36	
Strawberries	09316	Raw, 1/2-cup halves; 1/2-cup sliced; 1/2-cup whole	77	8	6	0	2	30	23	
Watermelon	09326	Raw, 1/2-cup balls; 1/2-cup diced	77	10	48	0	2	30	24	
Fruit for canning:										
Apples and applesauce	09401	1/2-cup applesauce, unsweetened, canned	122	0	0	0	1	15	52	
Apricots	09023	1/2-cup canned, water packed without skin or pits, solid and liquids	114	0	0	0	1	15	25	
Cherries (sweet & tart)	09071	1/2-cup sweet, canned, water pack, solids and liquid, pitted	124	0	0	0	1	15	57	
Peaches (excludes spiced)	09237	1/2-cup canned, water pack, solids and liquids, halves or slices	122	0	0	0	1	15	29	
Pears (incl. fr. cocktail)	09253	1/2-cup canned, water pack, cooked, drained solids	122	0	0	0	1	15	35	
Pineapples	09267	1/2-cup canned, water pack, solids and liquids, crushed, sliced, or in chunks	123	0	0	0	1	15	39	
Plums and prunes	09281	1/2-cup canned, purple, water pack, solids and liquids, pitted	125	0	0	0	1	15	51	

See notes at end of table.

—Continued

Appendix table 3—Serving weights for the fruit group—Continued

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight ²	Loss from primary to consumer weight ³	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
Fruits for freezing:									
Berries—									
Blackberries	09048	1/2-cup, frozen, unsweetened	76	0	0	0	1	15	48
Raspberries ⁴	09048	1/2-cup, frozen, unsweetened	76	0	0	0	1	15	48
Strawberries	09318	1/2-cup, frozen, unsweetened, unthawed	75	0	0	0	1	15	26
Blueberries	09054	1/2-cup, frozen, unsweetened, unthawed	78	0	0	0	1	15	39
Other berries ⁵	09048	1/2-cup, frozen, unsweetened	76	0	0	0	1	15	48
Other fruits for freezing—									
Apples	09014	1/2-cup, frozen, unsweetened, unheated	87	0	0	0	1	15	41
Apricots ⁶	09014	1/2-cup, frozen, unsweetened, unheated	87	0	0	0	1	15	41
Cherries	09068	1/2-cup, frozen, sour red, unsweetened, unthawed	78	0	0	0	1	15	36
Peaches ⁶	09014	1/2-cup, frozen, unsweetened, unheated	87	0	0	0	1	15	41
Dried fruit:									
Apples	09011	1/4-cup, dried, sulfured, uncooked	22	0	0	0	1	15	52
Apricots	09032	1/4-cup, dried, sulfured halves, uncooked	33	0	0	0	1	15	77
Dates (pits-in basis)	09087	1/4-cup, domestic, natural, dry, pitted	45	0	0	0	1	15	122
Figs	09094	1/4-cup, dried, uncooked	50	0	0	0	1	15	127
Peaches	09246	1/4-cup, dried, sulphured, uncooked halves	40	0	0	0	1	15	96
Pears	09259	1/4-cup, dried, uncooked halves	45	0	0	0	1	15	118
Prunes	09291	1/4-cup, dried, uncooked, pitted	43	0	0	0	1	15	102
Raisins	09298	1/4-cup, seedless, packed; seedless, unpacked	39	0	0	0	1	15	116
Fruit juices:									
Citrus juices—									
Orange	09207	3/4-cup, canned, unsweetened	187	0	0	0	1	15	78
Grapefruit	09123	3/4-cup, canned, unsweetened	185	0	0	0	1	15	70
Lemon	09153	3/4-cup, canned or bottled, unsweetened	183	0	0	0	1	15	38
Lime	09161	3/4-cup, canned or bottled, unsweetened	185	0	0	0	1	15	38
Other juices—									
Apple	09016	3/4-cup, canned or bottled, unsweetened	186	0	0	0	1	15	87
Grape	09135	3/4-cup, canned or bottled, unsweetened	190	0	0	0	1	15	116
Pineapple	09273	3/4-cup, canned, unsweetened	188	0	0	0	1	15	105
Prune	09294	3/4-cup, canned, unsweetened	192	0	0	0	1	15	136

¹USDA, ARS, October, 1997.

²All serving weights are without refuse unless otherwise noted.

³Primary weight for fresh vegetables is farm weight, consumer weight is retail weight. Primary and consumer weights for canned and frozen fruits are product weight. Primary and consumer weights for dried fruits are processed weight. Primary and consumer weights for fruit juices are single-strength equivalents.

⁴Unsweetened value for raspberries not available, value is for blackberries.

⁵Serving weights for other frozen berries (boysenberries, loganberries) are for blackberries.

⁶Serving weights are for frozen apples, values for apricots and peaches include sweetener.

Source: U.S. Department of Agriculture, Economic Research Service.

Food Guide Pyramid bulletin Food Choices Chart. In the case of smaller sized fresh fruit—plums, grapes, apricots, etc.—where the weight of an individual fruit was less than 1/2 cup, a serving was defined as the weight of 1/2 cup.

In the case of raw fruits where several different preparation methods were available for a 1/2 cup serving—chopped, sliced, diced, etc.—the serving weight was an average of the available options. For example, the Nutrient Data Base defines three different serving portions for fresh cantaloupe—balled, cubes, and pieces—each with a different serving weight. A serving of fresh cantaloupe was thus assigned a weight of 82 grams, or an average of the three portion weights.

A serving of canned fruit was the weight of 1/2 cup, water-pack. This is consistent with the product-weight basis for which consumption of these foods is reported in the food supply. A serving of frozen fruit, also reported on a product-weight basis, was 1/2 cup, unthawed and unsweetened. Dried fruits were assigned a serving weight of 1/4 cup while a serving of fruit juice was about 185 grams (single-strength equivalent) or 3/4 cup.

Dairy

Food supply data for dairy foods is reported on a product-weight basis, directly comparable with serving sizes identified in *The Food Guide Pyramid* bulletin or other dietary guidance materials (USDA, CNPP, 1996). Thus for this group, serving weights matched those identified in *The Food Guide Pyramid* bulletin—8 ounces of fluid milk or yogurt, 1.5 ounces of natural cheese, 2 ounces of processed cheese, 2 cups of cottage cheese, and 1-1/2 cups of ice cream, ice milk or other frozen dairy dessert (appendix table 4). For dry milk, a serving was defined as the dry weight that would yield 1 cup of fluid milk. For evaporated and condensed milk, a serving was one-half cup, or the quantity needed to yield 1 fluid cup of milk, when diluted.

The product-weight nature of the food supply data for dairy products means that a small quantity of nondairy ingredients, mostly added sweeteners, are included in the dairy servings total. Data on sweetener deliveries to the dairy industry (see table 9, page 24) suggest that the total amount of added sweeteners included in the consumption weight for dairy products is less than

1/2 of 1 percent of the total weight of dairy product consumption and would thus have a minimal impact on the food supply servings for dairy products. However, servings for dairy products that typically contain the most added sweeteners—ice cream and other frozen dairy desserts, yogurt, and flavored beverage milk—may be overstated.

While the food supply data for dairy foods are reported on a product-weight basis, many of the products are widely used as ingredients in other foods. Much of the nonfat dry milk, for example, is consumed indirectly as an ingredient in other food products such as bread, cake mixes, processed meat products, and beverage mixes. Some fluid milk is also used in the bakery and confectionary industries and for home baking in cakes, cookies, pies, and breads. The total dairy servings reported in this monograph reflect these ingredient uses.

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts

For the meat, poultry, fish, dry beans, eggs, and nuts group, total servings were estimated on a lean meat equivalent basis (appendix table 5). The *Food Guide Pyramid* suggests that consumers choose two to three servings each day from foods in this group, depending on calorie intake (USDA, CNPP, 1996). The total amount of these servings should be the equivalent of 5 to 7 ounces of cooked lean meat, poultry, or fish. Two to 3 ounces of cooked lean meat, poultry, or fish are counted as a serving. Servings of other foods in this group—1 egg, 2 tablespoons of peanut butter, or 1/3 cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat, or about 1/3 of a serving.

The food supply data for red meat (beef, pork, and lamb and mutton), poultry (chicken and turkey), and fish are reported on a *boneless, trimmed, equivalent* weight, which estimates the uncooked weight of various meats available for human ingestion (Duewer, Krause, and Nelson, 1993). Because it includes both the fat and lean portion of meat, poultry, and fish, the boneless weight equivalent is not directly comparable with the lean meat serving identified in *The Food Guide Pyramid* bulletin or the CSFII servings data. For example, the food supply data includes poultry skin, 1/4-inch external trim on red meat products, and all other naturally occurring fat that exists in meat, poultry, and fish products. As a result, the total meat group servings discussed in the “Findings” section of

Appendix table 4—Serving weights for the milk, yogurt, and cheese group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight	Loss from primary to consumer weight ²	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
Milk, yogurt, and cheese									
Total fluid milk products:									
Plain fluid milk—									
Whole milk	01077	1-cup, whole fluid milk, 3.3% fat	244	0	0	0	2	30	150
2-percent milk	01079	1-cup, low fat fluid milk, 2% fat	244	0	0	0	2	30	121
1-percent milk	01082	1-cup, low fat, 1% fat	244	0	0	0	2	30	102
Skim milk	01085	1-cup, skim fluid milk	245	0	0	0	2	30	85
Beverage milks—flavored—									
Whole beverage milks	01102	1-cup chocolate drink, fluid	250	0	0	0	2	30	208
Lowfat beverage milks	01103, 01104	1-cup chocolate drink, fluid (1% or 2%)	250	0	0	0	2	30	168
Buttermilk	01088	1-cup, fluid cultured buttermilk	245	0	0	0	2	30	99
Yogurt	01116, 01118	1-cup, plain, whole milk or skim yogurt	144	0	0	0	2	30	144
Cheese:									
American cheese—									
Cheddar	01009	Cheddar cheese	43	0	0	0	2	30	171
Other American cheese	01011, 01025	Colby, Monterey Jack	43	0	0	0	2	30	166
Italian cheese—									
Provolone	01035	Provolone cheese	43	0	0	0	2	30	149
Romano	01038	Romano cheese	28	0	0	0	2	30	110
Parmesan	01032	Parmesan cheese, grated	28	0	0	0	2	30	129
Mozzarella	01026, 01027, 01028, 01029	Mozzarella, whole milk, low moisture, part skim	43	0	0	0	2	30	121
Ricotta	01036, 01037	Ricotta, whole milk, part-skim	124	0	0	0	2	30	193
Other Italian cheese ³									
Miscellaneous cheese—									
Swiss	01040	Swiss cheese	43	0	0	0	2	30	160
Brick	01005	Brick cheese	43	0	0	0	2	30	158
Muenster	01030	Muenster cheese	43	0	0	0	2	30	162
Blue	01004	Blue cheese	43	0	0	0	2	30	150
Other Miscellaneous cheese ⁴			43	0	0	0	2	30	157
Processed cheese and spreads:									
Cheese	01042	Cheese, pasteurized process, American	57	0	0	0	2	30	213
Foods and spreads	01046, 01147	Cheese food or spread, pasteurized process	57	0	0	0	2	30	199

See notes at end of table.

—Continued

Appendix table 4—Serving weights for the milk, yogurt, and cheese group—Continued

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight	Loss from primary to consumer weight ²	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
Cottage cheese:									
Regular cottage cheese	01015	2-cups cottage cheese, 2% fat	452	0	0	0	2	30	405
Lowfat cottage cheese	01016	2-cups cottage cheese, 1% fat	452	0	0	0	2	30	327
Frozen dairy products:									
Ice cream	19095	1.5-cups frozen vanilla ice cream	198	0	0	0	2	30	398
Ice milk	19088	1.5-cups frozen vanilla ice milk	198	0	0	0	2	30	275
Other, including frozen yogurt	19293	1.5-cups vanilla soft-serve yogurt	216	0	0	0	2	30	343
Evaporated and condensed milk:									
Canned whole milk	01096	1/2-cup canned, evaporated, whole milk	126	0	0	0	2	30	169
Bulk whole milk	01096	1/2-cup canned, evaporated, whole milk	126	0	0	0	2	30	169
Bulk and canned skim milk	01097	1/2-cup, canned, evaporated skim milk	128	0	0	0	2	30	100
Dry milk products:									
Dry whole milk	01090	1/4-cup whole dry milk	32	0	0	0	2	30	159
Nonfat dry milk	01091	1/4-cup dry skim, nonfat milk solids	30	0	0	0	2	30	109
Dry buttermilk	01094	1/4-cup dried buttermilk	30	0	0	0	2	30	116

¹USDA, ARS, October 1997.

²Consumer weight for dairy products is at product or retail level.

³Serving weight for Other Italian cheeses was an average of all Italian cheeses.

⁴Serving weight for Other Miscellaneous cheeses was an average of Swiss, Brick, Muenster, and Blue cheeses.
Source: U.S. Department of Agriculture, Economic Research Service.

Appendix table 5—Servings weights for the meat, poultry, fish, dry beans, eggs, and nuts group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight	Loss from primary to consumer weight ²	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
Meat, poultry, fish, dry beans, eggs, nuts, and cheese									
Meat, poultry, and fish									
Red meat: ³									
Beef	13004	Beef composite of trimmed and retail cuts, separable lean and fat, trimmed to 1/4-inch fat, all grades, cooked	na	0	0	22	2	15	259
Veal	17089	Veal, composite of trimmed retail cuts, separable lean and fat, cooked	na	0	0	25	2	15	196
Pork	10188	Pork, fresh, composite of trimmed retail cuts (leg, loin, shoulder, and spareribs), separable lean and fat, cooked	na	0	0	39	2	15	232
Lamb and mutton	17002	Lamb, domestic, composite of trimmed retail cuts, separable lean and fat, trimmed to 1/4-inch fat, choice, cooked	na	0	0	26	2	15	250
Chicken and poultry: ⁴									
Chicken	05004	Cooked—boneless trimmed equivalent	na	0	0	30	2	15	199
Turkey	05164	Cooked—boneless trimmed equivalent	na	0	0	22	2	15	174
Fish and shellfish:									
Fresh and frozen—									
Fish	5	Cooked - edible weight	na	0	0	23	2	15	108
Shellfish	15243	Cooked - edible weight	na	0	0	23	2	15	74
Canned—									
Salmon	15084	Edible weight	na	0	0	0	1	15	118
Sardines	15089	Edible weight	na	0	0	0	1	15	151
Tuna	15121, 15126	Edible weight	na	0	0	0	1	15	104
Shellfish		Edible weight	na	0	0	0	1	15	93
Other		Edible weight	na	0	0	0	1	15	117
Cured	15179	Edible weight	na	0	0	0	1	15	99
Eggs ⁶	01129	One large egg, cooking method not specified, without shell	na	12	0	0	2	30	78

See notes at end of table.

—Continued

Appendix table 5—Servings weights for the meat, poultry, fish, dry beans, eggs, and nuts group—Continued

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight	Loss from primary to consumer weight ²	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per serving
Treenuts, peanuts, and coconuts:									
Treenuts—									
Almonds	12061	1/3-cup almonds, ground, sliced, slivered, whole	36	0	0	0	1	15	224
Filberts	12120	1/3-cup hazelnuts, chopped, ground, whole	36	0	0	0	1	15	254
Pecans	12142	1/3-cup pecans, chopped or halves	37	0	0	0	1	15	250
Walnuts	12155	1/3-cup english or persian walnuts, chopped, ground, halves, pieces, or chips	35	0	0	0	1	15	233
Macadamia nuts	12131	1/3-cup whole or halves	44	0	0	0	1	15	310
Pistachios	12151	1/3-pistachio nuts, dried	42	0	0	0	1	15	244
Other	12078, 12147, 12085	1/3-cup brazilnuts, pine nuts, or cashew nuts, dried	45	0	0	0	1	15	272
Peanuts—									
Cleaned in shell, shelled equivalent	16087	1/3-cup, all types, raw without shell	48	0	0	0	1	15	273
Peanut butter	16397, 16398	2 tablespoons smooth or chunk style, without salt	32	0	0	0	1	15	189
Snack	16087	1/3-cup, all types, raw	48	0	0	0	1	15	273
Other	16087	1/3-cup, all types, raw	48	0	0	0	1	15	273
Coconut (desiccated)	12108	1/3-cup dried, unsweetened coconut	76	0	0	0	1	15	486

na = not applicable. Meat, poultry, and fish consumption was measured in terms of total ounces, not servings.

¹USDA, ARS, October, 1997.

²Primary and consumer weights for red meat, poultry and fish are boneless, trimmed, equivalent. Primary and consumer weights for tree nuts are shelled basis. Primary and consumer weights for peanuts are kernel basis. Primary weight for eggs is farm weight. Consumer weight for eggs is retail weight.

³Boneless trimmed equivalent includes 1/4-inch trimmable fat on red meat and skin, neck meat, and giblets for poultry products.

⁴Edible weight includes raw edible meat, excluding bones, viscera, and shells.

⁵15009, 15016, 15029, 15032, 15034, 15037, 15061, 15063, 15067, 15086, 15092, 15102, 15116, 15118, 15133.

⁶Egg servings were measured by number rather than weight.

Source: U.S. Department of Agriculture, Economic Research Service.

this report are likely to overstate the number of lean meat servings available in the food supply.

For purposes of this study, dry beans, peas, and lentils were counted in the vegetable group and were assigned a serving weight of half a cup of the product cooked (see "Vegetable Group," page 15). However, these foods can also be counted in the meat group. In the meat group, 1/2 cup of cooked dry beans, peas, or lentils is equal to 1 ounce of lean meat, cooked.

Added Fats and Oils

In this study, fat servings were measured for added fats and oils only. Added fats and oils include shortening, salad oils and dressings, lard, edible tallow, margarine and dairy fats (butter, sour cream, cream cheese, half and half, light cream, and heavy cream) (appendix table 6). Total servings for this group reflect both direct use and indirect ingredient use of fats and oils in other food products. For example, the food servings for shortening include fats used directly for deep-fat frying as well as shortenings used as ingredients in home-prepared and commercial baked goods.

Fat grams were counted on a nutrient-fat basis. Butter and margarine were assumed to be 80 percent fat. Sour cream, light cream, heavy cream, half and half,

cream cheese, and eggnog were assumed to be 21 percent fat; 19 percent fat; 37 percent fat; 12 percent fat; 35 percent fat; and 8 percent fat; respectively.

However, to account for the growth of reduced-fat dairy products in the food supply, fat contents for sour cream and cream cheese were reduced for 1990-96. This reduction assumes that reduced-fat products accounted for 25 percent of total sour cream consumption and 31 percent of total cream cheese supplies in these years (Frazao and Allshouse, 1996). Naturally occurring fats, such as those found in meat, eggs, cheese, fluid milk, and nuts were not counted because of the difficulty in making waste adjustments for these nutrients.

Added Sugars

Servings of added sugars were measured for the following caloric sweeteners: cane and beet sugar, High Fructose Corn Syrup, dextrose, glucose, honey, and edible syrups (appendix table 7). Consumption was measured on a dry-weight basis and includes sweeteners consumed both directly and as food ingredients. Consumption was measured in both grams and teaspoons. Naturally occurring sugars, such as those found in milk and fruits, were not included. Also, due to data limitations, servings were not estimated for low calorie sweeteners (aspartame, saccharin, etc.).

Appendix table 6—Serving weights for the added fats and oils group

Food supply commodity	Nutrient database number ¹	Serving description	Serving weight ²	Loss from primary to consumer weight ³	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per gram
Animal and vegetable fats:									
Margarine	4	4	2	0	0	0	1	20	9
Shortening	4	4	2	0	0	0	1	50	9
Salad and cooking oils	4	4	2	0	0	0	1	20	9
Lard	4	4	2	0	0	0	1	50	9
Edible tallow	4	4	2	0	0	0	1	50	9
Other edible fats and oils	4	4	2	0	0	0	1	20	9
Dairy fats:									
Butter	4	4	2	0	0	0	2	30	9
Half and half ⁵	01049	Fluid cream, half and half	2	0	0	0	2	30	9
Light cream ⁶	01050	Fluid cream, light, coffee or table	2	0	0	0	2	30	9
Heavy cream ⁷	01053	Fluid cream, heavy whipping	2	0	0	0	2	30	9
Sour cream ⁸	01056, 01055	Sour cream, cultured; Sour cream, half and half, cultured	2	0	0	0	2	30	9
Cream and neufchatel cheese ⁹	01037, 01031	Cream cheese, neufchatel cheese	2	0	0	0	2	30	9
Eggnog ¹⁰	01057	Eggnog	2	0	0	0	2	30	9

¹USDA, ARS, October, 1997.

²Serving weights are total fat grams.

³Primary and consumer weights are product or retail weight for all added fats and oils.

⁴Fat grams were based on total product weight and percent fat; fat content of margarine and butter is 80 percent of product weight; fat content of shortening, salad and cooking oils, lard, edible tallow, and other edible fats and oils is 100 percent of product weight.

⁵Fat content, 12 grams per 100 grams of product weight.

⁶Fat content, 19 grams per 100 grams of product weight.

⁷Fat content, 37 grams per 100 grams of product weight.

⁸Fat content, 21 grams per 100 grams of product weight for 1970-89; 25 percent of product weight was assumed to be reduced fat at 12 grams per 100 grams of serving weight for 1990-96.

⁹Fat content, 35 grams per 100 grams of product weight for 1970-89; 31 percent of product weight was assumed to be reduced fat at 23 grams per 100 grams of serving weight for 1990-96.

¹⁰Fat content, 8 grams per 100 grams of product weight.

Source: U.S. Department of Agriculture, Economic Research Service.

Appendix table 7—Serving weights for the added sugars group

Food supply commodity	Nutrient database number	Serving description	Serving weight ¹	Loss from primary to consumer weight ¹	Nonedible share (refuse)	Cooking loss	Retail loss	Foodservice and consumer loss	Calories per gram
Refined cane and beet sugar	2	2	2	0	0	0	1	30	4
Corn sweeteners:									
High Fructose	2	2	2	0	0	0	1	30	4
Glucose	2	2	2	0	0	0	1	30	4
Dextrose	2	2	2	0	0	0	1	30	4
Other caloric sweeteners:									
Edible syrups ³	2	2	2	0	0	0	1	30	4
Honey	2	2	2	0	0	0	1	30	4

¹Primary and consumer weights for added sugars are on a product or retail basis.

²Grams of sugar were estimated on a product dry-weight basis.

³Includes sorgo, maple and sugarcane syrup, edible molasses, and edible refiner's syrup.

Source: U.S. Department of Agriculture, Economic Research Service.