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# 11. INTAKE OF MEAT AND DAIRY PRODUCTS

Consumption of meat, poultry, and dairy products is a potential pathway of exposure to toxic chemicals. These food sources can become contaminated if animals are exposed to contaminated media (i.e., soil, water, or feed crops).

The U.S. Department of Agriculture's (USDA) Nationwide Food Consumption Survey (NFCS) and Continuing Survey of Food Intakes by Individuals (CSFII) are the primary sources of information on intake rates of meat and dairy products in the United States. Data from the NFCS have been used in various studies to generate consumer-only and per capita intake rates for both individual meat and dairy products and total meat and dairy products. CSFII 1989-91 survey data have been analyzed by EPA to generate per capita intake rates for various food items and food groups. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, consumer-only intake is defined as the quantity of meat and dairy products consumed by individuals who ate these food items during the survey period. Per capita intake rates are generated by averaging consumer-only intakes over the entire population of users and non-users. In general, per capita intake rates are appropriate for use in exposure assessments for which average dose estimates for the general population are of interest because they represent both individuals who ate the foods during the survey period and individuals who may eat the food items at some time, but did not consume them during the survey period.

Intake rates may be presented on either an as consumed or dry weight basis. As consumed intake rates (g/day) are based on the weight of the food in the form that it is consumed. In contrast, dry weight intake rates are based on the weight of the food consumed after the moisture content has been removed. In calculating exposures based on ingestion, the unit of weight used to measure intake should be consistent with those used in measuring the contaminant concentration in the produce. Fat content data are also presented for various meat and dairy products. These data are needed for converting between residue levels on a whole-weight or as consumed basis and lipid basis. Intake data from the individual component of the NFCS and CSFII are based on "as eaten" (i.e., cooked or prepared) forms of the food items/groups. Thus, corrections to account for changes in portion sizes from cooking losses are not required.

The purpose of this section is to provide: (1) intake data for individual meat and dairy products, total meat, and total dairy; (2) guidance for converting between as consumed and dry weight intake rates; and (3) data on the fat content in meat and dairy products. Recommendations are based on average and upper-percentile intake among the general population of the U.S. Available data have been classified as being either a key or a relevant study based on the considerations discussed in Volume I, Section 1.3.1 of the Introduction. Recommendations are based on data from the 1989-91 CSFII survey, which was considered the only key intake study for meats and dairy products. Other relevant

studies are also presented to provide the reader with added perspective on this topic. It should be noted that most of the studies presented in this section are based on data from USDA's NFCS and CSFII. The USDA NFCS and CSFII are described below.

## 11.1. INTAKE STUDIES

### 11.1.1. U.S. Department of Agriculture Nationwide Food Consumption Survey and Continuing Survey of Food Intake by Individuals

The NFCS and CSFII are the basis of much of the data on meat and dairy intake presented in this section. Data from the 1977-78 NFCS are presented because the data have been published by USDA in various reports and reanalyzed by various EPA offices according to the food items/groups commonly used to assess exposure. Published one-day data from the 1987-88 NFCS and 1994 and 1995 CSFII are also presented. Recently, EPA conducted an analysis of USDA's 1989-91 CSFII. These data were the most recent food survey data that were available to the public at the time that EPA analyzed the data for this Handbook. The results of EPA's analyses are presented here. Detailed descriptions of the NFCS and CSFII data are presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables.

Individual average daily intake rates calculated from NFCS and CSFII data are based on averages of reported individual intakes over one day or three consecutive days. Such short term data are suitable for estimating average daily intake rates representative of both short-term and long-term consumption. However, the distribution of average daily intake rates generated using short term data (e.g., 3 day) do not necessarily reflect the long-term distribution of average daily intake rates. The distributions generated from short term and long term data will differ to the extent that each individual's intake varies from day to day; the distributions will be similar to the extent that individuals' intakes are constant from day to day.

Day-to-day variation in intake among individuals will be great for food item/groups that are highly seasonal and for items/groups that are eaten year around but that are not typically eaten every day. For these foods, the intake distribution generated from short term data will not be a good reflection of the long term distribution. On the other hand, for broad categories of foods (e.g., total meats) which are eaten on a daily basis throughout the year with minimal seasonality, the short term distribution may be a reasonable approximation of the true long term distribution, although it will show somewhat more variability. In this and the following section then, distributions are shown only for the following broad categories of foods: total meats and total dairy products. Because of the increased variability of the short-term distribution, the short-term upper percentiles shown will overestimate somewhat the corresponding percentiles of the long-term distribution.

### 11.1.2. Key Meat and Dairy Products Intake Study Based on the CSFII

*U.S. EPA Analysis of 1989-91 USDA CSFII Data* - EPA conducted an analysis of USDA's 1989-91 CSFII data set. The general methodology used in analyzing the data is presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables of this Handbook. Intake rates were generated for the following meat and dairy products: total meats, total dairy, beef, pork, poultry, game, and eggs. Appendix 9B presents the food categories and codes used in generating intake rates for these food groups. These data have been corrected to account for mixtures as described in Volume II, Chapter 9 - Intake of Fruits and Vegetables and Appendix 9A. However, it should be noted that although total meats account for items such as luncheon meats, sausages, and organ meats, these items are not included in the individual meat groups (i.e., beef, poultry, etc.). Per capita intake rates for total meat and total dairy are presented in Tables 11-1 and 11-2 at the end of this Chapter. Tables 11-3 to 11-7 present per capita intake data for individual meats and eggs. The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. However, if there is a need to compare the intake data presented here to intake data in units of g/day, a body weight less than 70 kg (i.e., approximately 60 kg; calculated based on the number of respondents in each age category and the average body weights for these age groups, as presented in Volume I, Chapter 7, Body Weight) should be used because the total survey population included children as well as adults.

The advantages of using the 1989-91 CSFII data set are that the data are expected to be representative of the U.S. population and that it includes data on a wide variety of food types. The data set was the most recent of a series of publicly available USDA data sets (i.e., NFCS 1977-78; NFCS 1987-88; CSFII 1989-91) at the time the analysis was conducted for this Handbook, and should reflect recent eating patterns in the United States. The data set includes three years of intake data combined. However, the 1989-91 CSFII data are based on a three day survey period. Short-term dietary data may not accurately reflect long-term eating patterns. This is particularly true for the tails of the distribution of food intake. In addition, the adjustment for including mixtures adds uncertainty to the intake rate distributions. The calculation for including mixtures assumes that intake of any mixture includes all of the foods identified and the proportions specified in Appendix Table 9A-1. This assumption yields valid estimates of per capita consumption, but results in overestimates of the proportion of the population consuming individual meats; thus, the quantities reported in Tables 11-3 to 11-7 should be interpreted as upper bounds on the proportion consuming beef, pork, poultry, game, and eggs.

The data presented in this handbook for the USDA 1989-91 CSFII is not the most up-to-date information on food intake. USDA has recently made available the data from its 1994 and 1995 CSFII. Over 5,500 people nationwide participated in both of these surveys, providing recalled food intake information for 2 separate days. Although the two-day data analysis has not been conducted, USDA published the results for the respondents' intakes on the first day surveyed (USDA, 1996a,b). USDA 1996 survey data will be made available later in 1997. As soon as 1996 data are available, EPA will take steps to get the 3-year data (1994, 1995, and 1996) analyzed and the food ingestion factors updated. Meanwhile, Table 11-8 presents a comparison of the mean daily intakes per individual in a day for the major meat and dairy groups from USDA survey data from years 1977-78, 1987-88, 1989-91, 1994, and 1995. This table shows that food consumption patterns have changed for beef and meat mixtures when comparing 1977 and 1995 data. In particular, consumption of beef decreased by 50 percent when comparing data from 1977 and 1995, while consumption of meat mixtures increased by 44 percent. However, consumption of the food items presented in Table 11-8 has remained fairly constant when comparing values from 1989-91 with the most recent data from 1994 and 1995. Meat mixtures show the largest change with an increase of 16 percent from 1989 to 1995. This indicates that the 1989-91 CSFII data are probably adequate for assessing ingestion exposure for current populations; however, these data should be used with caution.

It is interesting to note that there was not much variation in beef and poultry consumption from 1989-91 to 1995. This seems to contradict the other USDA reports that show that in recent years the U.S. population has been substituting beef for other sources of protein such as poultry and fish. One of those reports is the report titled Meat and Poultry Inspection; 1994 Report of the Secretary of Agriculture to the U.S. Congress (USDA, 1994). This USDA report shows a 39% increase in the number of poultry inspected at federally inspected plants in 1994 compared to 1984. In contrast, the number of meat animals inspected at federally inspected plants increased only by 2% from 1984 to 1994. This trend in food consumption patterns was also reported in the USDA report titled Food Consumption, Prices, and Expenditures, 1970-92 (USDA, 1993). This report shows that in 1992, consumption among Americans averaged 18 pounds less red meat, 26 pounds more poultry, and 3 pounds more fish and shellfish than in 1970. This apparent contradiction may be explained by assuming that most of the increase in poultry consumption has occured in the meat mixtures and grain mixtures categories. There has been a considerable shift from consuming individual food items to food in mixtures (such as pizza, tacos, burritos, frozen entrees, and salads from grocery stores). This may explain why, in Table 11-8, domestic consumption has remained fairly constant in the past few years.

### 11.1.3. Relevant Meat and Dairy Products Intake Studies

*The U.S. EPA's Dietary Risk Evaluation System (DRES) - U.S. EPA, Office of Pesticide Programs (OPP)* - EPA OPP's DRES contains per capita intake rate data for various items of meat, poultry, and dairy products for 22 subgroups (age, regional, and seasonal) of the population. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, intake data in DRES were generated by determining the composition of 1977/78 NFCS food items and disaggregating complex food dishes into their component raw agricultural commodities (RACs) (White et al., 1983). The DRES per capita, as consumed intake rates for all age/sex/demographic groups combined are presented in Table 11-9. These data are based on both consumers and non-consumers of these food items. Data for specific subgroups of the population are not presented in this section, but are available through OPP via direct request. The data in Table 11-9 may be useful for estimating the risks of exposure associated with the consumption of the various meat, poultry, and dairy products presented. It should be noted that these data are indexed to the reported body weights of the survey respondents and are expressed in units of grams of food consumed per kg body weight per day. Consequently, use of these data in calculating potential dose does not require the body weight factor in the denominator of the average daily dose (ADD) equation. It should also be noted that conversion of these intake rates into units of g/day by multiplying by a single average body weight is not appropriate because the DRES data base did not rely on a single body weight for all individuals. Instead, DRES used the body weights reported by each individual surveyed to estimate consumption in units of g/kg-day.

The advantages of using these data are that complex food dishes have been disaggregated to provide intake rates for a variety of meat, poultry, and dairy products. These data are also based on the individual body weights of the respondents. Therefore, the use of these data in calculating exposure to toxic chemicals may provide more representative estimates of potential dose per unit body weight. However, because the data are based on NFCS short-term dietary recall, the same limitations discussed previously for other NFCS data sets also apply here. In addition, consumption patterns may have changed since the data were collected in 1977-78. OPP is in the process of translating consumption information from the USDA CSFII 1989-91 survey to be used in DRES.

*Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1980, 1992, 1996a, 1996b)* -USDA calculated mean per capita intake rates for meat and dairy products using NFCS data from 1977-78 and 1987-88 (USDA, 1980; 1992) and CSFII data from 1994 and 1995 (USDA, 1996a; 1996b). The mean per capita intake rates for meat and dairy products are presented in Tables 11-10 and 11-11 for meats and Tables 11-12 and 11-13 for dairy based on intake data for one day from the 1977-78 and 1987-88 USDA

NFCSs. Tables 11-14 and 11-15 present similar data from the 1994 and 1995 CSFII for meats and dairy products, respectively.

The advantages of using these data are that they provide mean intake estimates for all meat, poultry, and dairy products. The consumption estimates are based on short-term (i.e., 1-day) dietary data which may not reflect long-term consumption.

*U.S. EPA - Office of Radiation Programs* - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-78 NFCS to estimate daily food intake. ORP uses food consumption data to assess human intake of radionuclides in foods (U.S. EPA, 1984a; 1984b). The 1977-78 NFCS data have been reorganized by ORP, and food items have been classified according to the characteristics of radionuclide transport. The mean per capita dietary intake of food sub classes (milk, other dairy products, eggs, beef, pork, poultry, and other meat) grouped by age for the U.S. population is presented in Table 11-16. The mean daily intake rates of meat, poultry, and dairy products for the U.S. population grouped by regions are presented in Table 11-17. Because this study was based on the USDA NFCS, the limitations and advantages associated with the USDA NFCS data also apply to these data. Also, consumption patterns may have changed since the data were collected in 1977-78.

*U.S. EPA - Office of Science and Technology* - The U.S. EPA Office of Science and Technology (OST) within the Office of Water (formerly the Office of Water Regulations and Standards) used data from the FDA revision of the Total Diet Study Food Lists and Diets (Pennington, 1983) to calculate food intake rates. OST uses these consumption data in its risk assessment model for land application of municipal sludge. The FDA data used are based on the combined results of the USDA 1977-78 NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-80 (U.S. EPA, 1989). Because food items are listed as prepared complex foods in the FDA Total Diet Study, each item was broken down into its component parts so that the amount of raw commodities consumed could be determined. Table 11-18 presents intake rates for meat, poultry, and dairy products for various age groups. Estimated lifetime ingestion rates derived by U.S. EPA (1989) are also presented in Table 11-18. Note that these are per capita intake rates tabulated as grams dry weight/day. Therefore, these rates differ from those in the previous tables because Pao et al. (1982) and U.S. EPA (1984a, 1984b) report intake rates on an as consumed basis.

The EPA-OST analysis provides intake rates for additional food categories and estimates of lifetime average daily intake on a per capita basis. In contrast to the other analyses of USDA NFCS data, this study reports the data in terms of dry weight intake rates. Thus, conversion is not required when contaminants are provided on a dry weight basis. These data, however, may not reflect current consumption patterns because they are based on 1977-78 data.

*USDA (1993) - Food Consumption, Prices, and Expenditures, 1970-92* -The USDA's Economic Research Service (ERS) calculates the amount of food available for human consumption in the United States annually. Supply and utilization balance sheets are generated. These are based on the flow of food items from production to end uses. Total available supply is estimated as the sum of production (i.e., some products are measured at the farm level or during processing), starting inventories, and imports (USDA, 1993). The availability of food for human use commonly termed as "food disappearance" is determined by subtracting exported foods, products used in industries, farm inputs (seed and feed) and end-of-the year inventories from the total available supply (USDA, 1993). USDA (1993) calculates the per capita food consumption by dividing the total food disappearance by the total U.S. population.

USDA (1993) estimated per capita consumption data for meat, poultry, and dairy products from 1970-1992 (1992 data are preliminary). In this section, the 1991 values, which are the most recent final data, are presented. The meat consumption data were reported as carcass weight, retail weight equivalent, and boneless weight equivalent. The poultry consumption data were reported as ready-to-cook (RTC) weight, retail weight, and boneless weight (USDA, 1993). USDA (1993) defined beef carcass weight as the chilled hanging carcass, which includes the kidney and attached internal fat (kidney, pelvic, and heart fat), excludes the skin, head, feet, and unattached internal organs. The pork carcass weight includes the skin and feet, but excludes the kidney and attached internal fat. Retail weight equivalents assume all food was sold through retail foodstores; therefore, conversion factors (Table 11-19) were used to correct carcass or RTC to retail weight to account for trimming, shrinkage, or loss of meat and chicken at these retail outlets (USDA, 1993). Boneless equivalent values for meat (pork, veal, beef) and poultry excludes all bones, but includes separable fat sold on retail cuts of red meat. Pet food was considered as an apparent source of food disappearance for poultry in boneless weight estimates, while pet food was excluded for beef, veal, and pork (USDA, 1993). Table 11-19 presents per capita consumption in 1991 for red meat (carcass weight, retail equivalent, and boneless trimmed equivalent) and poultry (RTC, retail equivalent for chicken only, and boneless trimmed equivalent). Per capita consumption estimates based on boneless weights appear to be the most appropriate data for use in exposure assessments, because boneless meats are more representative of what people would actually consume. Table 11-20 presents per capita consumption in 1991 for dairy products including eggs, milk, cheese, cream, and sour cream.

One of the limitations of this study is that disappearance data do not account for losses from the food supply from waste, spoilage, or foods fed to pets. Thus, intake rates based on these data will overestimate daily consumption because they are based on the total quantity of marketable commodity utilized. Therefore, these data may be useful for estimating bounding exposure estimates. It should also be noted that per capita estimates based on food disappearance are not a direct measure of actual consumption or quantity

ingested, instead the data are used as indicators of changes in usage over time (USDA, 1993). An advantage of this study is that it provides per capita consumption rates for meat, poultry, and dairy products which are representative of long-term intake because disappearance data are generated annually. Daily per capita intake rates are generated by dividing annual consumption by 365 days/year.

*National Live Stock and Meat Board (1993) - Eating in America Today: A Dietary Pattern and Intake Report* - The National Live Stock and Meat Board (NLMB) (1993) assessed the nutritional value of the current American diet based on two factors: (1) the composition of the foods consumed, and (2) the amount of food consumed. Data used in this study were provided by MRCA Information Services, Inc. through MRCA's Nutritional Marketing Information Division. The survey conducted by MRCA consisted of a 2,000 household panels of over 4,700 individuals. The survey sample was selected to be representative of the U.S. population. Information obtained from the survey by MRCA's Menu Census included food and beverage consumption over a period of 14 consecutive days. The head of the household recorded daily food and beverage consumption in-home and away-from-home in diaries for each household member. The survey period was from July 1, 1990 through June 30, 1991. This ensured that all days carried equal weights and provided a seasonally balanced data set. In addition, nutrient intake data calculated by the MRCA's Nutrient Intake Database (NID) (based on the 1987-88 USDA Food Intake Study) and information on food attitudes were also collected. It should be noted, however, that the 14 daily diaries provided only the incidence of eating each food product by an individual, but not the quantity eaten by each person. The for each individual was estimated by multiplying the eating frequency of a particular food item by the average amount eaten per eating occasion. The data on the average amount eaten per eating occasion were obtained from the USDA NFCS survey.

Table 11-21 presents the adult daily mean intake of meat and poultry grouped by region and gender. The adult population was defined as consumers ages 19 and above (NLMB, 1993). Beef consumption was high in all regions compared to other meats and poultry (Table 11-21). The average daily consumption of meat in the U.S. was 114.2 g/day which included beef (57 percent), veal (0.5 percent), lamb (0.5 percent), game/variety meats (8 percent), processed meats (18 percent), and pork (16 percent) (NLMB, 1993). Table 11-22 shows the amount of meat consumed by the adult population grouped as non-meat eaters (1 percent), light meat eaters (30 percent), medium meat eaters (33 percent), and heavy meat eaters (36 percent).

The advantage of this study is that the survey period is longer (i.e., 14 days) than any other food consumption survey. The survey is also based on a nationally representative sample. The survey also accounts for foods eaten as mixtures. However, only mean values are provided. Therefore, distribution of long-term consumption patterns cannot be derived. In addition, the survey collects data on incidence of eating each food item and

not actual consumption rates. This may introduce some bias in the results. The direction of this bias is unknown.

*AIHC (1994) - Exposure Factors Sourcebook* - The AIHC Sourcebook (AIHC, 1994) uses the data presented in the 1989 version of the Exposure Factors Handbook which reported data from the USDA 1977-78 NFCS. In this Handbook, new analyses of more recent data from the USDA 1989-91 CSFII are presented. Numbers, however, cannot be directly compared with previous values since the results from the new analysis are presented on a body weight basis. The Sourcebook was selected as a relevant study because it was not the primary source for the data used to make recommendations in this document. However, it is an alternative information source.

*Pao et al. (1982) - Foods Commonly Eaten by Individuals* - Using data gathered in the 1977-78 USDA NFCS, Pao et al. (1982) calculated percentiles for the quantities of meat, poultry, and dairy products consumed per eating occasion by members of the U.S. population. The data were collected during NFCS home interviews of 37,874 respondents, who were asked to recall food intake for the day preceding the interview, and record food intake the day of the interview and the day after the interview. Quantities consumed per eating occasion, are presented in Table 11-23.

The advantages of using these data are that they were derived from the USDA NFCS and are representative of the U.S. population. This data set provides distributions of serving sizes for a number of commonly eaten meat, poultry, and dairy products, but the list of foods is limited and does not account for meat, poultry, and dairy products included in complex food dishes. Also, these data are based on short-term dietary recall and may not accurately reflect long-term consumption patterns. Although these data are based on the 1977-78 NFCS, serving size data have been collected but not published for the more recent USDA surveys.

## 11.2. FAT CONTENT OF MEAT AND DAIRY PRODUCTS

In some cases, the residue levels of contaminants in meat and dairy products are reported as the concentration of contaminant per gram of fat. This may be particularly true for lipophilic compounds. When using these residue levels, the assessor should ensure consistency in the exposure assessment calculations by using consumption rates that are based on the amount of fat consumed for the meat or dairy product of interest. Alternately, residue levels for the "as consumed" portions of these products may be estimated by multiplying the levels based on fat by the fraction of fat per product as follows:

$$\frac{\text{residue level}}{\text{g\&product}} = \frac{\text{residue level}}{\text{g\&fat}} \times \frac{\text{g\&fat}}{\text{g\&product}} \qquad \text{(Eqn. 11-1)}$$

The resulting residue levels may then be used in conjunction with "as consumed" consumption rates. The percentages of lipid fat in meat and dairy products have been reported in various publications. USDA's Agricultural Handbook Number 8 (USDA, 1979-1984) provides composition data for agricultural products. It includes a listing of the total saturated, monounsaturated, and polyunsaturated fats for various meat and dairy items. Table 11-24 presents the total fat content for selected meat and dairy products taken from Handbook Number 8. The total percent fat content is based on the sum of saturated, monounsaturated, and polyunsaturated fats.

The National Livestock and Meat Board (NLMB) (1993) used data from Agricultural Handbook Number 8 and consumption data to estimate the fat contribution to the U.S. diet. Total fat content in grams, based on a 3-ounce (85.05 g) cooked serving size, was reported for several categories (retail composites) of meats. These data are presented in Table 11-25 along with the corresponding percent fat content values for each product. NLMB (1993) also reported that 0.17 grams of fat are consumed per gram of meat (i.e., beef, pork, lamb, veal, game, processed meats, and variety meats) (17 percent) and 0.08 grams of fat are consumed per gram of poultry (8 percent).

The average total fat content of the U.S. diet was reported to be 68.3 g/day. The meat group (meat, poultry, fish, dry beans, eggs, and nuts) was reported to contribute the most to the average total fat in the diet (41 percent) (NLMB, 1993). Meats (i.e., beef, pork, lamb, veal, game, processed meats, and variety meats) reportedly contribute less than 30 percent to the total fat of the average U.S. diet. The milk group contributes approximately 12 percent to the average total fat in the U.S. diet (NLMB, 1993). Fat intake rates and the contributions of the major food groups to fat intake for heavy, medium, and light meat eaters, and non meat eaters are presented in Table 11-26 (NLMB, 1993). NLMB (1993) also reported the average meat fat intake to be 19.4 g/day, with beef contributing about 50 percent of the fat to the diet from all meats. Processed meats contributed 31 percent; pork contributed 14 percent; game and variety meats contributed 4 percent; and lamb and veal contributed 1 percent to the average meat fat intake.

The Center for Disease Control (CDC) (1994) used data from NHANES III to calculate daily total food energy intake (TFEI), total dietary fat intake, and saturated fat intake for the U.S. population during 1988 to 1991. The sample population comprised 20,277 individuals ages 2 months and above, of which 14,001 respondents (73 percent response rate) provided dietary information based on a 24-hour recall. TFEI was defined as "all nutrients (i.e., protein, fat, carbohydrate, and alcohol) derived from consumption of foods and beverages (excluding plain drinking water) measured in kilocalories (kcal)." Total dietary fat intake was defined as "all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages measured in grams."

CDC (1994) estimated and provided data on the mean daily TFEI and the mean percentages of TFEI from total dietary fat grouped by age and gender. The overall mean daily TFEI was 2,095 kcal for the total population and 34 percent (or 82 g) of their TFEI was from total dietary fat (CDC, 1994). Based on this information, the mean daily fat intake was calculated for the various age groups and genders (see Appendix 11A for detailed calculation). Table 11-27 presents the grams of fat per day obtained from the daily consumption of foods and beverages grouped by age and gender for the U.S. population, based on this calculation.

## 11.3. CONVERSION BETWEEN AS CONSUMED AND DRY WEIGHT INTAKE RATES

As noted previously, intake rates may be reported in terms of units as consumed or units of dry weight. It is essential that exposure assessors be aware of this difference so that they may ensure consistency between the units used for intake rates and those used for concentration data (i.e., if the unit of food consumption is grams dry weight/day, then the unit for the amount of pollutant in the food should be grams dry weight). If necessary, as consumed intake rates may be converted to dry weight intake rates using the moisture content percentages of meat, poultry and dairy products presented in Table 11-28 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \quad \text{(Eqn. 11-2)}$$

“Dry weight" intake rates may be converted to "as consumed" rates by using:

$$IR_{ac} = IR_{dw}/[(100-W)/100] \quad \text{(Eqn. 11-3)}$$

where:

$IR_{dw}$ = dry weight intake rate;
$IR_{ac}$ = as consumed intake rate; and
W = percent water content.

## 11.4. RECOMMENDATIONS

The 1989-91 CSFII data described in this section were used in selecting recommended meat, poultry, and dairy product intake rates for the general population and various subgroups of the United States population. The general design of both key and relevant studies are summarized in Table 11-29. The recommended values for intake of meat and dairy products are summarized in Table 11-30 and the confidence ratings for the recommended values for meat and dairy intake rates are presented in Table 11-31. Per

capita intake rates for specific meat items, on a g/kg-day basis, may be obtained from Tables 11-3 to 11-7. Percentiles of the intake rate distribution in the general population for total meat and total dairy are presented in Tables 11-1 and 11-2. From these tables, the mean and 95th percentile intake rates for meats are 2.1 g/kg-day and 5.1 g/kg-day, respectively. The mean and 95th percentile intake rates for dairy products are 8.0 g/kg-day and 29.7 g/kg-day. It is important to note that the data presented in Tables 11-1 through 11-7 are based on data collected over a 3-day period and may not necessarily reflect the long-term distribution of average daily intake rates. However, for these broad categories of food (i.e., total meats and total dairy products), because they may be eaten on a daily basis throughout the year with minimal seasonality, the short-term distribution may be a reasonable approximation of the long-term distribution, although it will display somewhat increased variability. This implies that the upper percentiles shown here will tend to overestimate the corresponding percentiles of the true long-term distribution. Intake rates for the homeproduced form of these food items/groups are presented in Volume II, Chapter 13. It should be noted that because these recommendations are based on 1989-91 CSFII data, they may not reflect recent the most changes in consumption patterns. However, as indicated in Table 11-8, intake has remained fairly constant between 1989-91 and 1995. Thus, the 1989-91 CSFII data are believed to be appropriate for assessing ingestion exposure for current populations.

# APPENDIX 11A

## SAMPLE CALCULATION OF MEAN DAILY FAT INTAKE BASED ON CDC (1994) DATA

Sample Calculation of Mean Daily Fat Intake Based on CDC (1994) Data

CDC (1994) provided data on the mean daily total food energy intake (TFEI) and the mean percentages of TFEI from total dietary fat grouped by age and gender. The overall mean daily TFEI was 2,095 kcal for the total population and 34 percent (or 82 g) of their TFEI was from total dietary fat (CDC, 1994). Based on this information, the amount of fat per kcal was calculated as shown in the following example.

$$0.34 \text{ x } 2{,}095 \ \frac{\text{kcal}}{\text{day}} \text{ x X } \frac{\text{g\&fat}}{\text{day}} \text{ ' } 82 \ \frac{\text{g\&fat}}{\text{day}}$$

$$\therefore \text{X ' } 0.12 \ \frac{\text{g\&fat}}{\text{kcal}}$$

where 0.34 is the fraction of fat intake, 2,095 is the total food intake, and X is the conversion factor from kcal/day to g-fat/day.

Using the conversion factor shown above (i.e., 0.12 g-fat/kcal) and the information on the mean daily TFEI and percentage of TFEI for the various age/gender groups, the daily fat intake was calculated for these groups. An example of obtaining the grams of fat from the daily TFEI (1,591 kcal/day) for children ages 3-5 and their percent TFEI from total dietary fat (33 percent) is as follows:

$$1{,}591 \ \frac{\text{kcal}}{\text{day}} \text{ x } 0.33 \text{ x } 0.12 \ \frac{\text{g\&fat}}{\text{kcal}} \text{ ' } 63 \ \frac{\text{g\&fat}}{\text{day}}$$

Table 11-1. Per Capita Intake of Total Meats (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 96.4% | 2.146 | 0.014 | 0 | 0.33 | 0.63 | 1.13 | 1.84 | 2.78 | 4.06 | 5.06 | 7.67 | 25.67 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 66.7% | 2.867 | 0.187 | 0 | 0 | 0 | 0 | 2.34 | 4.72 | 6.52 | 8.56 | 11.52 | 25.67 |
| 01-02 | 95.6% | 4.384 | 0.116 | 0 | 1.07 | 1.58 | 2.70 | 4.13 | 5.38 | 7.69 | 8.41 | 11.88 | 21.61 |
| 03-05 | 97.5% | 3.873 | 0.092 | 0 | 1.12 | 1.38 | 2.21 | 3.50 | 5.04 | 6.64 | 8.23 | 11.25 | 15.00 |
| 06-11 | 97.6% | 3.011 | 0.052 | 0 | 0.66 | 1.02 | 1.80 | 2.78 | 3.98 | 5.12 | 6.08 | 8.38 | 11.68 |
| 12-19 | 97.7% | 2.078 | 0.034 | 0 | 0.42 | 0.67 | 1.19 | 1.99 | 2.79 | 3.49 | 4.40 | 5.95 | 8.28 |
| 20-39 | 97.9% | 1.923 | 0.019 | 0 | 0.39 | 0.64 | 1.09 | 1.73 | 2.54 | 3.49 | 4.14 | 5.46 | 8.37 |
| 40-69 | 97.3% | 1.700 | 0.017 | 0 | 0.36 | 0.59 | 1.03 | 1.58 | 2.20 | 2.95 | 3.47 | 4.73 | 7.64 |
| 70 + | 97.1% | 1.531 | 0.028 | 0 | 0.32 | 0.49 | 0.89 | 1.42 | 2.03 | 2.73 | 3.20 | 4.28 | 6.63 |
| Season | | | | | | | | | | | | | |
| Fall | 97.1% | 2.182 | 0.029 | 0 | 0.37 | 0.66 | 1.15 | 1.85 | 2.80 | 4.11 | 5.16 | 8.06 | 25.67 |
| Spring | 95.8% | 2.053 | 0.027 | 0 | 0.26 | 0.61 | 1.09 | 1.75 | 2.63 | 3.93 | 4.91 | 7.31 | 15.00 |
| Summer | 96.3% | 2.178 | 0.031 | 0 | 0.35 | 0.63 | 1.11 | 1.86 | 2.84 | 4.10 | 5.18 | 7.86 | 18.19 |
| Winter | 96.4% | 2.173 | 0.029 | 0 | 0.30 | 0.63 | 1.18 | 1.88 | 2.87 | 4.06 | 5.05 | 7.35 | 14.61 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 96.7% | 2.163 | 0.028 | 0 | 0.25 | 0.59 | 1.09 | 1.79 | 2.82 | 4.14 | 5.22 | 7.97 | 25.67 |
| Nonmetropolitan | 95.7% | 2.168 | 0.028 | 0 | 0.30 | 0.63 | 1.15 | 1.90 | 2.79 | 4.04 | 5.12 | 7.69 | 14.61 |
| Suburban | 96.6% | 2.126 | 0.021 | 0 | 0.39 | 0.64 | 1.13 | 1.84 | 2.74 | 4.03 | 4.94 | 7.31 | 15.00 |
| Race | | | | | | | | | | | | | |
| Asian | 89.3% | 2.233 | 0.131 | 0 | 0 | 0.60 | 1.10 | 1.86 | 3.23 | 4.49 | 4.66 | 6.86 | 8.13 |
| Black | 95.5% | 2.434 | 0.053 | 0 | 0.33 | 0.62 | 1.15 | 1.94 | 3.02 | 5.03 | 6.14 | 9.87 | 25.67 |
| Native American | 86.5% | 2.269 | 0.131 | 0 | 0 | 0.41 | 1.32 | 1.87 | 3.38 | 4.64 | 5.09 | 7.32 | 8.57 |
| Other/NA | 95.1% | 2.628 | 0.109 | 0 | 0 | 0.65 | 1.40 | 2.29 | 3.34 | 4.90 | 6.03 | 11.25 | 11.25 |
| White | 96.9% | 2.083 | 0.015 | 0 | 0.34 | 0.63 | 1.12 | 1.81 | 2.72 | 3.87 | 4.87 | 7.18 | 18.19 |
| Region | | | | | | | | | | | | | |
| Midwest | 96.5% | 2.204 | 0.029 | 0 | 0.44 | 0.69 | 1.21 | 1.85 | 2.82 | 4.08 | 5.05 | 7.86 | 21.61 |
| Northeast | 96.5% | 2.148 | 0.033 | 0 | 0.35 | 0.67 | 1.16 | 1.89 | 2.75 | 3.98 | 4.99 | 8.27 | 15.00 |
| South | 96.7% | 2.249 | 0.025 | 0 | 0.37 | 0.68 | 1.18 | 1.90 | 2.88 | 4.35 | 5.34 | 7.73 | 13.42 |
| West | 95.8% | 1.903 | 0.030 | 0 | 0.08 | 0.47 | 0.92 | 1.60 | 2.54 | 3.69 | 4.57 | 6.64 | 25.67 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-2. Per Capita Intake of Total Dairy Products (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 97.1% | 8.015 | 0.147 | 0 | 0.15 | 0.40 | 1.36 | 3.61 | 8.18 | 18.55 | 29.72 | 72.16 | 390.53 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 89.6% | 62.735 | 2.800 | 0 | 0 | 0.61 | 24.68 | 45.78 | 91.12 | 136.69 | 170.86 | 210.72 | 390.53 |
| 01-02 | 95.6% | 26.262 | 0.743 | 0 | 2.69 | 8.19 | 15.22 | 23.48 | 36.13 | 45.72 | 55.07 | 69.42 | 108.95 |
| 03-05 | 97.5% | 21.149 | 0.517 | 0 | 3.27 | 6.75 | 11.89 | 19.52 | 28.31 | 39.54 | 44.16 | 57.58 | 62.88 |
| 06-11 | 97.4% | 13.334 | 0.264 | 0 | 1.81 | 3.54 | 6.72 | 11.88 | 18.58 | 25.38 | 28.76 | 39.60 | 62.55 |
| 12-19 | 97.9% | 6.293 | 0.147 | 0 | 0.27 | 0.61 | 2.31 | 5.29 | 9.20 | 12.75 | 15.12 | 23.58 | 53.47 |
| 20-39 | 97.9% | 3.618 | 0.062 | 0 | 0.12 | 0.30 | 0.95 | 2.64 | 5.04 | 8.15 | 10.64 | 17.23 | 43.31 |
| 40-69 | 96.9% | 3.098 | 0.053 | 0 | 0.10 | 0.26 | 0.94 | 2.23 | 4.36 | 6.99 | 9.05 | 12.99 | 34.42 |
| 70 + | 97.6% | 3.715 | 0.104 | 0 | 0.16 | 0.47 | 1.46 | 3.03 | 4.93 | 8.03 | 9.63 | 16.49 | 26.33 |
| Season | | | | | | | | | | | | | |
| Fall | 97.7% | 8.262 | 0.286 | 0 | 0.17 | 0.38 | 1.32 | 3.53 | 8.31 | 20.16 | 32.71 | 75.83 | 351.48 |
| Spring | 96.8% | 8.273 | 0.335 | 0 | 0.13 | 0.39 | 1.37 | 3.50 | 7.88 | 18.02 | 27.02 | 116.00 | 390.53 |
| Summer | 96.8% | 7.561 | 0.257 | 0 | 0.14 | 0.37 | 1.37 | 3.51 | 7.93 | 18.01 | 30.86 | 64.95 | 347.93 |
| Winter | 97.1% | 7.964 | 0.293 | 0 | 0.16 | 0.43 | 1.39 | 3.90 | 8.77 | 17.60 | 27.34 | 63.27 | 307.54 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 97.2% | 8.528 | 0.309 | 0 | 0.17 | 0.41 | 1.44 | 3.78 | 8.05 | 18.25 | 29.51 | 106.93 | 318.93 |
| Nonmetropolitan | 96.6% | 7.224 | 0.261 | 0 | 0.10 | 0.28 | 1.08 | 3.34 | 7.82 | 17.28 | 24.70 | 59.17 | 390.53 |
| Suburban | 97.4% | 8.058 | 0.209 | 0 | 0.17 | 0.43 | 1.42 | 3.61 | 8.45 | 19.50 | 32.04 | 69.42 | 351.48 |
| Race | | | | | | | | | | | | | |
| Asian | 94.0% | 8.730 | 1.264 | 0 | 0 | 0.14 | 0.63 | 3.86 | 7.23 | 21.62 | 36.16 | 72.01 | 124.26 |
| Black | 94.8% | 7.816 | 0.498 | 0 | 0.03 | 0.11 | 0.64 | 2.49 | 7.29 | 17.28 | 27.78 | 116.00 | 347.93 |
| Native American | 88.9% | 6.987 | 1.057 | 0 | 0.02 | 0.14 | 0.81 | 2.83 | 8.06 | 20.20 | 24.17 | 66.71 | 139.37 |
| Other/NA | 97.1% | 10.727 | 1.002 | 0 | 0.12 | 0.33 | 1.03 | 4.15 | 11.28 | 34.64 | 40.33 | 121.50 | 166.48 |
| White | 97.7% | 7.943 | 0.156 | 0 | 0.22 | 0.49 | 1.50 | 3.76 | 8.24 | 18.16 | 28.76 | 66.11 | 390.53 |
| Region | | | | | | | | | | | | | |
| Midwest | 97.3% | 9.291 | 0.341 | 0 | 0.20 | 0.50 | 1.66 | 4.20 | 9.61 | 21.33 | 34.35 | 90.88 | 390.53 |
| Northeast | 97.2% | 7.890 | 0.330 | 0 | 0.18 | 0.42 | 1.42 | 3.41 | 7.54 | 18.07 | 32.04 | 78.15 | 307.54 |
| South | 97.3% | 6.926 | 0.225 | 0 | 0.11 | 0.27 | 1.01 | 3.10 | 7.49 | 15.86 | 25.76 | 54.94 | 347.93 |
| West | 96.7% | 8.454 | 0.313 | 0 | 0.17 | 0.49 | 1.60 | 3.93 | 8.67 | 19.88 | 29.89 | 84.46 | 174.65 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-3. Per Capita Intake of Beef (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 91% | 0.825 | 0.007 | 0 | 0 | 0.055 | 0.268 | 0.626 | 1.163 | 1.804 | 2.327 | 3.478 | 7.959 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 64% | 0.941 | 0.075 | 0 | 0 | 0 | 0 | 0.488 | 1.417 | 2.536 | 3.205 | 5.776 | 7.959 |
| 01-02 | 93% | 1.46 | 0.056 | 0 | 0 | 0.187 | 0.531 | 1.339 | 2.166 | 2.783 | 3.65 | 4.741 | 7.571 |
| 03-05 | 95% | 1.392 | 0.05 | 0 | 0 | 0.14 | 0.506 | 1.162 | 1.905 | 3.163 | 3.573 | 5.908 | 6.769 |
| 06-11 | 95% | 1.095 | 0.028 | 0 | 0.028 | 0.102 | 0.337 | 0.924 | 1.56 | 2.376 | 2.92 | 3.944 | 6.024 |
| 12-19 | 95% | 0.83 | 0.02 | 0 | 0.032 | 0.114 | 0.3 | 0.654 | 1.204 | 1.775 | 2.192 | 3.108 | 4.508 |
| 20-39 | 94% | 0.789 | 0.012 | 0 | 0 | 0.087 | 0.297 | 0.644 | 1.109 | 1.662 | 2.165 | 3.059 | 6.086 |
| 40-69 | 90% | 0.667 | 0.011 | 0 | 0 | 0.031 | 0.221 | 0.536 | 0.977 | 1.458 | 1.76 | 2.474 | 4.968 |
| 70 + | 87% | 0.568 | 0.018 | 0 | 0 | 0 | 0.151 | 0.427 | 0.817 | 1.324 | 1.651 | 2.62 | 4.02 |
| Season | | | | | | | | | | | | | |
| Fall | 92% | 0.834 | 0.014 | 0 | 0 | 0.063 | 0.296 | 0.665 | 1.167 | 1.785 | 2.277 | 3.339 | 6.086 |
| Spring | 91% | 0.797 | 0.014 | 0 | 0 | 0.046 | 0.254 | 0.595 | 1.132 | 1.788 | 2.295 | 3.531 | 7.959 |
| Summer | 90% | 0.845 | 0.017 | 0 | 0 | 0.045 | 0.254 | 0.605 | 1.187 | 1.887 | 2.519 | 3.707 | 7.085 |
| Winter | 92% | 0.823 | 0.015 | 0 | 0 | 0.066 | 0.272 | 0.636 | 1.157 | 1.767 | 2.271 | 3.266 | 7.571 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 91% | 0.808 | 0.013 | 0 | 0 | 0.037 | 0.271 | 0.611 | 1.13 | 1.777 | 2.329 | 3.325 | 6.182 |
| Nonmetropolitan | 91% | 0.841 | 0.015 | 0 | 0 | 0.064 | 0.269 | 0.637 | 1.196 | 1.852 | 2.308 | 3.531 | 6.66 |
| Suburban | 92% | 0.828 | 0.011 | 0 | 0 | 0.059 | 0.265 | 0.63 | 1.163 | 1.797 | 2.337 | 3.511 | 7.959 |
| Race | | | | | | | | | | | | | |
| Asian | 89% | 0.895 | 0.072 | 0 | 0 | 0.08 | 0.228 | 0.694 | 1.251 | 2.065 | 2.444 | 3.135 | 5.862 |
| Black | 87% | 0.665 | 0.019 | 0 | 0 | 0 | 0.151 | 0.42 | 0.963 | 1.488 | 2.177 | 3.126 | 6.769 |
| Native American | 82% | 0.995 | 0.088 | 0 | 0 | 0.016 | 0.182 | 0.73 | 1.299 | 2.338 | 2.825 | 4.958 | 6.66 |
| Other/NA | 90% | 1.159 | 0.069 | 0 | 0 | 0 | 0.389 | 0.739 | 1.63 | 2.756 | 3.269 | 5.908 | 6.182 |
| White | 93% | 0.833 | 0.008 | 0 | 0 | 0.068 | 0.284 | 0.651 | 1.18 | 1.784 | 2.28 | 3.41 | 7.959 |
| Region | | | | | | | | | | | | | |
| Midwest | 92% | 0.853 | 0.015 | 0 | 0 | 0.07 | 0.31 | 0.66 | 1.191 | 1.853 | 2.345 | 3.65 | 6.468 |
| Northeast | 93% | 0.805 | 0.017 | 0 | 0 | 0.054 | 0.253 | 0.595 | 1.136 | 1.816 | 2.352 | 3.41 | 6.769 |
| South | 90% | 0.846 | 0.013 | 0 | 0 | 0.058 | 0.268 | 0.648 | 1.195 | 1.805 | 2.324 | 3.511 | 7.959 |
| West | 92% | 0.775 | 0.016 | 0 | 0 | 0.039 | 0.235 | 0.562 | 1.105 | 1.73 | 2.226 | 3.219 | 6.66 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA s analyses of the 1989-91 CSFII

Table 11-4. Per Capita Intake of Pork (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 90.2% | 0.261 | 0.005 | 0 | 0 | 0.005 | 0.031 | 0.083 | 0.263 | 0.735 | 1.137 | 2.384 | 8.231 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 63.0% | 0.291 | 0.04 | 0 | 0 | 0 | 0 | 0.078 | 0.228 | 0.69 | 1.671 | 3.269 | 5.431 |
| 01-02 | 92.4% | 0.492 | 0.041 | 0 | 0 | 0.033 | 0.071 | 0.182 | 0.424 | 1.525 | 2.633 | 3.633 | 6.94 |
| 03-05 | 95.0% | 0.473 | 0.035 | 0 | 0 | 0.021 | 0.057 | 0.147 | 0.362 | 1.372 | 2.35 | 3.309 | 8.231 |
| 06-11 | 94.5% | 0.352 | 0.018 | 0 | 0 | 0.015 | 0.052 | 0.116 | 0.311 | 1.098 | 1.418 | 2.869 | 5.024 |
| 12-19 | 94.0% | 0.27 | 0.013 | 0 | 0 | 0.012 | 0.039 | 0.09 | 0.289 | 0.742 | 1.118 | 2.699 | 5.157 |
| 20-39 | 92.5% | 0.23 | 0.007 | 0 | 0 | 0.009 | 0.031 | 0.08 | 0.233 | 0.704 | 1.039 | 1.747 | 6.363 |
| 40-69 | 88.3% | 0.212 | 0.007 | 0 | 0 | 0 | 0.025 | 0.068 | 0.242 | 0.613 | 0.915 | 1.865 | 4.342 |
| 70 + | 86.5% | 0.207 | 0.011 | 0 | 0 | 0 | 0.016 | 0.061 | 0.223 | 0.667 | 0.924 | 1.74 | 3.035 |
| Season | | | | | | | | | | | | | |
| Fall | 91.9% | 0.254 | 0.008 | 0 | 0 | 0.01 | 0.037 | 0.098 | 0.267 | 0.723 | 1.045 | 2.118 | 5.338 |
| Spring | 88.8% | 0.264 | 0.009 | 0 | 0 | 0 | 0.027 | 0.076 | 0.265 | 0.728 | 1.19 | 2.762 | 6.94 |
| Summer | 89.4% | 0.245 | 0.01 | 0 | 0 | 0 | 0.027 | 0.072 | 0.22 | 0.688 | 1.097 | 2.43 | 8.231 |
| Winter | 90.6% | 0.279 | 0.009 | 0 | 0 | 0.006 | 0.032 | 0.084 | 0.3 | 0.819 | 1.195 | 2.608 | 5.946 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 89.5% | 0.258 | 0.009 | 0 | 0 | 0.001 | 0.027 | 0.076 | 0.235 | 0.736 | 1.085 | 2.699 | 6.94 |
| Nonmetropolitan | 90.3% | 0.299 | 0.01 | 0 | 0 | 0.007 | 0.038 | 0.099 | 0.324 | 0.863 | 1.212 | 2.808 | 8.231 |
| Suburban | 90.6% | 0.244 | 0.006 | 0 | 0 | 0.006 | 0.03 | 0.078 | 0.253 | 0.678 | 1.098 | 2.269 | 5.946 |
| Race | | | | | | | | | | | | | |
| Asian | 85.9% | 0.256 | 0.049 | 0 | 0 | 0.003 | 0.027 | 0.057 | 0.192 | 0.72 | 1.157 | 2.487 | 3.966 |
| Black | 89.2% | 0.418 | 0.019 | 0 | 0 | 0.002 | 0.035 | 0.123 | 0.48 | 1.19 | 2.108 | 3.178 | 8.231 |
| Native American | 83.6% | 0.188 | 0.024 | 0 | 0 | 0 | 0.027 | 0.08 | 0.179 | 0.473 | 0.889 | 1.317 | 1.662 |
| Other/NA | 88.3% | 0.191 | 0.021 | 0 | 0 | 0 | 0.027 | 0.075 | 0.183 | 0.48 | 0.845 | 1.638 | 5.252 |
| White | 90.6% | 0.241 | 0.005 | 0 | 0 | 0.006 | 0.031 | 0.081 | 0.249 | 0.685 | 1.061 | 2.035 | 5.946 |
| Region | | | | | | | | | | | | | |
| Midwest | 91.3% | 0.284 | 0.009 | 0 | 0 | 0.006 | 0.034 | 0.095 | 0.318 | 0.776 | 1.113 | 2.487 | 6.362 |
| Northeast | 90.4% | 0.236 | 0.01 | 0 | 0 | 0.005 | 0.027 | 0.071 | 0.227 | 0.699 | 1.064 | 2.11 | 5.338 |
| South | 89.5% | 0.283 | 0.008 | 0 | 0 | 0.005 | 0.032 | 0.09 | 0.281 | 0.802 | 1.212 | 2.769 | 8.231 |
| West | 89.7% | 0.22 | 0.009 | 0 | 0 | 0 | 0.028 | 0.072 | 0.198 | 0.59 | 1.009 | 1.944 | 5.946 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA s analyses of the 1989-91 CSFII

Table 11-5. Per Capita Intake of Poultry (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 91.7% | 0.598 | 0.007 | 0 | 0 | 0.015 | 0.097 | 0.344 | 0.83 | 1.506 | 2.035 | 3.273 | 12.239 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 64.9% | 0.816 | 0.087 | 0 | 0 | 0 | 0 | 0.178 | 1.07 | 2.467 | 3.453 | 7.373 | 12.239 |
| 01-02 | 94.2% | 1.156 | 0.064 | 0 | 0.017 | 0.08 | 0.211 | 0.636 | 1.695 | 2.931 | 4.144 | 5.429 | 11.747 |
| 03-05 | 95.0% | 1.068 | 0.049 | 0 | 0 | 0.044 | 0.18 | 0.607 | 1.647 | 2.662 | 3.603 | 5.024 | 7.565 |
| 06-11 | 95.7% | 0.871 | 0.028 | 0 | 0.022 | 0.047 | 0.166 | 0.556 | 1.364 | 2.182 | 2.851 | 3.861 | 6.936 |
| 12-19 | 94.3% | 0.558 | 0.017 | 0 | 0 | 0.02 | 0.088 | 0.378 | 0.813 | 1.476 | 1.806 | 2.394 | 3.535 |
| 20-39 | 94.6% | 0.53 | 0.01 | 0 | 0.005 | 0.021 | 0.098 | 0.332 | 0.768 | 1.35 | 1.744 | 2.666 | 3.801 |
| 40-69 | 90.5% | 0.477 | 0.01 | 0 | 0 | 0.011 | 0.084 | 0.294 | 0.696 | 1.192 | 1.528 | 2.358 | 6.219 |
| 70 + | 86.7% | 0.463 | 0.017 | 0 | 0 | 0 | 0.072 | 0.286 | 0.692 | 1.189 | 1.539 | 2.284 | 4.092 |
| Season | | | | | | | | | | | | | |
| Fall | 92.9% | 0.635 | 0.015 | 0 | 0 | 0.022 | 0.112 | 0.366 | 0.867 | 1.571 | 2.209 | 3.543 | 12.239 |
| Spring | 91.0% | 0.538 | 0.013 | 0 | 0 | 0.009 | 0.071 | 0.305 | 0.74 | 1.368 | 1.829 | 3.052 | 11.543 |
| Summer | 90.4% | 0.625 | 0.015 | 0 | 0 | 0.013 | 0.089 | 0.359 | 0.905 | 1.562 | 2.171 | 3.863 | 6.596 |
| Winter | 92.6% | 0.595 | 0.014 | 0 | 0 | 0.025 | 0.113 | 0.372 | 0.82 | 1.443 | 1.94 | 3.091 | 8.418 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 91.7% | 0.627 | 0.014 | 0 | 0 | 0.011 | 0.095 | 0.333 | 0.877 | 1.589 | 2.218 | 3.518 | 12.239 |
| Nonmetropolitan | 90.6% | 0.54 | 0.013 | 0 | 0 | 0.014 | 0.093 | 0.314 | 0.781 | 1.321 | 1.71 | 3.077 | 11.543 |
| Suburban | 92.4% | 0.608 | 0.011 | 0 | 0 | 0.02 | 0.1 | 0.37 | 0.842 | 1.542 | 2.06 | 3.111 | 8.306 |
| Race | | | | | | | | | | | | | |
| Asian | 88.6% | 0.79 | 0.068 | 0 | 0 | 0.035 | 0.112 | 0.503 | 1.15 | 1.901 | 2.368 | 2.939 | 4.745 |
| Black | 91.9% | 0.798 | 0.025 | 0 | 0 | 0.02 | 0.143 | 0.521 | 1.133 | 1.867 | 2.352 | 4.288 | 12.239 |
| Native American | 80.7% | 0.54 | 0.051 | 0 | 0 | 0 | 0.071 | 0.324 | 0.985 | 1.343 | 1.545 | 2.348 | 4.158 |
| Other/NA | 91.7% | 0.81 | 0.049 | 0 | 0 | 0.005 | 0.169 | 0.467 | 1.252 | 2.11 | 2.695 | 3.863 | 4.002 |
| White | 92.0% | 0.559 | 0.007 | 0 | 0 | 0.016 | 0.092 | 0.318 | 0.771 | 1.419 | 1.906 | 3.091 | 11.543 |
| Region | | | | | | | | | | | | | |
| Midwest | 91.7% | 0.551 | 0.014 | 0 | 0 | 0.013 | 0.095 | 0.318 | 0.735 | 1.328 | 1.938 | 3.244 | 11.747 |
| Northeast | 92.7% | 0.651 | 0.017 | 0 | 0 | 0.016 | 0.093 | 0.391 | 0.934 | 1.687 | 2.134 | 3.38 | 8.306 |
| South | 91.7% | 0.643 | 0.012 | 0 | 0 | 0.02 | 0.106 | 0.394 | 0.93 | 1.581 | 2.173 | 3.426 | 8.418 |
| West | 91.0% | 0.526 | 0.014 | 0 | 0 | 0.011 | 0.086 | 0.28 | 0.754 | 1.33 | 1.766 | 2.942 | 12.239 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA s analyses of the 1989-91 CSFII

Table 11-6. Per Capita Intake of Game (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 1.2% | 0.01 | 0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.098 | 5.081 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 0.5% | 0.014 | 0.091 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.113 | 1.866 |
| 01-02 | 0.9% | 0.026 | 0.125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.692 | 2.638 |
| 03-05 | 1.5% | 0.01 | 0.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.953 |
| 06-11 | 1.1% | 0.004 | 0.016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.176 |
| 12-19 | 1.0% | 0.004 | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.78 |
| 20-39 | 1.3% | 0.01 | 0.021 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.098 | 5.081 |
| 40-69 | 1.3% | 0.012 | 0.017 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.462 | 2.882 |
| 70 + | 1.1% | 0.002 | 0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.261 |
| Season | | | | | | | | | | | | | |
| Fall | 1.7% | 0.016 | 0.022 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.521 | 3.488 |
| Spring | 0.7% | 0.006 | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.882 |
| Summer | 0.7% | 0.003 | 0.012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.78 |
| Winter | 1.6% | 0.013 | 0.021 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.446 | 5.081 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 0.7% | 0.005 | 0.014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 |
| Nonmetropolitan | 2.0% | 0.019 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.822 | 1.866 |
| Suburban | 1.1% | 0.008 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.081 |
| Race | | | | | | | | | | | | | |
| Asian | 0.0% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Black | 0.1% | 0.001 | 0.027 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.887 |
| Native American | 0.6% | 0.001 | 0.012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.255 |
| Other/NA | 0.3% | 0.003 | 0.046 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.636 |
| White | 1.4% | 0.011 | 0.011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.329 | 5.081 |
| Region | | | | | | | | | | | | | |
| Midwest | 2.2% | 0.012 | 0.012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.588 | 1.866 |
| Northeast | 0.5% | 0.005 | 0.026 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.055 |
| South | 0.8% | 0.009 | 0.025 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.081 |
| West | 1.3% | 0.012 | 0.022 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.446 | 2.953 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA s analyses of the 1989-91 CSFII

Table 11-7. Per Capita Intake of Eggs (g/kg-day as consumed)

| Population Group | Percent Consuming | Mean | SE | P1 | P5 | P10 | P25 | P50 | P75 | P90 | P95 | P99 | P100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 41.4% | 0.317 | 0.009 | 0 | 0 | 0 | 0 | 0 | 0.445 | 0.968 | 1.422 | 2.953 | 13.757 |
| Age (years) | | | | | | | | | | | | | |
| < 01 | 32.3% | 0.791 | 0.126 | 0 | 0 | 0 | 0 | 0 | 1.537 | 2.744 | 3.645 | 5.487 | 13.757 |
| 01-02 | 43.3% | 0.822 | 0.087 | 0 | 0 | 0 | 0 | 0 | 1.381 | 2.604 | 3.299 | 5.242 | 8.577 |
| 03-05 | 39.6% | 0.677 | 0.088 | 0 | 0 | 0 | 0 | 0 | 0.89 | 2.224 | 3.106 | 7.475 | 10.799 |
| 06-11 | 36.6% | 0.414 | 0.033 | 0 | 0 | 0 | 0 | 0 | 0.735 | 1.312 | 1.617 | 3.037 | 6.331 |
| 12-19 | 36.0% | 0.244 | 0.023 | 0 | 0 | 0 | 0 | 0 | 0.345 | 0.828 | 1.26 | 2.137 | 4.12 |
| 20-39 | 43.3% | 0.271 | 0.012 | 0 | 0 | 0 | 0 | 0 | 0.439 | 0.897 | 1.193 | 1.764 | 5.392 |
| 40-69 | 44.0% | 0.225 | 0.009 | 0 | 0 | 0 | 0 | 0 | 0.375 | 0.725 | 1.029 | 1.496 | 3.216 |
| 70 + | 42.0% | 0.218 | 0.017 | 0 | 0 | 0 | 0 | 0 | 0.328 | 0.653 | 0.969 | 1.582 | 2.791 |
| Season | | | | | | | | | | | | | |
| Fall | 40.1% | 0.291 | 0.017 | 0 | 0 | 0 | 0 | 0 | 0.422 | 0.871 | 1.237 | 2.744 | 6.331 |
| Spring | 42.7% | 0.307 | 0.017 | 0 | 0 | 0 | 0 | 0 | 0.402 | 1.015 | 1.42 | 2.604 | 13.548 |
| Summer | 40.5% | 0.344 | 0.02 | 0 | 0 | 0 | 0 | 0 | 0.476 | 1.035 | 1.496 | 3.533 | 13.757 |
| Winter | 42.2% | 0.325 | 0.019 | 0 | 0 | 0 | 0 | 0 | 0.47 | 0.98 | 1.409 | 2.841 | 11.39 |
| Urbanization | | | | | | | | | | | | | |
| Central City | 41.6% | 0.315 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0.423 | 0.924 | 1.422 | 3.106 | 13.757 |
| Nonmetropolitan | 43.8% | 0.338 | 0.018 | 0 | 0 | 0 | 0 | 0 | 0.493 | 1.043 | 1.438 | 2.826 | 13.548 |
| Suburban | 39.7% | 0.309 | 0.013 | 0 | 0 | 0 | 0 | 0 | 0.434 | 0.95 | 1.399 | 2.73 | 11.39 |
| Race | | | | | | | | | | | | | |
| Asian | 38.9% | 0.452 | 0.094 | 0 | 0 | 0 | 0 | 0 | 0.615 | 1.47 | 2.604 | 2.672 | 2.672 |
| Black | 48.9% | 0.385 | 0.023 | 0 | 0 | 0 | 0 | 0 | 0.595 | 1.134 | 1.486 | 2.881 | 6.213 |
| Native American | 49.7% | 0.491 | 0.17 | 0 | 0 | 0 | 0 | 0 | 0.457 | 1.395 | 1.61 | 10.799 | 13.548 |
| Other/NA | 55.1% | 0.472 | 0.056 | 0 | 0 | 0 | 0 | 0 | 0.712 | 1.26 | 2.247 | 3.292 | 5.997 |
| White | 39.5% | 0.297 | 0.01 | 0 | 0 | 0 | 0 | 0 | 0.408 | 0.922 | 1.368 | 2.906 | 13.757 |
| Region | | | | | | | | | | | | | |
| Midwest | 36.9% | 0.288 | 0.019 | 0 | 0 | 0 | 0 | 0 | 0.35 | 0.893 | 1.44 | 3.106 | 13.548 |
| Northeast | 35.9% | 0.264 | 0.02 | 0 | 0 | 0 | 0 | 0 | 0.376 | 0.791 | 1.229 | 2.815 | 11.39 |
| South | 44.3% | 0.325 | 0.014 | 0 | 0 | 0 | 0 | 0 | 0.469 | 0.999 | 1.422 | 2.531 | 8.737 |
| West | 46.6% | 0.392 | 0.022 | 0 | 0 | 0 | 0 | 0 | 0.563 | 1.135 | 1.603 | 3.08 | 13.757 |

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA s analyses of the 1989-91 CSFII

**Table 11-8. Main Daily Intake of Meat and Dairy Products Per Individual in a Day for USDA 1977-78, 87-88, 89-91, 94, and 95 Surveys**

| Food Product | 77-78 Data (g-day) | 87-88 Data (g/day) | 89-91 Data (g/day) | 94 Data (g/day) | 95 Data (g/day) |
|---|---|---|---|---|---|
| Beef | 52 | 32 | 26 | 24 | 27 |
| Poultry | 25 | 26 | 27 | 29 | 24 |
| Meat Mixtures[1] | 69 | 86 | 90 | 95 | 104 |
| Dairy Products[2] | 314 | 290 | 286 | 277 | 284 |

[1] Includes mixtures having meat, poultry, or fish as a main ingredient; frozen meals in which the main course is a meat, poultry, or fish item; meat, poultry, or fish sandwiches coded as a single item; and baby-food meat and poultry mixtures.

[2] Includes total milk, cream, milk desserts, and cheese. Total milk includes fluid milk, yogurt, flavored milk, milk drinks, meal replacements with milk, milk-based infant formulas, and unreconstituted dry milk and powdered mixtures.

Sources: USDA, 1980; 1992; 1996a; 1996b.

Table 11-9. Mean Per Capita Intake Rates for Meat, Poultry, and Dairy Products (g/kg-d as consumed) Based on All Sex/Age/Demographic Subgroups

| Raw Agricultural Commodity[a] | Average Consumption (Grams/kg Body Weight/Day) | Standard Error |
|---|---|---|
| Milk-Non-Fat Solids | 0.9033354 | 0.0134468 |
| Milk-Non-Fat Solids (Food additive) | 0.9033354 | 0.0134468 |
| Milk-Fat Solids | 0.4297199 | 0.0060264 |
| Milk-Fat Solids (Food additive) | 0.4297199 | 0.0060264 |
| Milk Sugar (Lactose) | 0.0374270 | 0.0033996 |
| Beef-Meat Byproducts | 0.0176621 | 0.0005652 |
| Beef (Organ Meats) - Other | 0.0060345 | 0.0007012 |
| Beef - Dried | 0.0025325 | 0.0004123 |
| Beef (Boneless) - Fat (Beef Tallow) | 0.3720755 | 0.0048605 |
| Beef (Organ Meats) - Kidney | 0.0004798 | 0.0003059 |
| Beef (Organ Meats) - Liver | 0.0206980 | 0.0014002 |
| Beef (Boneless) - Lean (w/o Removeable Fat) | 1.1619987 | 0.0159453 |
| Goat-Meat Byproducts | 0.0000000 | NA |
| Goat (Organ Meats) - Other | 0.0000000 | NA |
| Goat (Boneless) - Fat | 0.0000397 | 0.0000238 |
| Goat (Organ Meats) - Kidney | 0.0000000 | NA |
| Goat (Organ Meats) - Liver | 0.0000000 | NA |
| Goat (Boneless) - Lean (w/o Removeable Fat) | 0.0001891 | 0.0001139 |
| Horse | 0.0000000 | NA |
| Rabbit | 0.0014207 | 0.00003544 |
| Sheep - Meat Byproducts | 0.0000501 | 0.0000381 |
| Sheep (Organ Meats) - Other | 0.0000109 | 0.0000197 |
| Sheep (Boneless) - Fat | 0.0042966 | 0.0005956 |
| Sheep (Organ Meats) - Kidney | 0.0000090 | 0.0000079 |
| Sheep (Organ Meats) - Liver | 0.0000000 | NA |
| Sheep (Boneless) - Lean (w/o Removeable Fat) | 0.0124842 | 0.0015077 |
| Pork - Meat Byproducts | 0.0250792 | 0.0022720 |
| Pork (Organ Meats) - Other | 0.0038496 | 0.0003233 |
| Pork (Boneless) - Fat (Including Lard) | 0.2082022 | 0.0032032 |
| Pork (Organ Meats) - Kidney | 0.0000168 | 0.0000106 |
| Pork (Organ Meats) - Liver | 0.0048194 | 0.0004288 |
| Pork (Boneless) - Lean (w/o Removeable Fat) | 0.3912467 | 0.0060683 |
| Meat, Game | 0.0063507 | 0.0010935 |
| Turkey - Byproducts | 0.0002358 | 0.0000339 |
| Turkey - Giblets (Liver) | 0.0000537 | 0.0000370 |
| Turkey - Flesh (w/o Skin, w/o Bones) | 0.0078728 | 0.0007933 |
| Turkey - Flesh (+ Skin, w/o Bones) | 0.0481655 | 0.0026028 |
| Turkey - Unspecified | 0.0000954 | 0.0000552 |
| Poultry, Other - Byproducts | 0.0000000 | NA |
| Poultry, Other - Giblets (Liver) | 0.0002321 | 0.0001440 |
| Poultry, Other - Flesh (+ Skin, w/o Bones) | 0.0053882 | 0.0007590 |
| Eggs - Whole | 0.5645020 | 0.0076651 |
| Eggs - White Only | 0.0092044 | 0.0004441 |
| Eggs - Yolk Only | 0.0066323 | 0.0004295 |
| Chicken - Byproducts | 0.0000000 | NA |
| Chicken - Giblets (Liver) | 0.0050626 | 0.0005727 |
| Chicken - Flesh (w/o Skin, w/o Bones) | 0.0601361 | 0.0021616 |
| Chicken - Flesh (+ Skin, w/o Bones) | 0.3793205 | 0.0104779 |

NA = Not applicable
[a] Consumed in any raw or prepared form.
Source: DRES database (based on 1977-78 NFCS)

Table 11-10. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1977-1978

| Group Age (yrs.) | Total Meat, Poultry and Fish | Beef | Pork | Lamb, Veal, Game | Frankfurters, Sausages, Luncheon Meats, Spreads | Total Poultry | Chicken Only | Meat Mixtures[c] |
|---|---|---|---|---|---|---|---|---|
| Males and Females | | | | | | | | |
| 1 and Under | 72 | 9 | 4 | 3 | 2 | 4 | 1 | 51 |
| 1-2 | 91 | 18 | 6 | (b) | 15 | 16 | 13 | 32 |
| 3-5 | 121 | 23 | 8 | (b) | 15 | 19 | 19 | 49 |
| 6-8 | 149 | 33 | 15 | 1 | 17 | 20 | 19 | 55 |
| Males | | | | | | | | |
| 9-11 | 188 | 41 | 22 | 3 | 19 | 24 | 21 | 71 |
| 12-14 | 218 | 53 | 18 | (b) | 25 | 27 | 24 | 87 |
| 15-18 | 272 | 82 | 24 | 1 | 25 | 37 | 32 | 93 |
| 19-22 | 310 | 90 | 21 | 2 | 33 | 45 | 43 | 112 |
| 23-34 | 285 | 86 | 27 | 1 | 30 | 31 | 29 | 94 |
| 35-50 | 295 | 75 | 28 | 1 | 26 | 31 | 28 | 113 |
| 51-64 | 274 | 70 | 32 | 1 | 29 | 31 | 29 | 86 |
| 65-74 | 231 | 54 | 25 | 2 | 22 | 29 | 26 | 72 |
| 75 and Over | 196 | 41 | 39 | 7 | 19 | 28 | 25 | 54 |
| Females | | | | | | | | |
| 9-11 | 162 | 38 | 17 | 1 | 20 | 27 | 23 | 55 |
| 12-14 | 176 | 47 | 19 | 1 | 18 | 23 | 22 | 61 |
| 15-18 | 180 | 46 | 14 | 2 | 16 | 28 | 27 | 61 |
| 19-22 | 184 | 52 | 19 | 1 | 18 | 26 | 24 | 61 |
| 23-34 | 183 | 48 | 17 | 1 | 16 | 24 | 22 | 66 |
| 35-50 | 187 | 49 | 19 | 2 | 14 | 24 | 21 | 63 |
| 51-64 | 187 | 52 | 19 | 2 | 12 | 26 | 24 | 60 |
| 65-74 | 159 | 34 | 21 | 4 | 12 | 30 | 25 | 47 |
| 75 and Over | 134 | 31 | 17 | 2 | 9 | 19 | 16 | 49 |
| Males and Females | | | | | | | | |
| All Ages | 207 | 54 | 20 | 2 | 20 | 27 | 24 | 72 |

[a] Based on USDA Nationwide Food Consumption Survey 1977-78 data for one day.
[b] Less than 0.5 g/day but more than 0.
[c] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1980.

Table 11-11. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1987-1988

| Group Age (yrs.) | Total Meat, Poultry, and Fish | Beef | Pork | Lamb, Veal, Game | Frankfurters, Sausages, Luncheon Meats | Total Poultry | Chicken Only | Meat Mixtures[b] |
|---|---|---|---|---|---|---|---|---|
| Males and Females | | | | | | | | |
| 5 and Under | 92 | 10 | 9 | <0.5 | 11 | 14 | 12 | 39 |
| Males | | | | | | | | |
| 6-11 | 156 | 22 | 14 | <0.5 | 13 | 27 | 24 | 74 |
| 12-19 | 252 | 38 | 17 | 1 | 20 | 27 | 20 | 142 |
| 20 and over | 250 | 44 | 19 | 23 | 2 | 31 | 25 | 108 |
| Females | | | | | | | | |
| 6-11 | 151 | 26 | 9 | 1 | 11 | 20 | 17 | 74 |
| 12-19 | 169 | 31 | 10 | <0.5 | 18 | 17 | 13 | 80 |
| 20 and over | 170 | 29 | 12 | 1 | 13 | 24 | 18 | 73 |
| All individuals | 193 | 32 | 14 | 1 | 17 | 26 | 20 | 86 |

[a] Based on USDA Nationwide Food Consumption Survey 1987-88 data for one day.
[b] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1992.

Table 11-12. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1977-1978

| Group Age (yrs.) | Total Milk | Fluid Milk | Cheese | Eggs |
|---|---|---|---|---|
| 1 and Under | 618 | 361 | 1 | 5 |
| 1-2 | 404 | 397 | 8 | 20 |
| 3-5 | 353 | 330 | 9 | 22 |
| 6-8 | 433 | 401 | 10 | 18 |
| 9-11 | 432 | 402 | 8 | 26 |
| 12-14 | 504 | 461 | 9 | 28 |
| 15-18 | 519 | 467 | 13 | 31 |
| 19-22 | 388 | 353 | 15 | 32 |
| 23-34 | 243 | 213 | 21 | 38 |
| 35-50 | 203 | 192 | 18 | 41 |
| 51-64 | 180 | 173 | 17 | 36 |
| 65-74 | 217 | 204 | 14 | 36 |
| 75 and Over | 193 | 184 | 18 | 41 |
| 9-11 | 402 | 371 | 7 | 14 |
| 12-14 | 387 | 343 | 11 | 19 |
| 15-18 | 316 | 279 | 11 | 21 |
| 19-22 | 224 | 205 | 18 | 26 |
| 23-34 | 182 | 158 | 19 | 26 |
| 35-50 | 130 | 117 | 18 | 23 |
| 51-64 | 139 | 128 | 19 | 24 |
| 65-74 | 166 | 156 | 14 | 22 |
| 75 and Over | 214 | 205 | 20 | 19 |
| All Ages | 266 | 242 | 15 | 27 |

[a] Based on USDA Nationwide Food Consumption Survey 1977-78 data for one day.
Source: USDA, 1980.

Table 11-13. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1987-1988

| Group Age (yrs.) | Total Fluid Milk | Whole Milk | Lowfat/Skim Milk | Cheese | Eggs |
|---|---|---|---|---|---|
| Males and Females | | | | | |
| 5 and under | 347 | 177 | 129 | 7 | 11 |
| Males | | | | | |
| 6-11 | 439 | 224 | 159 | 10 | 17 |
| 12-19 | 392 | 183 | 168 | 12 | 17 |
| 20 and over | 202 | 88 | 94 | 17 | 27 |
| Females | | | | | |
| 6-11 | 310 | 135 | 135 | 9 | 14 |
| 12-19 | 260 | 124 | 114 | 12 | 18 |
| 20 and over | 148 | 55 | 81 | 15 | 17 |
| All individuals | 224 | 99 | 102 | 14 | 20 |

[a] Based on USDA Nationwide Food Consumption Survey 1987-88 data for one day.
Source: USDA, 1992.

Table 11-14. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1994 and 1995

| Group Age (yrs.) | Total Meat, Poultry, and Fish | | Beef | | Pork | | Lamb, Veal, Game | | Frankfurters, Sausages, Luncheon Meats | | Total Poultry | | Chicken Only | | Meat Mixtures[c] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 |
| Males and Females | | | | | | | | | | | | | | | | |
| 5 and Under | 94 | 87 | 10 | 8 | 6 | 4 | (b) | (b) | 17 | 18 | 16 | 15 | 14 | 14 | 41 | 39 |
| Males | | | | | | | | | | | | | | | | |
| 6-11 | 131 | 161 | 19 | 18 | 9 | 7 | 0 | (b) | 22 | 27 | 19 | 25 | 16 | 22 | 51 | 68 |
| 12-19 | 238 | 256 | 31 | 29 | 11 | 11 | 1 | 1 | 21 | 27 | 40 | 26 | 29 | 23 | 119 | 150 |
| 20 and over | 266 | 283 | 35 | 41 | 17 | 14 | 2 | 1 | 29 | 27 | 39 | 31 | 30 | 27 | 124 | 149 |
| Females | | | | | | | | | | | | | | | | |
| 6-11 | 117 | 136 | 18 | 16 | 5 | 5 | (b) | (b) | 18 | 20 | 19 | 17 | 15 | 14 | 51 | 69 |
| 12-19 | 164 | 158 | 23 | 22 | 5 | 7 | (b) | 0 | 16 | 10 | 20 | 19 | 15 | 18 | 94 | 82 |
| 20 and over | 168 | 167 | 18 | 21 | 9 | 11 | 1 | 1 | 16 | 15 | 25 | 22 | 20 | 19 | 87 | 83 |
| All individuals | 195 | 202 | 24 | 27 | 11 | 10 | 1 | 1 | 21 | 21 | 29 | 24 | 23 | 21 | 98 | 104 |

[a] Based on USDA CSFII 1994 and 1995 data for one day.
[b] Less than 0.5 g/day but more than 0.
[c] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1996a; 1996b.

Table 11-15. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1994 and 1995

| Group Age (yrs.) | Total Fluid Milk | | Whole Milk | | Lowfat Milk | | Cheese | | Eggs | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 |
| Males and Females | | | | | | | | | | |
| 5 and under | 424 | 441 | 169 | 165 | 130 | 129 | 12 | 9 | 11 | 13 |
| Males | | | | | | | | | | |
| 6-11 | 407 | 400 | 107 | 128 | 188 | 164 | 11 | 12 | 13 | 15 |
| 12-19 | 346 | 396 | 105 | 105 | 160 | 176 | 19 | 20 | 18 | 24 |
| 20 and over | 195 | 206 | 50 | 57 | 83 | 88 | 19 | 16 | 23 | 23 |
| Females | | | | | | | | | | |
| 6-11 | 340 | 330 | 101 | 93 | 136 | 146 | 17 | 13 | 12 | 15 |
| 12-19 | 239 | 235 | 75 | 71 | 88 | 107 | 14 | 13 | 13 | 17 |
| 20 and over | 157 | 158 | 37 | 32 | 56 | 57 | 16 | 15 | 15 | 16 |
| All individuals | 229 | 236 | 65 | 66 | 89 | 92 | 17 | 15 | 17 | 19 |

[a] Based on USDA CSFII 1994 and 1995 data for one day.
Source: USDA, 1996a; 1996b.

**Table 11-16. Mean and Standard Error for the Dietary Intake of Food Sub Classes Per Capita by Age (g/day as consumed)**

| Age (yrs.) | Fresh Cows Milk | Other Dairy Products | Eggs | Beef | Pork | Poultry | Other Meat |
|---|---|---|---|---|---|---|---|
| All Ages | 253.5 ± 4.9 | 55.1 ± 1.2 | 26.9 ± 0.5 | 87.6 ± 1.1 | 28.2 ± 0.6 | 31.3 ± 0.8 | 25.1 ± 0.4 |
| <1 | 272.0 ± 31.9 | 296.7 ± 7.6 | 4.9 ± 3.2 | 18.4 ± 7.4 | 5.8 ± 3.6 | 18.4 ± 4.9 | 2.6 ± 2.8 |
| 1-4 | 337.3 ± 15.6 | 41.0 ± 3.7 | 19.8 ± 1.6 | 42.2 ± 3.7 | 13.6 ± 1.8 | 19.0 ± 2.4 | 17.6 ± 1.4 |
| 5-9 | 446.2 ± 13.1 | 47.3 ± 3.1 | 17.0 ± 1.3 | 63.4 ± 3.1 | 18.2 ± 1.5 | 24.7 ± 2.0 | 22.3 ± 1.2 |
| 10-14 | 456.0 ± 12.3 | 53.3 ± 2.9 | 19.3 ± 1.2 | 81.9 ± 2.9 | 22.2 ± 1.4 | 30.0 ± 1.9 | 26.1 ± 1.1 |
| 15-19 | 404.8 ± 12.9 | 52.9 ± 3.1 | 24.8 ± 1.3 | 99.5 ± 3.0 | 29.5 ± 1.5 | 33.0 ± 2.0 | 27.6 ± 1.1 |
| 20-24 | 264.3 ± 16.4 | 44.2 ± 4.0 | 28.3 ± 1.7 | 103.7 ± 3.9 | 29.6 ± 1.9 | 33.0 ± 2.6 | 28.8 ± 1.5 |
| 25-29 | 217.6 ± 17.2 | 51.5 ± 4.1 | 27.9 ± 1.7 | 103.8 ± 4.0 | 31.8 ± 2.0 | 33.8 ± 2.7 | 28.9 ± 1.5 |
| 30-39 | 182.9 ± 13.5 | 53.8 ± 3.2 | 30.1 ± 1.4 | 105.8 ± 3.2 | 33.0 ± 1.5 | 34.0 ± 2.1 | 28.4 ± 1.2 |
| 40-59 | 169.1 ± 10.5 | 52.0 ± 2.5 | 31.1 ± 1.0 | 99.0 ± 2.5 | 33.5 ± 1.2 | 33.8 ± 1.6 | 27.4 ± 0.9 |
| ≥60 | 192.4 ± 11.8 | 55.9 ± 2.8 | 28.7 ± 1.2 | 74.3 ± 2.8 | 27.5 ± 1.3 | 31.5 ± 1.8 | 21.1 ± 1.0 |

Source: U.S. EPA, 1984a (based on 1977-78 NFCS).

Table 11-17. Mean and Standard Error for the Per Capita Daily Intake of Food Class and Sub Class by Region (g/day as consumed)

| | US Population | Northeast | North Central | South | West |
|---|---|---|---|---|---|
| Dairy Products (Total) | 308.6 ± 5.3 | 318.6 ± 10.4 | 336.1 ± 10.0 | 253.6 ± 8.4 | 348.1 ± 12.3 |
| Fresh Cows Milk | 253.5 ± 4.9 | 256.1 ± 9.7 | 279.7 ± 9.4 | 211.0 ± 7.8 | 283.5 ± 11.5 |
| Other | 55.1 ± 1.2 | 62.5 ± 2.3 | 56.5 ± 2.2 | 42.6 ± 1.9 | 64.6 ± 2.7 |
| Eggs | 26.9 ± 0.5 | 23.8 ± 1.0 | 23.5 ± 0.9 | 31.0 ± 0.8 | 29.1 ± 1.2 |
| Meats (Total) | 172.2 ± 1.6 | 169.9 ± 3.3 | 176.9 ± 3.1 | 171.9 ± 2.6 | 168.6 ± 3.9 |
| Beef and Veal | 87.6 ± 1.1 | 82.3 ± 2.3 | 92.9 ± 2.2 | 84.0 ± 1.8 | 92.9 ± 2.7 |
| Pork | 28.2 ± 0.6 | 28.8 ± 1.1 | 29.6 ± 1.1 | 30.1 ± 0.9 | 22.1 ± 1.3 |
| Poultry | 31.3 ± 0.8 | 31.7 ± 1.5 | 26.6 ± 1.4 | 36.5 ± 1.2 | 28.9 ± 1.8 |
| Other | 25.1 ± 0.4 | 27.1 ± 0.9 | 27.8 ± 0.8 | 21.3 ± 0.7 | 24.7 ± 1.0 |

NOTE: Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

West = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, Washington, Oregon, and California.

Source: U.S. EPA, 1984b (based on 1977-78 NFCS).

**Table 11-18. Consumption of Meat, Poultry, and Dairy Products for Different Age Groups (averaged across sex), and Estimated Lifetime Average Intakes for 70 Kg Adult Citizens Calculated from the FDA Diet Data.**

| Produce | Baby (0-1 yrs) | Toddler 1-6 yrs) | Child (6-14 yrs) | Teen (14-20 yrs) | Adult (20-45 yrs) | Old (45-70 yrs) | Estimated Lifetime Intake[a] |
|---|---|---|---|---|---|---|---|
| | | | | g - dry weight/day | | | |
| Beef | 3.99 | 9.66 | 15.64 | 21.62 | 23.28 | 18.34 | 19.25 |
| Beef Liver | 0.17 | 0.24 | 0.30 | 0.36 | 1.08 | 1.2 | 0.89 |
| Lamb | 0.14 | 0.08 | 0.06 | 0.05 | 0.30 | 0.21 | 0.20 |
| Pork | 1.34 | 4.29 | 6.57 | 8.86 | 10.27 | 9.94 | 9.05 |
| Poultry | 2.27 | 3.76 | 5.39 | 7.03 | 7.64 | 6.87 | 6.70 |
| Dairy | 40.70 | 32.94 | 38.23 | 43.52 | 27.52 | 22.41 | 28.87 |
| Eggs | 3.27 | 6.91 | 7.22 | 7.52 | 8.35 | 9.33 | 8.32 |
| Beef Fat | 2.45 | 6.48 | 11.34 | 16.22 | 20.40 | 14.07 | 15.50 |
| Beef Liver Fat | 0.05 | 0.07 | 0.08 | 0.10 | 0.29 | 0.33 | 0.25 |
| Lamb Fat | 0.14 | 0.08 | 0.07 | 0.06 | 0.31 | 0.22 | 0.21 |
| Dairy Fat | 38.99 | 16.48 | 20.46 | 24.43 | 18.97 | 14.51 | 18.13 |
| Pork Fat | 2.01 | 8.19 | 10.47 | 12.75 | 14.48 | 13.04 | 12.73 |
| Poultry Fat | 1.10 | 0.83 | 1.12 | 1.41 | 1.54 | 1.31 | 1.34 |

[a] The estimated lifetime dietary intakes were estimated by:

$$\text{Estimated lifetime intake} = \frac{IR(0\text{-}1) + 5yrs * IR(1\text{-}5) + 8\ yrs * IR(6\text{-}13) + 6\ yrs * IR(14\text{-}19) + 25\ yrs * IR(20\text{-}44) + 25\ yrs * IR(45\text{-}70)}{70\ \text{years}}$$

where IR = the intake rate for a specific age group.

Source: U.S. EPA, 1989 (based in 1977-78 NFCS and NHANES II data).

**Table 11-19. Per Capita Consumption of Meat and Poultry in 1991[a]**

| Food Item | Per Capita Consumption Carcass[b] Weight (g/day)[f] | Per Capita Consumption RTC[c] (g/day)[f] | Per Capita Consumption Retail Cut Equivalent[d] (g/day)[f] | Per Capita Consumption Boneless Trimmed Equivalent[e] (g/day)[f] |
|---|---|---|---|---|
| **Red Meat** | | | | |
| Beef | 118.3 | --- | 82.8 | 78.4 |
| Veal | 1.5 | --- | 1.2 | 0.99 |
| Pork | 8.0 | --- | 62.1 | 58.3 |
| Lamb and Mutton | 2.0 | --- | 1.7 | 1.2 |
| Total[g] | 201.7 | --- | 147.9 | 139.1 |
| **Poultry** | | | | |
| Young Chicken | --- | --- | 78.3 | --- |
| Other Chicken | --- | --- | 1.7 | --- |
| Chicken | --- | 91.3 | --- | 54.5[h,i] |
| Turkey | --- | 22.2 | --- | 17.5[h] |
| Total[g] | --- | 109.2 | 77.0 | 72.1 |

[a] Includes processed meats and poultry in a fresh basis; excludes shipments to U.S. territories; uses U.S. total population, July 1, and does not include residents of the U.S. territories.

[b] Beef-Carcass-Weight is the weight of the chilled hanging carcass, which includes the kidney and attached internal fat [kidney, pelvic, and heart fat (kph)] but not head, feet, and unattached internal organs. Definitions of carcass weight for other red meats differ slightly.

[c] RTC - ready-to-cook poultry weight is the entire dressed bird which includes bones, skin, fat, liver, heart, gizzard, and neck.

[d] Retail equivalents in 1991 were converted from carcass weight by multiplying by a factor of 0.7, 0.83, 0.89, and 0.776 for beef, veal, lamb, and pork, respectively; 0.877 was the factor used each for young chicken and other chicken.

[e] Boneless equivalent for red meat derived from carcass weight in 1991 by using conversion factors of 0.663, 0.685, 0.658 and 0.729 for beef, veal, lamb, and pork, respectively; 0.597, 0.597 and 0.790 were the factors used for young chicken, other chicken, and turkey.

[f] Original data were presented in lbs; converted to g/day by multiplying by a factor of 453.6 g/lb and dividing by 365 days/yr.

[g] Computed from unrounded data.

[h] Includes skin, neck, and giblets.

[i] Excludes amount of RTC chicken going to pet food as well as some water leakage that occurs when chicken is cut-up before packaging.

Source: USDA, 1993.

**Table 11-20. Per Capita Consumption of Dairy Products in 1991[a]**

| Food Item | Per Capita Consumption (g/day)[j] |
|---|---|
| **Eggs** | |
| Farm Weight[b,e] | 37.8 |
| Retail Weight[c,e] | 37.3 |
| **Fluid Milk and Cream** | 289.7 |
| Plain Whole Milk | 105.3 |
| Lowfat Plain Milk (2%) | 98.1 |
| Lowfat Plain Milk (1%) | 25.8 |
| Skim Plain Milk | 29.7 |
| Whole Flavored Milk and Drink | 3.4 |
| Lowfat Flavored Milk and Drink | 8.5 |
| Buttermilk (lowfat and skim) | 4.2 |
| Half and Half Cream | 3.9 |
| Light Cream | 0.4 |
| Heavy Cream | 1.6 |
| Sour Cream | 3.2 |
| Eggnog | 0.5 |
| **Evaporated and Condensed Milk[i]** | |
| Canned Whole Milk | 2.6 |
| Bulk Whole Milk | 1.4 |
| Bulk and Canned Skim Milk | 6.2 |
| Total[e] | 10.2 |
| **Dry Milk Products[i]** | |
| Dry Whole Milk | 0.5 |
| Nonfat Dry Milk | 3.2 |
| Dry Buttermilk | 0.3 |
| Total[e] | 4.0 |
| Dried Whey | 4.5 |
| **Butter** | 5.2 |

| Food Item | Per Capita Consumption (g/day)[j] |
|---|---|
| **Cheese** | |
| American | |
| Cheddar | 11.2 |
| Other[d] | 2.5 |
| Italian | |
| Provolone | 0.8 |
| Romano | 0.2 |
| Parmesan | 0.6 |
| Mozzarella | 9.0 |
| Ricotta | 1.0 |
| Other | 0.07 |
| Miscellaneous | |
| Swiss[f] | 1.5 |
| Brick | 0.07 |
| Muenster | 0.5 |
| Cream | 1.9 |
| Neufchatel | 0.3 |
| Blue[g] | 0.2 |
| Other | 1.2 |
| Processed Products | |
| Cheese | 6.1 |
| Foods and spreads | 4.7 |
| Cheese Content | 8.5 |
| Consumed as Natural | 22.6 |
| Cottage Cheese (lowfat) | 1.6 |
| **Frozen Dairy Products** | |
| Ice Cream | 20.3 |
| Ice Milk | 9.2 |
| Sherbet | 1.5 |
| Other Frozen Products[h] | 5.3 |
| Total[e] | 36.4 |
| **All Diary Products** | |
| USDA Donations | 17.1 |
| Commercial Sales | 685.2 |
| Total | 702.4 |

[a] All per capita consumption figures use U.S. total populations, except fluid milk and cream data, which are based on U.S. residential population. For eggs, excludes shipments to U.S. territories, uses U.S. total population, July 1, which does not include U.S. territories.
[b] A dozen eggs converted at 1.57 pounds.
[c] The factor for converting farm weight to retail weight was 0.97 in 1960 and was increased 0.003 per year until 0.985 was reached in 1990.
[d] Includes Colby, washed curd, Monterey, and Jack.
[e] Computed from unrounded data.
[f] Includes imports of Gruyere and Emmenthaler.
[g] Includes Gorgonzola.
[h] Includes mellorine, frozen yogurt beginning 1981, and other nonstandardized frozen diary products.
[i] Includes quantities used in other dairy products.
[j] Original data were presented in lbs, conversions to g/day were calculated by multiplying by a factor of 453.6 and dividing by 365 days.
Source: USDA, 1993.

**Table 11-21. Adult Mean Daily Intake (as consumed) of Meat and Poultry Grouped by Region and Gender[a]**

| Food Item | Mean Daily Intake (g/day) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Region | | | | | | | | | |
| | Pacific | | Mountain | | North Central | | Northeast | | South | |
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| Beef | 84.8 | 52.8 | 89.8 | 59.6 | 86.8 | 55.9 | 71.8 | 46.6 | 87.3 | 54.9 |
| Pork | 18.6 | 12.6 | 23.7 | 16.8 | 26.5 | 18.8 | 22.4 | 15.9 | 24.4 | 17.2 |
| Lamb | 1.3 | 1.2 | 0.5 | 0.3 | 0.4 | 0.4 | 1.3 | 1.0 | 0.5 | 0.3 |
| Veal | 0.4 | 0.2 | 0.2 | 0.2 | 0.4 | 0.4 | 2.8 | 1.5 | 0.3 | 0.3 |
| Variety Meats/Game | 11.1 | 7.9 | 9.1 | 7.4 | 11.9 | 8.0 | 8.1 | 6.8 | 9.4 | 7.8 |
| Processed Meats | 22.8 | 15.4 | 22.9 | 13.2 | 26.3 | 15.8 | 21.2 | 15.5 | 26.0 | 17.0 |
| Poultry | 67.3 | 56.1 | 51.0 | 45.2 | 51.7 | 44.7 | 56.2 | 49.2 | 57.7 | 50.2 |

[a] Adult population represents consumers ages 19 and above.

NOTE: Pacific = Washington, Oregon and California

Mountain = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, and Nevada

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

Source: National Livestock and Meat Board, 1993.

Table 11-22. Amount (as consumed) of Meat Consumed by Adults Grouped by Frequency of Eatings[e]

| Frequency of Eatings | Percent of Total Eaters | Percent of Eaters | | Total Consumption for 14 Days (g) | Median Daily Intake (g/day) |
|---|---|---|---|---|---|
| | | Male | Female | | |
| Non-Meat Eaters[a] | 1% | 20 | 80 | None | None |
| Light Meat Eaters[b] | 30% | 27 | 73 | <1025 | 54 |
| Medium Meat Eaters[c] | 33% | 39 | 61 | 1025-1584 | 93 |
| Heavy Meat Eaters[d] | 36% | 73 | 27 | >1548 | 144 |

[a] A female who is employed and on a diet. She lives alone or in a small household (without children).
[b] Female who may or may not be on a diet. There are probably 2-4 people in her household but that number is not likely to include children.
[c] This person may be of either sex, might be on a diet, and probably lives in a household of 2-4 people, which may include children.
[d] Male who is not on a diet and lives in a household of 2-4 individuals, which may include children.
[e] Adult population represents consumers ages 19 and above.
Source: National Livestock and Meat Board, 1993.

Table 11-23. Quantity (as consumed) of Meat, Poultry, and Dairy Products Consumed Per Eating Occasion and the Percentage of Individuals Using These Foods in Three Days

| Food category | % Indiv. using food in 3 days | Quantity consumed per eating occasion (g) | | Consumers-only Quantity consumed per eating occasion at Specified Percentiles (g) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Standard Deviation | 5 | 25 | 50 | 75 | 90 | 95 | 99 |
| Meat[a] | 84.6 | 107 | 85 | 16 | 46 | 86 | 140 | 224 | 252 | 432 |
| Beef | 67.3 | 133 | 85 | 41 | 84 | 112 | 168 | 224 | 280 | 448 |
| Pork | 49.9 | 69 | 69 | 8 | 16 | 44 | 92 | 160 | 194 | 320 |
| Lamb | 1.5 | 146 | 84 | 43 | 88 | 123 | 184 | 227 | 280 | 448 |
| Veal | 2.3 | 130 | 71 | 42 | 84 | 112 | 168 | 224 | 276 | 352 |
| Poultry | 42.8 | 128 | 77 | 42 | 82 | 112 | 168 | 224 | 280 | 388 |
| Chicken | 38.7 | 131 | 76 | 43 | 84 | 112 | 170 | 224 | 280 | 388 |
| Turkey | 5.8 | 105 | 73 | 28 | 57 | 86 | 129 | 172 | 240 | 350 |
| Dairy Products | | | | | | | | | | |
| Eggs | 54.3 | 82 | 44 | 40 | 50 | 64 | 100 | 128 | 150 | 237 |
| Butter | 31.4 | 12 | 13 | 2 | 5 | 7 | 14 | 28 | 28 | 57 |
| Margarine | 43.1 | 11 | 11 | 2 | 5 | 7 | 14 | 28 | 28 | 57 |
| Milk[b] | 82.5 | 203 | 134 | 15 | 122 | 244 | 245 | 366 | 488 | 552 |
| Cheese[c] | 40 | 41 | 28 | 14 | 28 | 28 | 56 | 58 | 85 | 140 |

[a] Meat - beef, pork, lamb, and veal.
[b] Milk - fluid milk, milk beverages, and milk-based infant formulas.
[c] Cheese - natural and processed cheese.
Source: Pao et al., 1982 (based on 1977-78 NFCS).

Table 11-24. Percentage Lipid Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a]

| Product | Fat Percentage | Comment |
|---|---|---|
| **Meats** | | |
| Beef | | |
| Lean only | 6.16 | Raw |
| Lean and fat, 1/4 in. fat trim | 9.91 | Cooked |
| Brisket (point half) | 19.24 | Raw |
| Lean and fat | 21.54 | Cooked |
| Brisket (flat half) | | |
| Lean and fat | 22.40 | Raw |
| Lean only | 4.03 | Raw |
| Pork | | |
| Lean only | 5.88 | Raw |
| | 9.66 | Cooked |
| Lean and fat | 14.95 | Raw |
| | 17.18 | Cooked |
| Cured shoulder, blade roll, lean and fat | 20.02 | Unheated |
| Cured ham, lean and fat | 12.07 | Center slice |
| Cured ham, lean only | 7.57 | Raw, center, country style |
| Sausage | 38.24 | Raw, fresh |
| Ham | 4.55 | Cooked, extra lean (5% fat) |
| Ham | 9.55 | Cooked, (11% fat) |
| Lamb | | |
| Lean | 5.25 | Raw |
| | 9.52 | Cooked |
| Lean and fat | 21.59 | Raw |
| | 20.94 | Cooked |
| Veal | | |
| Lean | 2.87 | Raw |
| | 6.58 | Cooked |
| Lean and fat | 6.77 | Raw |
| | 11.39 | Cooked |
| Rabbit | | |
| Composite of cuts | 5.55 | Raw |
| | 8.05 | Cooked |
| Chicken | | |
| Meat only | 3.08 | Raw |
| | 7.41 | Cooked |
| Meat and skin | 15.06 | Raw |
| | 13.60 | Cooked |
| Turkey | | |
| Meat only | 2.86 | Raw |
| | 4.97 | Cooked |
| Meat and skin | 8.02 | Raw |
| | 9.73 | Cooked |
| Ground | 6.66 | Raw |

Table 11-24. Percentage Lipid Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a] (continued)

| Product | Fat Percentage | Comment |
|---|---|---|
| **Dairy** | | |
| Milk | | |
| Whole | 3.16 | 3.3% fat, raw or pasteurized |
| Human | 4.17 | Whole, mature, fluid |
| Lowfat (1%) | 0.83 | Fluid |
| Lowfat (2%) | 1.83 | Fluid |
| Skim | 0.17 | Fluid |
| Cream | | |
| Half and half | 18.32 | Table or coffee, fluid |
| Medium | 23.71 | 25% fat, fluid |
| Heavy-whipping | 35.09 | Fluid |
| Sour | 19.88 | Cultured |
| Butter | 76.93 | Regular |
| Cheese | | |
| American | 29.63 | Pasteurized |
| Cheddar | 31.42 | |
| Swiss | 26.02 | |
| Cream | 33.07 | |
| Parmesan | 24.50; 28.46 | Hard; grated |
| Cottage | 1.83 | Lowfat, 2% fat |
| Colby | 30.45 | |
| Blue | 27.26 | |
| Provolone | 25.24 | |
| Mozzarella | 20.48 | |
| Yogurt | 1.47 | Plain, lowfat |
| Eggs | 8.35 | Chicken, whole raw, fresh or frozen |

[a] Based on the lipid content in 100 grams, edible portion.
Source: USDA, 1979-1984.

| Table 11-25. Fat Content of Meat Products | | |
|---|---|---|
| **Meat Product**<br>**3-oz cooked serving (85.05 g)** | **Total Fat**<br>**(g)** | **Percent Fat**<br>**Content (%)** |
| Beef, retail composite, lean only | 8.4 | 9.9 |
| Pork, retail composite, lean only | 8.0 | 9.4 |
| Lamb, retail composite, lean only | 8.1 | 9.5 |
| Veal, retail composite, lean only | 5.6 | 6.6 |
| Broiler chicken, flesh only | 6.3 | 7.4 |
| Turkey, flesh only | 4.2 | 4.9 |
| Source: National Livestock and Meat Board, 1993 | | |

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**Table 11-26. Fat Intake, Contribution of Various Food Groups to Fat Intake, and Percentage of the Population in Various Meat Eater Groups of the U.S. Population**

| | Total Population | Heavy Meat Eaters | Medium Meat Eaters | Light Meat Eaters | Non-Meat Eaters |
|---|---|---|---|---|---|
| Average Fat Intake (g) | 68.3 | 84.5 | 62.5 | 53.5 | 32.3 |
| Percent of Population | 100 | 36 | 33 | 30 | 1 |
| Meat Group (%)[a] | 41 | 44 | 40 | 37 | 33 |
| Bread Group (%) | 24 | 23 | 24 | 26 | 25 |
| Milk Group (%) | 12 | 11 | 13 | 14 | 14 |
| Fruits (%) | 1 | 1 | 1 | 1 | 1 |
| Vegetables (%) | 9 | 9 | 9 | 9 | 11 |
| Fats/oil/sweets (%) | 13 | 12 | 13 | 14 | 17 |

[a] Meat Group includes meat, poultry, dry beans, eggs, and nuts.
Source: National Livestock and MeatBoard, 1993.

**Table 11-27. Mean Total Daily Dietary Fat Intake (g/day) Grouped by Age and Gender[a]**

| Age (yrs) | Total N | Total Mean Fat Intake (g/day) | Males N | Males Mean Fat Intake (g/day) | Females N | Females Mean Fat Intake (g/day) |
|---|---|---|---|---|---|---|
| 2-11 (months) | 871 | 37.52 | 439 | 38.31 | 432 | 36.95 |
| 1-2 | 1,231 | 49.96 | 601 | 51.74 | 630 | 48.33 |
| 3-5 | 1,647 | 60.39 | 744 | 70.27 | 803 | 61.51 |
| 6-11 | 1,745 | 74.17 | 868 | 79.45 | 877 | 68.95 |
| 12-16 | 711 | 85.19 | 338 | 101.94 | 373 | 71.23 |
| 16-19 | 785 | 100.50 | 308 | 123.23 | 397 | 77.46 |
| 20-29 | 1,882 | 97.12 | 844 | 118.28 | 638 | 76.52 |
| 30-39 | 1,628 | 93.84 | 736 | 114.28 | 791 | 74.06 |
| 40-49 | 1,228 | 84.90 | 626 | 99.26 | 602 | 70.80 |
| 50-59 | 929 | 79.29 | 473 | 96.11 | 456 | 63.32 |
| 60-69 | 1,108 | 69.15 | 646 | 80.80 | 560 | 59.52 |
| 70-79 | 851 | 61.44 | 444 | 73.35 | 407 | 53.34 |
| ≥ 80 | 809 | 54.61 | 290 | 68.09 | 313 | 47.84 |
| Total | 14,801 | 81.91 | 7,322 | 97.18 | 7,479 | 67.52 |
| ≥ 2 | 13,314 | 82.77 | 6,594 | 98.74 | 8,720 | 68.06 |

[a] Total dietary fat intake includes all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages (excluding plain drinking water).

Source: Adapted from CDC, 1994.

Table 11-28. Percentage Mean Moisture Content (Expressed as Percentages of 100 Grams of Edible Portions)[a]

| Food | Moisture Content Percent | Comments |
|---|---|---|
| **Meat** | | |
| Beef | 71.60 | Raw, composite, trimmed, retail cuts |
| Beef liver | 68.99 | Raw |
| Chicken (light meat) | 74.86 | Raw, without skin |
| Chicken (dark meat) | 75.99 | Raw, without skin |
| Duck - domestic | 73.77 | Raw |
| Duck - wild | 75.51 | Raw |
| Goose - domestic | 68.30 | Raw |
| Ham - cured | 66.92 | Raw |
| Horse | 72.63 | Raw, roasted |
| | 63.98 | Cooked, roasted |
| Lamb | 73.42 | Raw, composite, trimmed, retail cuts |
| Lard | 0.00 | |
| Pork | 70.00 | Raw |
| Rabbit - domestic | 72.81 | Raw |
| | 69.11 | Raw, roasted |
| Turkey | 74.16 | Cooked, roasted |
| **Dairy Products** | | |
| Eggs | 74.57 | Raw |
| Butter | 15.87 | Raw |
| Cheese American pasteurized | 39.16 | Regular |
| Cheddar | 36.75 | |
| Swiss | 37.21 | |
| Parmesan, hard | 29.16 | |
| Parmesan, grated | 17.66 | |
| Cream, whipping, heavy | 57.71 | |
| Cottage, lowfat | 79.31 | |
| Colby | 38.20 | |
| Blue | 42.41 | |
| Cream | 53.75 | |
| Yogurt | | |
| Plain, lowfat | 85.07 | |
| Plain, with fat | 87.90 | Made from whole milk |
| Human milk - estimated from USDA Survey | | |
| Human | 87.50 | Whole, mature, fluid |
| Skim | 90.80 | |
| Lowfat | 90.80 | 1% |

[a] Based on the water content in 100 grams, edible portion.
Source: USDA, 1979-1984.

Table 11-29. Summary of Meat, Poultry, and Dairy Intake Studies

| Study | Survey Population Used in Calculating Intake | Types of Data Used | Units | Food Items |
|---|---|---|---|---|
| **KEY STUDIES** | | | | |
| EPA Analysis of 1989-91 CSFII Data | Per capita | 1989-91 CSFII data; Based on 3-day average individual intake rates. | g/kg-day; as consumed | Distributions of intake rates for total meats and total dairy; individual food items. |
| **RELEVANT STUDIES** | | | | |
| AIHC, 1994 | Adults, Per Capita | USDA NFCS 1977-78 data presented in the 1989 version of the Exposure Factors Handbook that were analyzed by Finley and Paustenbach (1992). | g/day | Distribution for beef consumption presented in @Risk format. |
| EPA's DRES (White et al., 1983) | Per capita (i.e., consumers and nonconsumers) | 1977-78 NFCS 3-day individual intake data | g/kg-day; as consumed | Intake for a wide variety of meats, poultry, and dairy products presented; complex food groups were disaggregated |
| NLMB, 1993 | Adult daily mean intake rates | MRCA s Menu Census | g/day; as consumed | Intake rates for various meats by region and gender. |
| Pao et al., 1982 | Consumers only serving size data provided | 1977-78 NFCS 3-day individual intake data | g; as consumed | Distributions of serving sizes for meats, poultry, and diary products. |
| USDA, 1980; 1992; 1996a; 1996b | Per capita and consumer only grouped by age and sex | 1977-78 and 1987-88 NFCS, and 1994 and 1995 CSFII 1-day individual intake data | g/day; as consumed | Total meat, poultry and fish, total poultry, total milk, cheese and eggs. |
| USDA, 1993 | Per capita consumption based on "food disappearance" | Based on food supply and utilization data which were provided by National Agricultural Statistics Service (NASS), Customs Service reports, and trade associations. | g/day; as consumed | Intake rates of meats, poultry, and diary products; intake rates of individual food items. |
| U.S. EPA/ORP, 1984a; 1984b | Per capita | 1977-78 NFCS Individual intake data | g/day; as consumed | Mean intake rates for total meats, total diary products, and individual food items. |
| U.S. EPA/OST, 1989 | Estimated lifetime dietary intake | Based on FDA Total Diet Study Food List which used 1977-78 NFCS data, and NHANES II data | g/day; dry weight | Various food groups; complex foods disaggregated |

| Table 11-30. Summary of Recommended Values for Per Capita Intake of Meat and Dairy Products and Serving Size | | | |
|---|---|---|---|
| **Mean** | **95th Percentile** | **Multiple Percentiles** | **Study** |
| **Total Meat Intake** | | | |
| 2.1 g/kg-day | 5.1 g/kg-day | see Table 11-1 | EPA Analysis of CSFII 1989-91 Data |
| **Total Dairy Intake** | | | |
| 8.0 g/kg-day | 29.7 g/kg-day | see Table 11-2 | EPA Analysis of CSFII 1989-91 Data |
| **Individual Meat and Dairy Products** | | | |
| see Tables 11-3 to 11-7 | see Tables 11-3 to 11-7 | see Tables 11-3 to 11-7 | EPA Analysis of CSFII 1989-91 Data |

| Table 11-31. Confidence in Meats and Dairy Products Intake Recommendations | | |
|---|---|---|
| **Considerations** | **Rationale** | **Rating** |
| **Study Elements** | | |
| Level of peer review | USDA CSFII survey receives high level of peer review. EPA analysis of these data has been peer reviewed outside the Agency. | High |
| Accessibility | CSFII data are publicly available. | High |
| Reproducibility | Enough information is included to reproduce results. | High |
| Focus on factor of interest | Analysis is specifically designed to address food intake. | High |
| Data pertinent to U.S. | Data focuses on the U.S. population. | High |
| Primary data | This is new analysis of primary data. | High |
| Currency | Were the most current data publicly available at the time the analysis was conducted for this Handbook. | High |
| Adequacy of data collection period | Survey is designed to collect short-term data. | Medium confidence for average values; Low confidence for long term percentile distribution |
| Validity of approach | Survey methodology was adequate. | High |
| Study size | Study size was very large and therefore adequate. | High |
| Representativeness of the population | The population studied was the U.S. population. | High |
| Characterization of variability | Survey was not designed to capture long term day-to-day variability. Short term distributions are provided for various age groups, regions, etc. | Medium |
| Lack of bias in study design (high rating is desirable) | Response rate was adequate. | Medium |
| Measurement error | No measurements were taken. The study relied on survey data. | N/A |
| **Other Elements** | | |
| Number of studies | 1<br>CSFII was the most recent data set publicly available at the time the analysis was conducted for this Handbook. Therefore, it was the only study classified as key study. | Low |
| Agreement between researchers | Although the CSFII was the only study classified as key study, the results are in good agreement with earlier data. | High |
| **Overall Rating** | The survey is representative of U.S. population. Although there was only one study considered key, these data are the most recent and are in agreement with earlier data. The approach used to analyze the data was adequate. However, due to the limitations of the survey design, estimation of long-term percentile values (especially the upper percentiles) is uncertain. | High confidence in the average;<br>Low confidence in the long-term upper percentiles |

## REFERENCES FOR CHAPTER 11


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## DOWNLOADABLE TABLES FOR CHAPTER 11

The following selected tables are available for download as Lotus 1-2-3 worksheets.

Table 11-1. Per Capita Intake of Total Meats (g/kg-day as consumed) [WK1, 6 kb]

Table 11-2. Per Capita Intake of Total Dairy Products (g/kg-day as consumed) [WK1, 6 kb]

Table 11-3. Per Capita Intake of Beef (g/kg-day as consumed) [WK1, 6 kb]

Table 11-4. Per Capita Intake of Pork (g/kg-day as consumed) [WK1, 6 kb]

Table 11-5. Per Capita Intake of Poultry (g/kg-day as consumed) [WK1, 6 kb]

Table 11-6. Per Capita Intake of Game (g/kg-day as consumed) [WK1, 5 kb]

Table 11-7. Per Capita Intake of Eggs (g/kg-day as consumed) [WK1, 6 kb]

Table 11-23. Quantity (as consumed) of Meat, Poultry, and Dairy Products Consumed Per Eating Occasion and the Percentage of Individuals Using These Foods in Three Days [WK1, 2 kb]