# Composition of Foods
# Raw, Processed, Prepared
# USDA National Nutrient Database for Standard
# Reference, Release 20

February 2008

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USDA Nutrient Data Laboratory website: http://www.ars.usda.gov/nutrientdata

# Contents

**Errata**

Since the release of SR20 in September 2007, NDL Staff have found a few errors:

Columns pertaining to individual carotenoids, vitamin E and vitamin K have been misidentified in the Microsoft Excel version of the Abbreviated file and in the documentation. The documentation and the Microsoft Excel version have been corrected.  The ASCII file was correct. If you downloaded either of these files prior to February 21, 2008, please download the file again to get the correct version.

Several nutrient values in two food items have been changed:

   14461  Sports drink, COCA-COLA, POWERADE, lemon-lime flavored, ready-to-drink
   -  Values for iron, magnesium, zinc and copper have been updated
   03925  Infant formula, NESTLE, GOOD START ESSENTIALS SOY, with iron, ready-to-feed
   -  Value for thiamin has been updated.

These values have been updated in the search programs (online web search, PC search and PDA search), the Microsoft Access database for the full version, and the Microsoft Excel spreadsheet for the abbreviated file.  The corresponding pages in the individual page reports have been replaced.  None of the data in the Nutrient List reports are affected by these changes.

A file containing the patch is available for the ASCII files (the NUT_DATA file in the full version (File Name = SR20_Patch0208_NutDat.txt) and the ABBREV file for the abbreviated version (File Name = SR20_Patch0208_Abbrev.txt)).  Users who have imported or plan to import the database into their programs from the ASCII files will need to use this patch to update the appropriate files.

The changes included in the February 2008 patch file for SR20 will be included in the update files disseminated with SR21.

**Introduction**

The USDA National Nutrient Database for Standard Reference (SR) is the major source of food composition data in the United States. It provides the foundation for most food composition databases in the public and private sectors. As information is updated, new versions of the database are released. This version, Release 20 (SR20), contains data on 7,519 food items and up to 140 food components. It replaces SR19 issued in August 2006.

SR20 includes composition data for all the food groups and nutrients published in the 21 volumes of "Agriculture Handbook 8" (U.S. Department of Agriculture 1976−92), and its four supplements (U.S. Department of Agriculture 1990−93), which superseded the 1963 edition (Watt and Merrill, 1963). Since 1992, updated data have been published electronically on the USDA Nutrient Data Laboratory (NDL) website. SR20 supersedes all previous releases, including the printed versions, in the event of any differences.

With the first release of data from the new Nutrient Databank System (NDBS) in July 2001, formats were changed and fields added to improve the descriptive information for food items and the statistical information about the nutrient values. While data in previous releases have been moved to the new NDBS, they may not have been updated through the complete system. Therefore, many of these new fields contain data only for those items that have been processed through the new NDBS and it will take a number of years before they are populated for most food items in the database.

Data have been compiled from published and unpublished sources. Published sources include the scientific and technical literature. Unpublished data include those obtained from the food industry, other government agencies, and research conducted under contracts initiated by USDA Agricultural Research Service (ARS). These analyses are currently conducted under the National Food and Nutrient Analysis Program (NFNAP), in cooperation with the National Cancer Institute and 16 other offices and institutes of the National Institutes of Health (Pehrsson et al., 2000).   Data from the food industry represents the nutrient content of a specific food or food product at the time the data is sent to NDL.  The values may change due to reformulations or other processing changes by individual companies between the time that SR is released and the next update of the database. Values in the database may be based on the results of laboratory analyses or calculated by using appropriate algorithms, factors, or recipes, as indicated by the source code in the Nutrient Data file. Not every food item contains a complete nutrient profile.

**Specific Changes for SR20**

Several major changes to the database since the last release include the following:

- Expanded the nutrient values for total choline for all foods used in the Food and Nutrient Database for Dietary Surveys (FNDDS) (USDA, 2006).  This builds upon the nutrient values for total choline for approximately 500 foods from the USDA Database for the Choline Content of Common Foods (USDA, 2004), which were added to SR19 (2006).

- Added a number of new foods to the database using data generated by USDA through NFNAP or submitted by the food industry:  27 infant formulas; 225 brand name soups, sauces and gravies; 5 less common grains, raw and cooked; 7 types of soymilk, and 12 new chicken products (nuggets, tenders, patties, ground chicken and USDA commodity canned chicken), raw and cooked.  A complete list of the added food items is in the ADD_FOOD  file (p. 31).  In addition, many nutrient values in all food groups have been updated with new data including: 35 breakfast cereals, 6 vegetable oils and shortenings, and 10 sausage and luncheon meat items.  These can be found in the CHG_NUTR file (p. 32).

- Added 40 bone-in and boneless fried chicken items to Fast Foods, as well as 6 fast food side items. The fried chicken samples were sampled nationwide during the winter of 2005, based on the NFNAP sampling plan.  These items are identified by year of analysis in the database.  Since 2005, many fast food companies are transitioning or have transitioned to oil that has reduced the amount of *trans* fat in their products.  KFC announced in April 2007 that they switched to zero grams trans fat soybean cooking oil.  Discussions are underway with fast food fried chicken companies to obtain their data on reformulated foods to update these data.

- Added 19 traditional or subsistence foods collected for development of the American Indian/Alaska Native Foods Database.  These foods were hunted, harvested, fished, and prepared by tribal members.  Data developed for this project are shared with the tribes that provided the samples.  In many cases, the wild form of a plant or animal has a very different nutrient profile than its domesticated counterpart (e.g., berries, fish).  In almost all cases, these data are generated from a limited sampling.  Therefore, they are subject to revision as additional samples are analyzed.

- Conducted a study to determine the nutrient composition of fresh pork products.  Nationally representative samples of 9 pork cuts (shoulder blade steak, tenderloin, top loin chop, center loin chop, rib chop, top loin roast, sirloin roast, country style ribs, and spare ribs) were obtained from 12 locations nation-wide. Measurements of chop thickness, external fat thickness, and weights were determined.  Chops were cooked by broiling; blade steaks and country-style ribs were cooked by braising. All other cuts (top loin and sirloin roasts, tenderloin, and spareribs) were roasted. The samples were analyzed for nutrient content in both raw and cooked form. As a result of this study, values for  35 fresh pork cuts (separable lean only, and separable lean and fat) have been replaced in SR and one new pork cut (spare ribs, roasted) has been added. In addition to fresh pork cuts, three enhanced pork cuts (shoulder blade steak, tenderloin, top loin chop), both raw and cooked, were also included.

- Updated data on margarine and spreads.  Products no longer on the market have been removed and new analytical profiles for existing products now reflect major industry changes in oil ingredients.

- Deleted a number of brand name items in Soups, Sauces and Gravies; Beverages; Baked Products; and Meals, Entrees and Sidedishes because products were no longer on the

market or nutritional information does not reflect current market data.  A complete list of all the deleted food items can be found in the DEL_FOOD file (p. 32).

## Data Files

The data files for SR20 are in ASCII format. A description of each field in these files and the relationships between each begins on p. 20.  A Microsoft Access 2000 database is available. This database contains all the SR20 files and relationships, with a few sample queries and reports. An abbreviated file (p. 29), with fewer nutrients but all the food items is also included. A Microsoft Excel 2000 spreadsheet of this file is also provided.  These database and spreadsheet files are generally compatible with later releases of the same software package or with other software packages released at the same time.

## Reports

The data in SR20 are available as reports in two different presentations. The first presents items in SR20 as page images containing all the data for each food.  These data are separated into files by food groups. The second presentation contains selected foods and nutrients in SR20.  These reports are sorted either by food description or in descending order by nutrient content in terms of common household measures. The food items and weights in these reports are adapted from those in the "U.S. Department of Agriculture Home and Garden Bulletin 72, Nutritive Value of Foods" (Gebhardt and Thomas, 2002).

The Adobe Reader is needed to see these files. There is a link from the NDL website to Adobe's website where it can be downloaded at no charge.

## Database Content

The database consists of several sets of data:  food descriptions, nutrients, weights and measures, footnotes, and sources of data.  The sections below provide details about the information in each. More extensive details on many specific foods are available in the printed "Agriculture Handbook 8" sections (U.S. Department of Agriculture, 1976-92).

## <u>Food Descriptions</u>

This file includes descriptive information about the food items. For more details on the Food Description file, see "Food Description File Formats" (p. 22). A full description and a short description (containing abbreviations) are provided. Abbreviations used in creating short descriptions are given in Appendix A.  In creating the short description, the first word in the long description is not abbreviated.  In addition, if the long description was 25 characters or less, the short description contains no abbreviations. Abbreviations used elsewhere are given in Appendix B.  Brand names used in food descriptions are in upper case. Scientific names, common names, manufacturers' names, amounts of refuse, and refuse descriptions are provided where appropriate.  The food group to which the food item belongs is also indicated.  A code is also provided indicting if an item is used in the FNDDS. The factors used to calculate protein from nitrogen are included, as well as those used to calculate calories. There are no factors for items

prepared using the recipe program of the NDBS or for items where the manufacturer calculates protein and calories.

The refuse and refuse description fields contain amounts and descriptions of inedible material (for example, seeds, bone, and skin) for applicable foods. These amounts are expressed as a percentage of the total weight of the item as purchased, and they are used to compute the weight of the edible portion.  Refuse data were obtained from USDA-sponsored contracts and U.S. Department of Agriculture Handbooks 102 (Matthews and Garrison, 1975) and 456 (Adams, 1975).  To calculate "amount of nutrient in edible portion of 1 pound as purchased," use the following formula:

$$Y = V*4.536*[(100-R)/100]$$

where
$\quad$ Y = nutrient value per 1 pound as purchased,
$\quad$ V = nutrient value per 100 g (Nutr_Val in the Nutrient Data file), and
$\quad$ R = percent refuse (Refuse in the Food Description file).

For meat cuts containing bone and connective tissue, the amount of connective tissue is included in the value given for bone. Separable fat is not shown as refuse if the meat is described as separable lean and fat. Separable fat generally refers to seam fat and external trim fat.  Separable lean refers to muscle tissue that can be readily separated from the intact cut; it includes any fat striations (marbling) within the muscle. For boneless cuts, the refuse values apply to connective tissue or connective tissue plus separable fat.  The percentage yield of cooked, edible meat from 1 pound of raw meat with refuse can be determined by using the following formula:

$$Y = (W_c/453.6)*100$$

where
$\quad$ Y = nutrient value per 1 pound as purchased, and
$\quad$ $W_c$ = weight of cooked, edible meat.

## **Nutrients**

The Nutrient file contains mean nutrient values per 100 g, edible portion, along with fields to further describe the mean value. The following statistical attributes are provided to better describe the data:

- Nutrient value – the mean of the data values for a specific parameter.  Nutrient values have been rounded to the number of decimal places for each nutrient as specified in the Nutrient Definition file (p. 24).
- Number of data points – the number of data points used to estimate the mean.
- Standard error – the standard error of the mean; a measure of variability of the mean value.
- Number of studies—the number of analytical studies used to generate a mean. A study is a discrete research project on the analysis of foods. A study can be the analysis of one

nutrient in one food, one nutrient in many foods, or many nutrients in many foods.

- Minimum value—the smallest observed value in a range of values.
- Maximum value—the largest observed value in a range of values.
- Degrees of freedom—the number of data values that are free to vary after certain restrictions are placed on the estimates; used in probability calculations.
- Lower- and upper-error bounds—represent a range of values within which the population mean is expected to fall, given a pre-specified confidence level. For SR20 and related releases, the confidence level is 95 percent.
- Statistical comments—give additional details about certain assumptions made during statistical calculations. The definition of each comment is given after the description of the Nutrient Value file under "File Formats" (p. 23).

Other fields provide information on how the values are generated, as follows:

- Derivation code—gives more information about how a value was calculated or imputed. Procedures for imputing nutrient values were described by Schakel et al. (1997).
- Reference NDB number—indicates the NDB number of the food item that was used to impute a nutrient value for another food. This field is only populated for items added or updated since SR14.
- Added nutrient marker—a "Y" indicates that a mineral or vitamin was added for enrichment or fortification. This field is populated for ready-to-eat breakfast cereals and many brand name hot cereals in food group 8. In future releases, this field will be populated for other food groups.
- Confidence code—indicates the relative quality of the data. This code is derived using the data quality criteria first described by Mangels et al. (1993). These criteria have been expanded and enhanced for the new NDBS (Holden et al., 2002). This field is included as a placeholder for future releases.

For more details on the Nutrient Data file, see "Nutrient Data File Formats" (p. 23). Nutrient values indicate the total amount of the nutrient present in the edible portion of the food, including any nutrients added in processing. Table 1 gives an idea of the comprehensiveness of the database by listing for each nutrient the number of food items that contain data.

When nutrient data for prepared or cooked products were unavailable or incomplete, nutrient values were calculated from comparable raw items or by recipe. When values are calculated in a recipe or from the raw item, appropriate nutrient retention (USDA, 2003) and yield factors (Matthews and Garrison, 1975) are applied. To obtain the content of nutrient per 100 g of cooked food, the nutrient content per 100 g of raw food is multiplied by the nutrient retention factor and, when appropriate, adjustments are made for fat and moisture gains and losses.

Nutrient retention factors are based on data from USDA research contracts, research reported in the literature, and USDA publications. Most retention factors were calculated by the True Retention Method (%TR) (Murphy et al., 1975). This method, as shown below, accounts for the loss of solids from foods that occurs during preparation and cooking.

$\%TR = (N_c * G_c) / (N_r * G_r) * 100$

Where
    TR = true retention
    $N_c$ = nutrient content per g of cooked food,
    $G_c$ = g of cooked food,
    $N_r$ = nutrient content per g of raw food, and
    $G_r$ = g of food before cooking.

In general, levels of fortified nutrients are the values calculated by the manufacturer or NDL food specialists, based on the Nutrition Labeling and Education Act (NLEA) label declaration of % Daily Value (DV) (CFR, Title 21, Pt. 101) (U.S. Food and Drug Administration–Department of Health and Human Services, 2004). Such values represent the minimum nutrient level one can expect in the product. If analytical values were used to estimate levels of added nutrients, a number is present in the sample count field for these nutrients.

**Table 1.—Number of Foods in Database (*n* = 7519)**

| Nutr. No. | Nutrient | Number of foods | Nutr. No. | Nutrient | Number of foods |
|---|---|---|---|---|---|
| 255 | Water* [†] | 7515 | 306 | Potassium* [†] | 7019 |
| 208 | Energy* [†] | 7519 | 307 | Sodium* [†] | 7433 |
| 203 | Protein* [†] | 7519 | 309 | Zinc* [†] | 6829 |
| 204 | Total lipid (fat)* [†] | 7519 | 312 | Copper* | 6754 |
| 207 | Ash* [†] | 7513 | 315 | Manganese[†] | 5970 |
| 205 | Carbohydrate, by difference* [†] | 7519 | 317 | Selenium* [†] | 6118 |
| | | | 313 | Fluoride, F | 524 |
| 291 | Total dietary fiber* [†] | 6797 | 318 | Vitamin A (IU) [†] | 7206 |
| 209 | Starch | 557 | 320 | Vitamin A (RAE)* [†] | 6366 |
| 269 | Total sugars* [†] | 5040 | 319 | Retinol* [†] | 6272 |
| 210 | Sucrose | 958 | 321 | β-carotene* [†] | 4210 |
| 211 | Glucose | 952 | 322 | α-carotene* [†] | 4106 |
| 212 | Fructose | 944 | 334 | β-cryptoxanthin* [†] | 4096 |
| 213 | Lactose | 929 | 337 | Lycopene* [†] | 4065 |
| 214 | Maltose | 912 | 338 | Lutein+zeaxanthin* [†] | 4014 |
| 287 | Galactose | 801 | 324 | Vitamin D | 594 |
| 301 | Calcium* [†] | 7373 | 323 | α-tocopherol (vitamin E)* [†] | 4327 |
| 303 | Iron* [†] | 7393 | | | |
| 304 | Magnesium* [†] | 6838 | 573 | Added vitamin E* | 3353 |
| 305 | Phosphorus* [†] | 6903 | 341 | β-tocopherol | 1106 |

*Nutrients included in the USDA Food and Nutrient Database for Dietary Studies (FNDDS).
[†] Nutrients included in the Abbreviated file (p. 29)

**Table 1.—Number of Foods in Database ($n = 7519$)—(continued)**

| Nutr. No. | Nutrient | Number of foods | Nutr. No. | Nutrient | Number of foods |
|---|---|---|---|---|---|
| 342 | γ-tocopherol | 1101 | 615 | 20:0 | 1288 |
| 343 | δ-tocopherol | 1083 | 624 | 22:0 | 1138 |
| 430 | Vitamin K* [†] | 3932 | 654 | 24:0 | 621 |
| 401 | Vitamin C, total ascorbic acid* [†] | 7134 | 645 | Total monounsaturated fatty acids* [†] | 6773 |
| 404 | Thiamin* [†] | 6878 | 625 | 14:1 | 1224 |
| 405 | Riboflavin* [†] | 6884 | 697 | 15:1 | 861 |
| 406 | Niacin* [†] | 6876 | 626 | 16:1 undifferentiated* | 6065 |
| 410 | Pantothenic acid[†] | 6105 | 673 | 16:1 c | 153 |
| 415 | Vitamin $B_6$* [†] | 6669 | 662 | 16:1 t | 95 |
| 417 | Folate, total* [†] | 6582 | 687 | 17:1 | 887 |
| 431 | Folic acid* [†] | 6296 | 617 | 18:1 undifferentiated* | 6354 |
| 432 | Food folate* [†] | 6415 | 674 | 18:1 c | 378 |
| 435 | Folate (DFE)* [†] | 6288 | 663 | 18:1 t | 390 |
| 421 | Choline, total * [†] | 3299 | 628 | 20:1* | 5371 |
| 454 | Betaine | 1214 | 630 | 22:1 undifferentiated* | 4691 |
| 418 | Vitamin $B_{12}$* [†] | 6618 | 676 | 22:1 c | 99 |
| 578 | Added vitamin $B_{12}$* | 3412 | 664 | 22:1 t | 75 |
| 601 | Cholesterol* [†] | 7243 | 671 | 24:1 c | 291 |
| 636 | Phytosterols | 573 | 646 | Total polyunsaturated fatty acids* [†] | 6779 |
| 641 | β-Sitosterol | 73 | | | |
| 638 | Stigmasterol | 72 | 618 | 18:2 undifferentiated* | 6372 |
| 639 | Campesterol | 72 | 675 | 18:2 n-6 c,c | 350 |
| 221 | Alcohol* | 4314 | 666 | 18:2 i | 75 |
| 262 | Caffeine* | 4041 | 669 | 18:2 t,t | 172 |
| 263 | Theobromine* | 4019 | 665 | 18:2 t not further defined | 81 |
| 606 | Total saturated fatty acids* [†] | 7211 | 670 | 18:2 CLAs | 102 |
| 607 | 4:0* | 4434 | 619 | 18:3 undifferentiated* | 6255 |
| 608 | 6:0* | 4457 | 851 | 18:3 n-3 c,c,c | 565 |
| 609 | 8:0* | 4724 | 685 | 18:3 n-6 c,c,c | 538 |
| 610 | 10:0* | 5371 | 856 | 18:3 i | 35 |
| 611 | 12:0* | 5691 | 627 | 18:4* | 4443 |
| 696 | 13:0 | 219 | 672 | 20:2 n-6 c,c | 925 |
| 612 | 14:0* | 6106 | 689 | 20:3 undifferentiated | 945 |
| 652 | 15:0 | 1141 | 852 | 20:3 n-3 | 73 |
| 613 | 16:0* | 6331 | 853 | 20:3 n-6 | 82 |
| 653 | 17:0 | 1174 | 620 | 20:4 undifferentiated* | 5393 |
| 614 | 18:0* | 6317 | 855 | 20:4 n-6 | 9 |

*Nutrients included in the USDA Food and Nutrient Database for Dietary Studies (FNDDS).
[†] Nutrients included in the Abbreviated file (p. 29)

**Table 1.—Number of Foods in Database (*n* = 7519)—(continued)**

| Nutr. No. | Nutrient | Number of foods | Nutr. No. | Nutrient | Number of foods |
|---|---|---|---|---|---|
| 629 | 20:5 n-3* | 4668 | 506 | Methionine | 4700 |
| 857 | 21:5 | 79 | 507 | Cystine | 4632 |
| 858 | 22:4 | 157 | 508 | Phenylalanine | 4685 |
| 631 | 22:5 n-3* | 4612 | 509 | Tyrosine | 4654 |
| 621 | 22:6 n-3* | 4667 | 510 | Valine | 4688 |
| 605 | Fatty acids, total *trans* | 1213 | 511 | Arginine | 4674 |
| 693 | Fatty acids, total *trans-*monoenoic | 325 | 512 | Histidine | 4680 |
| | | | 513 | Alanine | 4627 |
| 695 | Fatty acids, total *trans-*polyenoic | 262 | 514 | Aspartic acid | 4629 |
| | | | 515 | Glutamic acid | 4631 |
| 501 | Tryptophan | 4643 | 516 | Glycine | 4629 |
| 502 | Threonine | 4687 | 517 | Proline | 4616 |
| 503 | Isoleucine | 4688 | 518 | Serine | 4628 |
| 504 | Leucine | 4689 | 521 | Hydroxyproline | 812 |
| 505 | Lysine | 4702 | | | |

*Nutrients included in the USDA Food and Nutrient Database for Dietary Studies (FNDDS).
[†] Nutrients included in the Abbreviated file (p. 29)

**Proximates.** The term proximate components refers to those macronutrients that include water (moisture), protein, total lipid (fat), total carbohydrate, and ash.

Protein. The values for protein were calculated from the level of total nitrogen (N) in the food, using the conversion factors recommended by Jones (1941). The analytical methods used to determine the nitrogen content of foods are AOAC 968.06 (4.2.04) and 990.03 (combustion) and 991.20 (Kjeldahl) (AOAC, 2003). The specific factor applied to each food item is provided in the N_Factor field in the Food Description file. The general factor of 6.25 is used to calculate protein in items that do not have a specific factor. There is no factor for items prepared using the recipe program of the NDBS or for items where the manufacturer calculates protein.

Protein values for chocolate, cocoa, coffee, mushrooms, and yeast were adjusted for nonprotein nitrogenous material. The adjusted protein conversion factors used to calculate protein for these items are as follows:

| | |
|---|---|
| chocolate and cocoa | 4.74 |
| coffee | 5.3 |
| mushrooms | 4.38 |
| yeast | 5.7 |

When these items were used as ingredients, such as chocolate in chocolate milk or yeast in bread, only their protein nitrogen content was used to determine their contribution to the calculated protein and amino acid content of the food. Protein calculated from total nitrogen, which may contain nonprotein nitrogen, was used in determining carbohydrate by difference.

This unadjusted protein value is not given in the Nutrient Data file for SR20; rather, it is given as a footnote in printed sections of "Agriculture Handbook 8."

For soybeans, nitrogen values were multiplied by a factor of 5.71 (Jones, 1941) to calculate protein. The soybean industry, however, uses 6.25 to calculate protein. The protein content of soy flours, soy meals, soy protein concentrates, and soy protein isolates is expressed both ways. The item calculated using the 6.25 factor is identified as "crude protein basis."

Total Lipid. The total lipid (fat) content of most foods was determined by gravimetric methods, including extraction methods such as those that use ether or a mixed solvent system of chloroform and methanol, or by acid hydrolysis. Total lipid determined by extraction is reported as Nutrient No. 204. It is sometimes referred to as "crude fat" and includes the weight of all lipid components, including glycerol, soluble in the solvent system. Nutrient No. 204 may not be identical to the fat level declared on food labels under the NLEA, where fat is expressed as the amount of triglyceride that would produce the analytically determined amount of lipid fatty acids and does not include other lipid components not soluble in the solvent system. The term "NLEA fat" is commonly referred to as "total fatty acids expressed as triglycerides."

Carbohydrate. Carbohydrate, when present, was determined as the difference between 100 and the sum of the percentages of water, protein, total lipid (fat), ash, and, when present, alcohol. Total carbohydrate values include total dietary fiber. Carbohydrate in beer and wine was determined by methods 979.06 (27.1.21) and 985.10 (28.1.18) of AOAC International (AOAC 2003), respectively. Total dietary fiber content was determined by enzymatic-gravimetric methods 985.29 and 991.43 of the AOAC (2003). Total sugars is the term used for the sum of the individual monosaccharides (galactose, glucose, and fructose) and disaccharides (sucrose, lactose, and maltose). Analytical data for individual sugars were determined using AOAC methods (2003), either high-performance liquid chromatography (HPLC) or gas-liquid chromatography (GLC). When analytical data for total sugars were unavailable for items in the FNDDS, values were imputed or obtained from manufacturers and trade associations. Starch was analyzed using the AOAC method 966.11 (2003). Because the analyses of total dietary fiber, total sugars, and starch are performed separately and reflect the analytical variability inherent to the measurement process, the sum of these carbohydrate fractions may not equal the carbohydrate-by-difference value.

Food Energy. Food energy is expressed in kilocalories (kcal) and kilojoules (kJ). One kcal equals 4.184 kJ. The data are for physiological energy, which is the energy value remaining after losses from digestion and metabolism, are deducted from gross energy. Calorie values, with the exception of multi-ingredient processed foods, are based on the Atwater system for determining energy values. Derivation of the Atwater calorie factors is discussed in "Agriculture Handbook 74" (Merrill and Watt, 1973). For multi-ingredient processed foods, calorie values (source codes 8 or 9; for more information on source codes, see p. 25) generally reflect industry practices (as permitted by NLEA) of calculating calories as 4, 4, or 9 calories per gram of protein, carbohydrate, and fat, respectively, or as 4, 4, or 9 calories per gram of protein, carbohydrate minus insoluble fiber, and fat. The latter method is often used for high-fiber foods.

Calorie factors for protein, fat, and carbohydrates are included in the Food Description file. For foods containing alcohol, a factor of 6.93 is used to calculate calories per gram of alcohol. No calorie factors are given for items prepared using the recipe program of the NDBS. Instead, total calories for these items equal the sums of the calories contributed by each ingredient after adjustment for changes in yield, as appropriate. For multi-ingredient processed foods, if the calories calculated by the manufacturer are reported, no calorie factors are given.

Calorie factors for fructose and sorbitol, not available in the Atwater system, were derived from the work of Livesay and Marinos (1988). Calorie factors for coffee and tea were estimated from those for seeds and vegetables, respectively.

**Minerals**. Minerals included in the database are calcium, iron, magnesium, phosphorus, potassium, sodium, zinc, copper, manganese, selenium, and fluoride. Levels of minerals for most foods were determined by methods of the AOAC (2003). Calcium, iron, magnesium, phosphorus, sodium, potassium, zinc, copper, and manganese were usually determined by atomic absorption (AOAC 985.35) and inductively coupled plasma emission spectrophotometry (AOAC 984.27).

Analytical data for selenium were published earlier by USDA (1992) and were determined by the modified selenium hydride and fluorometric methods. Selenium values from the NFNAP were determined by either the modified selenium hydride (AOAC 986.15) or stable isotope dilution gas chromatography-mass spectrometry (Reamer and Veillon, 1981) methods. The selenium content of plants, in particular cereal grains, is strongly influenced by the quantity of biologically available selenium in the soil in which the plants grow, that is, by their geographical origin (Kubota and Allaway, 1972). The values given are national averages and should be used with caution when levels of selenium in locally grown foods are of interest or concern.

Values for fluoride, previously released in the USDA National Fluoride Database of Selected Beverages and Foods, Release 2 (USDA, 2005), have been incorporated into SR20, but other analyzed values, including regional values, are not included in SR.  Samples were analyzed using a fluoride ion-specific electrode, direct read method (VanWinkle, 1995) for clear liquids and a micro-diffusion method (VanWinkle, 1995) for other food samples.

**Vitamins.** Vitamins included in the database are ascorbic acid (vitamin C), thiamin, riboflavin, niacin, pantothenic acid, vitamin $B_6$, vitamin $B_{12}$, folate, total choline and betaine, vitamin A, vitamin E ($\alpha$-tocopherol), vitamin K (phylloquinone), and vitamin D.

Ascorbic acid. In the current database system, all data for ascorbic acid are listed under Nutrient No. 401, total ascorbic acid, determined by the fluorometric method (AOAC 967.22).   Older values which have not been updated are primarily reduced ascorbic acid and were determined by the dichloroindophenol method (AOAC 967.21)

Thiamin, Riboflavin, and Niacin. Thiamin was determined chemically by the fluormetric method (AOAC 942.23).  Fluorometric (AOAC 970.65) or microbiological (AOAC 940.33) methods were used to measure riboflavin. Niacin was determined by microbiological methods (AOAC 944.13). The values for niacin are for preformed niacin only and do not include the niacin

contributed by tryptophan, a niacin precursor. The term "niacin equivalent" applies to the potential niacin value, that is, to the sum of the preformed niacin and the amount that could be derived from tryptophan (the mean value of 60 mg tryptophan is considered equivalent to 1 mg niacin (IOM, 1998)). Although not included in SR, niacin equivalents can be estimated:

mg Niacin equivalents = mg niacin + (mg tryptophan / 60)

Pantothenic acid, Vitamins $B_6$, and $B_{12}$. Pantothenic acid was determined microbiologically (AOAC 945.74 or 992.07). Vitamin $B_6$ was determined by microbiological methods (AOAC 961.15) and $B_{12}$ was also determined by microbiological methods (AOAC 952.20). Vitamin $B_{12}$ is found in foods of animal origin or those containing some ingredient of animal origin, for example, cake that contains eggs or milk. For foods that contain only plant products, the value for vitamin $B_{12}$ is assumed to be zero. Some reports contain values for vitamin $B_{12}$ in certain fermented foods (beer, soy sauce, and miso). It is believed that this $B_{12}$ is synthesized not by the microorganisms responsible for the fermentation of the food, but rather by other contaminating microorganisms. Therefore, one should not consider these foods to be a consistent source of vitamin $B_{12}$ (Liem et al., 1977).

The Dietary Reference Intakes (DRI) for vitamin $B_{12}$ recommend that people older than 50 years meet their Recommended Dietary Allowances (RDA) mainly by consuming foods fortified with vitamin $B_{12}$ or a vitamin $B_{12}$-containing supplement (IOM, 1998). Since vitamin $B_{12}$, added as a fortificant, may provide a significant source of the vitamin in the diet, a nutrient number (#578) for "added vitamin $B_{12}$" has been added to the database. In this release, there are about 260 foods fortified with vitamin $B_{12}$. The vast majority are breakfast cereals, infant formulas, and plant-based meat substitutes. For these foods, the value for total vitamin $B_{12}$ was used for "added vitamin $B_{12}$." Only a few cereals containing a milk ingredient would contain any intrinsic vitamin $B_{12}$. Milk-based infant formulas would contain intrinsic vitamin $B_{12}$. However, infants are not the population of concern for intake of fortified vitamin $B_{12}$. Plant-based meat substitutes would not contain intrinsic vitamin $B_{12}$.

Folate. Values are reported for folic acid, food folate, and total folate reported as µg of dietary folate equivalents (DFEs). These varied folate forms are included as described in the DRI report issued by the Institute of Medicine of the National Academies (IOM, 1998). RDAs for folate are expressed in DFEs, which take into account the greater bioavailability of synthetic folic acid compared with naturally occurring food folate.

To calculate DFEs for any single food, it is necessary to have separate values for naturally occurring food folate and added synthetic folic acid in that item.

µg DFE = µg food folate + (1.7 * µg folic acid)

Folate values for foods analyzed through NFNAP are generated using the trienzyme microbiological procedure (Martin et al., 1990). Microbiological methods measure total folate; for enriched foods, folic acid and food folate are not distinguished from each other. Therefore, to be able to calculate DFE, multi-ingredient enriched foods are analyzed by an additional microbiological procedure without enzymes to estimate the amount of added folic acid (Chun et

al., 2006). Food folate is then calculated by difference.

The addition of folic acid to enriched cereal-grain products subject to standards of identity began in the United States on January 1, 1998 (CFR, Title 21, Pts. 136–137). These products include flour, cornmeal and grits, farina, rice, macaroni, noodles, bread, rolls, and buns. Folic acid may continue to be added (with some restrictions on amounts) to breakfast cereals, infant formulas, medical foods, food for special dietary use, and meal replacement products.

For unenriched foods, food folate would be equivalent to total folate since folic acid (pteroylmonoglutamic acid) occurs rarely in foods. Therefore, the same value with its number of data points and standard error, if present, is used for total folate and food folate. The folic acid value is assumed to be zero.

For enriched cereal-grain products with standards of identity (flour, cornmeal and grits, farina, rice, macaroni, noodles, bread, rolls, and buns), the folic acid value is calculated by subtracting the analytical folate value before fortification from the analytical value for the fortified product.

Enriched ready-to-eat (RTE) cereals have generally included folic acid fortification for over 25 years. Therefore, food folate values (before fortification) were not readily available for these products. Food folate was estimated by means of the NDBS formulation program for a variety of high-consumption cereals. Mean folate values were calculated for categories of RTE cereals based on grain content. Added folic acid was then calculated by subtracting estimated food folate from the total folate content. Generally, food folate values represent a small proportion of the total folate in the fortified products.

Choline. Beginning with SR19, total choline and betaine values from the USDA Database for the Choline Content of Common Foods (USDA, 2004) were incorporated into SR. Values for the individual metabolites were not added to SR, but are available in the USDA Database for the Choline Content of Common Foods.

Choline compounds were extracted and partitioned into organic and aqueous phases using methanol and chloroform and analyzed directly by liquid chromatography - electrospray ionization -isotope dilution mass spectrometry (LC-ESI-IDMS) (Koc et al., 2002). Samples were analyzed for betaine and these choline-contributing compounds: free choline (Cho), glycerophosphocholine (GPC), phosphocholine (Pcho), phosphatidylcholine (Ptdcho), and sphingomyelin (SM).

Because there are metabolic pathways for the interconversion of Cho, GPC, Pcho, PtdCho, and SM (Zeisel et al., 1994), total choline content is calculated as the sum of these choline-contributing metabolites. Betaine values are not included in the calculation of total choline since the conversion of choline to betaine is irreversible (Zeisel et al., 2003).

Vitamin A. Beginning with SR15 (2002), in addition to the international units (IUs) that have been reported in the past, values for vitamin A in μg of retinol activity equivalents (RAEs) and μg of retinol are also reported. Values in μg of retinol equivalents (REs) were dropped from the database.

This change responds to new reference values for vitamin A issued by the Institute of Medicine of the National Academies (IOM, 2001). Along with the new DRIs, the panel recommended changing the factors used for calculating vitamin A activity from the individual provitamin A carotenoids and introduced RAE as a new unit for expressing vitamin A activity. One µg RAE is equivalent to 1 µg of all-*trans*-retinol, 12 µg of all-*trans*-β-carotene, or 24 µg of other provitamin A carotenoids. The RAE conversion factors are based on recent studies that show that the conversion of provitamin A carotenoids to retinol is only half as great as previously thought.

Vitamin A in IU will continue to be reported because it is still the unit used for nutrition labeling. One IU is equivalent to 0.3 µg retinol, 0.6 µg β-carotene, or 1.2 µg other provitamin-A carotenoids (NAS/NRC, 1989).

Individual carotenoids, β-carotene, α-carotene, β-cryptoxanthin, lycopene, and lutein+zeaxanthin are reported. The analytical data are from NFNAP, generated using HPLC methodology (AOAC 941.15) and from the scientific literature. Most analytical systems do not separate lutein and zeaxanthin, so these carotenoids are shown combined. These values supersede those in Holden et al., 1999.  Vitamin A values in IU and RAE were calculated from the individual carotenoids (β-carotene, α-carotene, and β-cryptoxanthin) using the appropriate factors. For food items used in the FNDDS, carotenoid values were imputed if analytical data were not available. For many of these items data were only available for vitamin A in IU. However, the variability in carotenoid levels due to cultivar, season, growing area, etc., as well as rounding within the NDBS, increases the difficulty in matching the calculated vitamin A values from imputed individual carotenoids to the existing IU values. As a result, the vitamin A IU value should agree within ±15 IU of the value calculated from individual carotenoids.

When individual carotenoids are not reported for plant foods (such as fruits, vegetables, legumes, nuts, cereal grains, and spices and herbs), µg RAE were calculated by dividing the IU value by 20. In foods of animal origin, such as eggs, beef, pork, poultry, lamb, veal, game, and fish (except for some organ meats and dairy), all of the vitamin A activity is contributed by retinol. For these foods, when analytical data were not available, µg RAE and µg of retinol were calculated by dividing the IU value by 3.33.

In foods that contain both retinol and provitamin A carotenoids, the amount of each of these components must be known to calculate RAE. Most of the vitamin A data in the database were received as IU. Therefore, the amounts of the provitamin A carotenoids and retinol had to be estimated based on the amount of retinol and provitamin A carotenoids in the ingredients. Once the components had been estimated, µg RAE were calculated as (IU from carotenoids/20) + (IU from retinol/3.33).  Micrograms of retinol were calculated as IU from retinol/3.33.

Vitamin E. Vitamin E activity for the RDA as defined by the DRI report (IOM, 2000) is now limited to the naturally occurring form and three synthetic forms of α-tocopherol. For this reason, α-tocopherol equivalents, which included vitamin E activity from α-, β-, γ-, and δ-tocopherols and α-, β-, and γ-tocotrienols, were dropped from the database in SR16. Tocopherols were determined by gas-liquid chromatography (GLC) or high-performance liquid chromatography (HPLC) (Lee et al., 1999). For those items in FNDDS, values are presented for

α-tocopherol. If analytical data were unavailable, values for α-tocopherol were imputed. When available, values are also presented for the other tocopherols.

In the DRI report for Vitamin E, different factors were used to calculate the milligram amount of α-tocopherol from IU of vitamin E (IOM, 2000). The factors vary depending upon the chemical form of α-tocopherol used to fortify the food where

mg of α-tocopherol in food, fortified food, or multivitamin

$= $ IU of the RRR-α-tocopherol compound $\times 0.67$ and

$= $ IU of the *all rac*-α-tocopherol compound $\times 0.45$.

Before SR16-1, the conversion factor for RRR-α-tocopherol was used for all vitamin E fortified foods. New α-tocopherol values have been calculated for breakfast cereals, most infant formulas and a few other foods that are fortified with vitamin E, where NDL confirmed that all rac-α-tocopherol was the form added. For more information about vitamin E in breakfast cereals, see the article in the January 2004 issue of the *American Journal of Clinical Nutrition* by Leonard et al. (2004).

The basis of the vitamin E tolerable upper intake level (UL), another reference value in the DRI report, was established using all forms of supplemental α-tocopherol (IOM, 2000). A new nutrient number (#573) has been added to identify quantities of "added vitamin E." In this release, there are about 125 food items that have values for added vitamin E greater than 0. For the majority of these food items the form added is synthetic vitamin E (all rac-α-tocopherol). To relate intakes of supplemental α-tocopherol to the UL, values for "added vitamin E" should be multiplied by 2 when the added form is synthetic vitamin E. Although the 2S-stereoisomers do not contribute to vitamin E activity for the RDA (IOM, 2000), they do contribute to the UL. Items that are fortified with RRR-α-tocopherol (natural vitamin E) are identified by a footnote and the added vitamin E can be used directly for contribution to the UL. The majority of foods that are fortified with vitamin E are infant formulas and breakfast cereals. For these foods, the value for total vitamin E was used for "added vitamin E"; the small amount of intrinsic vitamin E was not considered. In fortified peanut butter, the intrinsic vitamin E was calculated since it is a substantial amount.

Vitamin K. Much of the data for vitamin K were generated under NFNAP and supersede the values in the Provisional Table (PT-104) (Weihrauch and Chatra, 1994). Vitamin K is extracted with hexane, purified with solid phase extraction using silica columns, and quantitated using HPLC with chemical reduction and fluorescence detection. Losses are corrected using vitamin $K_{1(25)}$ as internal standard (Booth et al. 1994).

Vitamin D. Much of the data for vitamin D were published earlier in the Provisional Table (PT-108) (Weihrauch and Tamaki, 1991). Values for breakfast cereals were updated based on data received from the food industry; values for other food items were updated using data generated under NFNAP using liquid chromatography (AOAC 995.05 or 982.29). These new values supersede those in PT-108.

**Lipid Components.** Fatty acids are expressed as the actual quantity of fatty acid in g per 100 g of food and do not represent fatty acids as triglycerides. Historically, most fatty acid data were obtained as the percentage of fatty acid methyl esters and determined by GLC analyses (AOAC 996.06). These data were converted to g fatty acid per 100 g total lipid using lipid conversion factors and then to g fatty acid per 100 g edible portion of food using the total lipid content. Details of the derivation of lipid conversion factors were published by Weihrauch et al., 1977. In the redesigned NDBS, fatty acid data may be imported in a variety of units and converted within the system. No conversions are required if data are received as g fatty acid per 100 g edible portion of food. Data received as fatty acid esters and as triglycerides are converted to fatty acids using Sheppard conversion factors. Sheppard conversion factors are based on the molecular weights of the specific fatty acid and its corresponding esters (butyl or methyl) and triglyceride (Sheppard, 1992). When fatty acid data are received as percentages of fatty acid methyl esters, methyl esters are converted to fatty acids using Sheppard conversion factors and then multiplied by total lipid (Nutrient No. 204) to give g fatty acid per 100 g edible portion of food. Occasionally, total lipid values are available from a variety of data sources, but individual fatty acids are available from fewer references. In those cases, it may be necessary to normalize the individual fatty acids to the mean fat value of the food item. In the case of normalized fatty acids, the sum of the individual fatty acids will equal the mean fat value multiplied by the Weihrauch (1977) lipid conversion factor for that food item. No statistics of variability are reported for normalized fatty acids.

Individual Fatty Acids. The basic format for describing individual fatty acids is that the number before the colon indicates the number of carbon atoms in the fatty acid chain, and the number after the colon indicates the number of double bonds. For unsaturated fatty acids, additional nutrient numbers have been added to accommodate the reporting of many specific positional and geometric isomers. Of the specific isomers, there are two basic classifications considered: omega double bond position and *cis/trans* configuration of double bonds.

Omega-3 and omega-6 isomers are denoted in shorthand nomenclature as n-3 and n-6. The n-number indicates the position of the first double bond from the methyl end of the carbon chain. The letter *c* or *t* indicates whether the bond is *cis* or *trans*. For polyunsaturated fatty acids, *cis* and *trans* configurations at successive double bonds may be indicated. For example, linoleic acid is an 18 carbon omega-6 fatty acid with 2 double bonds, both in *cis* configuration. When data are isomer specific, linoleic acid is described as 18:2 n-6 c,c. Other isomers of 18:2, for which new nutrient numbers have been assigned, include 18:2 c,t, 18:2 t,c, and 18:2 t,t; 18:2 t not further defined and 18:2 i. 18:2 i is not a single isomer but includes isomers other than 18:2 n-6 c,c with peaks that cannot be easily differentiated in the particular food item. Systematic and common names for fatty acids are given in Table 2.

Table 2 is provided for the convenience of users in attaching common names or systematic names to fatty acids in this database. Though individual fatty acids are more specific than in past releases, it is not possible to include every possible geometric and positional isomer. Where specific isomers exist for a fatty acid, the common name of the most typical isomer is listed for the undifferentiated fatty acid and an asterisk (*) designates the specific isomer by that name. The most typical isomer for 18:1 is oleic. Thus, the specific isomer by that name, 18:1 c, is

designated in Table 2 as oleic.

**Table 2.—Systematic and Common Names for Fatty Acids**

| Fatty acid | Systematic name | Common name of most typical isomer | Nutrient number |
|---|---|---|---|
| Saturated fatty acids | | | |
| 4:0 | butanoic | butyric | 607 |
| 6:0 | hexanoic | caproic | 608 |
| 8:0 | octanoic | caprylic | 609 |
| 10:0 | decanoic | capric | 610 |
| 12:0 | dodecanoic | lauric | 611 |
| 13:0 | tridecanoic | | 696 |
| 14:0 | tetradecanoic | myristic | 612 |
| 15:0 | pentadecanoic | | 652 |
| 16:0 | hexadecanoic | palmitic | 613 |
| 17:0 | heptadecanoic | margaric | 653 |
| 18:0 | octadecanoic | stearic | 614 |
| 20:0 | eicosanoic | arachidic | 615 |
| 22:0 | docosanoic | behenic | 624 |
| 24:0 | tetracosanoic | lignoceric | 654 |
| | | | |
| Monounsaturated fatty acids | | | |
| 14:1 | tetradecenoic | myristoleic | 625 |
| 15:1 | pentadecenoic | | 697 |
| 16:1 undifferentiated | hexadecenoic | palmitoleic | 626 |
| 16:1 c | | | 673* |
| 16:1 t | | | 662 |
| 17:1 | heptadecenoic | | 687 |
| 18:1 undifferentiated | octadecenoic | oleic | 617 |
| 18:1 c | | | 674* |
| 18:1 t | | | 663 |
| 20:1 | eicosenoic | gadoleic | 628 |
| 22:1 undifferentiated | docosenoic | erucic | 630 |
| 22:1 c | | | 676* |
| 24:1 c | cis-tetracosenoic | nervonic | 671 |

* Designates the specific isomer associated with the common name; the typical isomer is listed for the undifferentiated fatty acid.

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**Table 2.—Systematic and Common Names for Fatty Acids—(continued)**

| Fatty acid | Systematic name | Common name of most typical isomer | Nutrient number |
|---|---|---|---|
| Polyunsaturated fatty acids | | | |
| 18:2 undifferentiated | octadecadienoic | linoleic | 618 |
| 18:2 t not further defined | | | 665 |
| 18:2 n-6 c,c | | | 675* |
| 18:2 i | | | 666 |
| 18:2 t,t | | | 669 |
| 18:3 | octadecatrienoic | linolenic | 619 |
| 18:3 n-3 c,c,c | | alpha-linolenic | 851* |
| 18:3 n-6 c,c,c | | gamma-linolenic | 685 |
| 18:4 undifferentiated | octadecatetraenoic | parinaric | 627 |
| 20:2 n-6 c,c | eicosadienoic | | 672 |
| 20:3 undifferentiated | eicosatrienoic | | 689 |
| 20:3 n-3 | | | 852 |
| 20:3 n-6 | | | 853 |
| 20:4 undifferentiated | eicosatetraenoic | arachidonic | 620 |
| 20:4 n-6 | | | 855 |
| 20:5 n-3 | eicosapentaenoic (EPA) | timnodonic | 629 |
| 21:5 | | | 857 |
| 22:4 | | | 858 |
| 22:5 n-3 | docosapentaenoic (DPA) | clupanodonic | 631 |
| 22:6 n-3 | docosahexaenoic (DHA) | | 621 |

* Designates the specific isomer associated with the common name; the typical isomer is listed for the undifferentiated fatty acid.

Fatty acid totals. Only a small portion of the fatty acid data received for release in SR20 contains specific positional and geometric isomers. Therefore, it has been necessary to maintain the usual nutrient numbers corresponding to fatty acids with no further differentiation other than carbon length and number of double bonds. To aid users of our data, specific isomers are always summed to provide a total value for the undifferentiated fatty acid. Thus, mean values for the specific isomers of 18:2 would be summed to provide a mean for 18:2 undifferentiated (Nutrient No. 618). Other fatty acid totals provided are (1) the sum of saturated, monounsaturated, and polyunsaturated fatty acids and (2) the sum of *trans*-monoenoic, the sum of *trans*-polyenoic, and the sum of all *trans* fatty acids.

Values for total saturated, monounsaturated, and polyunsaturated fatty acids may include individual fatty acids not reported; therefore, the sum of their values may exceed the sum of the individual fatty acids. In rare cases, the sum of the individual fatty acids may exceed the sum of the values given for the total saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA). These differences are generally caused by rounding and may be relatively small.

For multi-ingredient processed brand-name foods, industry data were often available for fatty acid classes (SFA, MUFA, and PUFA) but were lacking for individual fatty acids. In these cases, individual fatty acids were calculated from the fatty acids of the individually listed ingredients and normalized to the total fat level. A best-fit approximation was made to fatty acid classes, but unavoidably, calculated sums of individual fatty acid totals did not always match industry data for fatty acid classes. Zero values for individual fatty acids should be understood to mean that trace amounts may be present. When g fatty acids per 100 g of total lipid were converted to g fatty acids per 100 g of food, values of less than 0.0005 were rounded to 0.

Cholesterol. Cholesterol values were generated primarily by GLC procedures (AAOC 994.10). It is assumed that cholesterol is present only in foods of animal origin and foods containing at least one ingredient of animal origin (for example, cake that contains eggs). For mixtures containing ingredients derived from animal products, the cholesterol value may have been calculated from the value for those ingredients. For foods that contain only plant products, the value for cholesterol is assumed to be zero.

Plant sterols. Data on plant sterols (campesterol, stigmasterol, and β-sitosterol) were obtained by gas-chromatographic procedures (AOAC 967.18) and summed to calculate total phytosterols.

**Amino Acids.** Amino acid data for a class or species of food are aggregated to yield a set of values that serve as the pattern for calculating the amino acid profile of other similar foods. The amino acid values for the pattern are expressed on a per-gram-of-nitrogen basis. Amino acids are extracted in three groups—tryptophan, sulfur-containing amino acids (methionine and cystine), and all others. Tryptophan is determined by alkaline hydrolysis/HPLC (AOAC 988.15), methionine and cystine by performic oxidation/HPLC (AOAC 994.12) and all others by acid hydrolysis/HPLC (AOAC 982.30). The amino acid patterns and the total nitrogen content were used to calculate the levels of individual amino acids per 100 g of food, using the following formula:

$$AA_f = (AA_n * V_p )/N_f$$
where

$AA_f$ = amino acid content per 100 g of food,
$AA_n$ = amino acid content per g of nitrogen,
$V_p$ = protein content of food, and
$N_f$ = nitrogen factor.

In the past, the number of data points appeared only on the food item for which the amino acid pattern was developed, not on other foods that used the same pattern. It referred to the number of observations used in developing the amino acid pattern for that food. For foods processed in the new NDBS, the number of observations used in developing an amino acid pattern will be released only with the pattern. The amino acid profiles calculated from these patterns will show the number of data points to be zero.

If amino acid values are presented for an item with more than one protein-containing ingredient, the values may have been calculated on a per-gram-of-nitrogen basis from the amino acid

patterns of the various protein-containing ingredients. Then the amino acid contents for an item on the 100-g basis were calculated as the sum of the amino acids in each protein-containing ingredient multiplied by total nitrogen in the item.

## Weights and Measures

Information is provided on household measures for food items (for example, 1 cup, 1 tablespoon, 1 fruit, 1 leg). Weights are given for edible material without refuse, that is, the weight of an apple without the core or stem, or a chicken leg without the bone, and so forth. The Weight file contains the gram weights and measure descriptions for each food item. This file can be used to calculate nutrient values for food portions from the values provided per 100 g of food. The following formula is used to calculate the nutrient content per household measure:

$$N = (V*W)/100$$

where

$N$ = nutrient value per household measure,
$V$ = nutrient value per 100 g (Nutr_Val in the Nutrient Data file), and
$W$ = g weight of portion (Gm_Wgt in the Weight file).

The Weight file can be used to produce reports showing the household measure and nutrient values calculated for that portion. The weights were derived from published sources, industry files, studies conducted by USDA (Adams, 1975; Fulton et al., 1977), and the weights and measures used in the FNDDS (2006). Though special efforts were made to provide representative values, weights and measures obtained from different sources vary considerably for some foods. The format of this file is described on p. 27.

## Footnotes

Footnotes are provided for a few items where information about food description, weights and measures, or nutrient values could not be accommodated in existing fields. For example, if citric acid was added to a juice drink, this is indicated in the footnote. The format of this file is described on p. 27.

## Sources of Data

This file (previously called References) was first added with SR14 (2001). The name and some of the fields were changed to reflect the fact that not all sources are journals or published literature, but also include the results of unpublished data from USDA-sponsored research and from research sponsored by others either separately or in collaboration with USDA. It contains data sources for the nutrient values and links to an identification number on each nutrient record. Since many of the data in this release were carried forward from SR13 (1999), nutrient-specific source documentation was not electronically available. As new data for these foods are generated and as additional documentation is entered into the new NDBS, data source information will increase in future releases. The format of this file is described on p. 28.

A file, the Sources of Data Link file, is provided to allow users to establish a relationship between the Sources of Data file and the Nutrient Data file. This lets the user identify specific sources of data for each nutrient value. For example, the user can use these files to identify where NFNAP data is used in the database. The format of this file is described on p. 28.

**Explanation of File Formats**

The data appear in two different organizational formats. One is a relational format of four principal and six support files making up the database. The relational format is complete and contains all food, nutrient, and related data. The other is a flat abbreviated file with all the food items, but fewer nutrients, and not all of the other related information. The abbreviated file does not include values for starch, fluoride, betaine, added vitamin E and added vitamin $B_{12}$, alcohol, caffeine, theobromine, vitamin D, phytosterols, or individual amino acids, fatty acids, and sugars.

**Relational Files**

The four principal files are the Food Description file, Nutrient Data file, Gram Weight file, and Footnote file. The six support files are the Nutrient Definition file, Food Group Description file, Source Code file, Data Derivation Code Description file, Sources of Data file, and Sources of Data Link file. Table 3 shows the number of records in each file. In a relational database, these files can be linked together in a variety of combinations to produce queries and generate reports (Figure 1).

**Table 3.—Number of Records in Principal and Support Files**

| File name | Table name | Number of records |
|---|---|---|
| Principal files | | |
| Food Description | FOOD_DES | 7,519 |
| Nutrient Data | NUT_DATA | 520,378 |
| Weight | WEIGHT | 13,360 |
| Footnote | FOOTNOTE | 292 |
| Support files | | |
| Food Group Description | FD_GROUP | 24 |
| Nutrient Definition | NUTR_DEF | 140 |
| Source Code | SRC_CD | 10 |
| Data Derivation Description | DERIV_CD | 54 |
| Sources of Data | DATA_SRC | 459 |
| Sources of Data Link | DATSRCLN | 123,527 |

**Figure 1.** Relationships among files in the USDA National Nutrient Database for Standard Reference

```
┌─────────────────────────┐                      ┌─────────────────────────────┐
│ Food Description File   │─────────────────────▶│ Food Group Description File │
│   NDB No.               │                      │   Food Group Code           │
│   Food Group Code       │                      └─────────────────────────────┘
└─────────────────────────┘
       │         │
       │         ▼
       │   ┌─────────────────────┐              ┌─────────────────────────┐
       │   │ Footnote File       │         ┌───▶│ Nutrient Definition File│
       │   │   NDB No.           │         │    │   Nutrient No.          │
       │   └─────────────────────┘         │    └─────────────────────────┘
       │         │                         │
       │         ▼                         │    ┌─────────────────────────┐
       │   ┌─────────────────────┐         ├───▶│ Source Code File        │
       │   │ Nutrient Data File  │         │    │   Source Code           │
       │   │   NDB No.           │─────────┤    └─────────────────────────┘
       ├──▶│   Nutrient No.      │         │
       │   │   Source Code       │         │    ┌─────────────────────────┐
       │   │   Derivation Code   │         ├───▶│ Data Derivation File    │
       │   └─────────────────────┘         │    │   Data Derivation Code  │
       │                                   │    └─────────────────────────┘
       │                                   │
       │   ┌─────────────────────┐         │    ┌─────────────────────────┐
       └──▶│ Weight File         │         └───▶│ Sources of Data Link File│
           │   NDB No.           │              │   NDB No,               │
           └─────────────────────┘              │   DataSrc_ID            │
                                                └─────────────────────────┘
                                                            │
                                                            ▼
                                                ┌─────────────────────────┐
                                                │ Sources of Data File    │
                                                │   DataSrc_ID            │
                                                └─────────────────────────┘
```
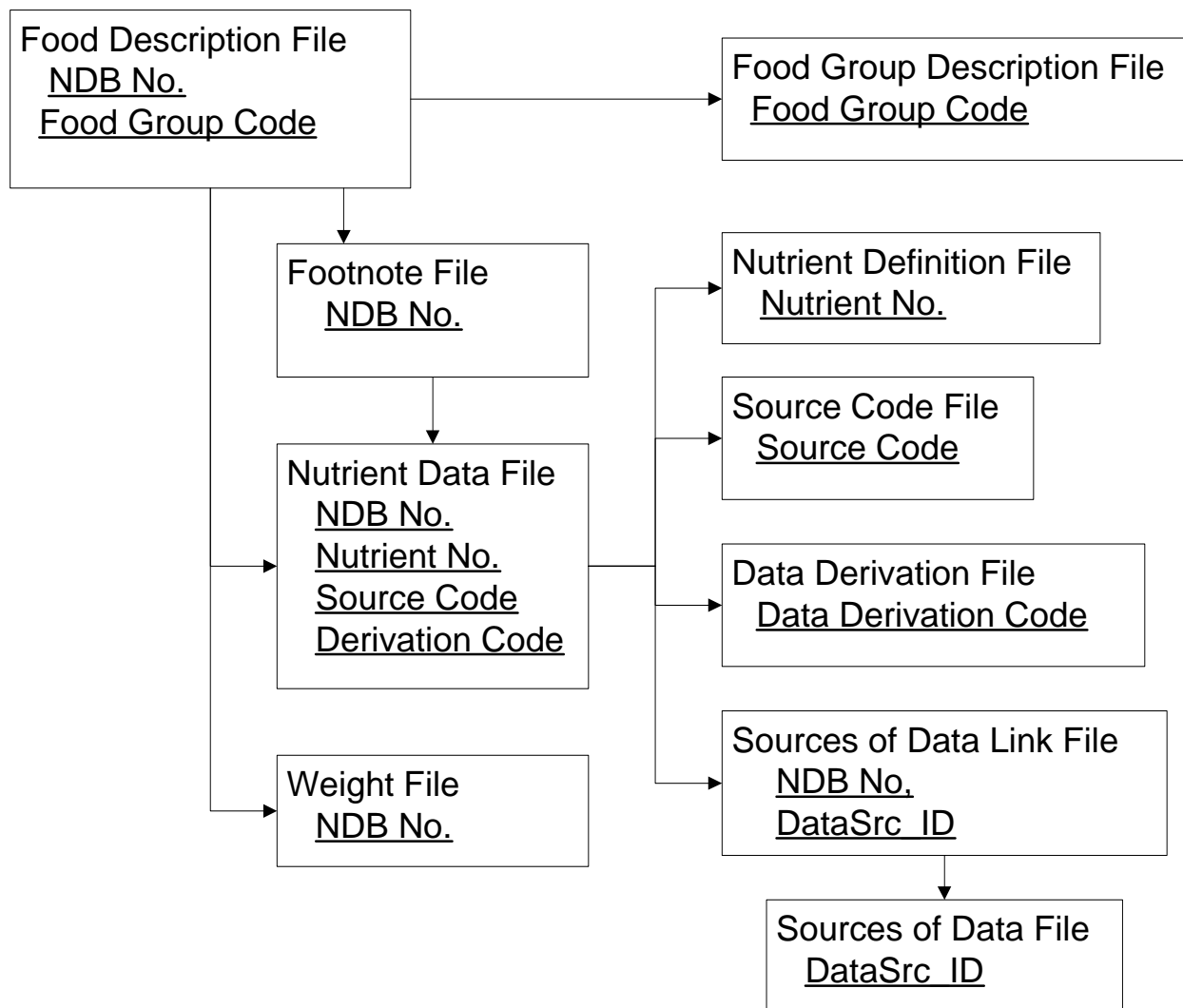
The relational files are in both ASCII format and a Microsoft Access 2000 database. Tables 4–13 describe the formats of these files. Information on the relationships that can be made among these files is also given. Fields that always contain data and fields that can be left blank or null are identified in the "blank" column; N indicates a field that is always filled; Y indicates a field that may be left blank (null) (Tables 4–13). An asterisk (*) indicates that this is an index field for the file. Though the ASCII files are not indexed, the file descriptions show where indices were used to sort and manage records within the NDBS. When importing these files into a database management system, if files are to be indexed, it is important to use the indices listed here, particularly with the Nutrient Data file, which uses two.

ASCII files are delimited. All fields are separated by carets (^) and text fields are surrounded by tildes (~). A double caret (^^) or two carets and two tildes (~~) appear when a field is null or blank. Format descriptions include the name of each field, its type [N = numeric with width and number of decimals (w.d) and A = alphanumeric], and maximum length. The actual length in the

data files may be less and most likely will change in later releases. Values will be padded with zeroes when imported into various software packages, depending on the formats used.

**Food Description File** (file name = FOOD_DES). The Food Description file (Table 4) contains a long and short description and food group for 7,519 food items, along with common names, manufacturer name, scientific name, percentage and description of refuse, and factors used for calculating protein and calories, if applicable. Items used in the FNDDS are also identified.

- Links to the Food Group Description file by the FdGrp_Cd field
- Links to the Nutrient Data file by the NDB_No field
- Links to the Weight file by the NDB_No field
- Links to the Footnote file by the NDB_No field
- Links to Sources of Data file by the NDB_No field through the Sources of Data Link file

**Table 4.—Food Description File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| NDB_No | A 5* | N | 5-digit Nutrient Databank number that uniquely identifies a food item |
| FdGrp_Cd | A 4 | N | 4-digit code indicating food group to which a food item belongs |
| Long_Desc | A 200 | N | 200-character description of food item |
| Shrt_Desc | A 60 | N | 60-character abbreviated description of food item. Generated from the 200-character description using abbreviations in appendix A. If short description was longer than 60 characters, additional abbreviations were made. |
| ComName | A 100 | Y | Other names commonly used to describe a food, including local or regional names for various foods, for example, "soda" or "pop" for "carbonated beverages" |
| ManufacName | A 65 | Y | Indicates the company that manufactured the product, when appropriate |
| Survey | A 1 | Y | Indicates if the food item is used in the USDA Food and Nutrient Database for Dietary Studies (FNDDS) and has a complete nutrient profile for a specified set of nutrients |
| Ref_desc | A 135 | Y | Description of inedible parts of a food item (refuse), such as seeds or bone |
| Refuse | N 2 | Y | Percentage of refuse |
| SciName | A 65 | Y | Scientific name of the food item. Given for the least processed form of the food (usually raw), if applicable |

| | | | |
|---|---|---|---|
| N_Factor | N 4.2 | Y | Factor for converting nitrogen to protein  (see p. 8) |
| Pro_Factor | N 4.2 | Y | Factor for calculating calories from protein (see p. 9) |
| Fat_Factor | N 4.2 | Y | Factor for calculating calories from fat (see p. 9) |
| CHO_Factor | N 4.2 | Y | Factor for calculating calories from carbohydrate (see p. 9) |

\* Index field for the Food Description file.

**Food Group Description File**  (file name = FD_GROUP). This file (Table 5) is a support file to the Food Description file and contains a list of food groups used in SR20 and their descriptions.

- Links to the Food Description file by FdGrp_Cd

**Table 5.—Food Group Description File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| FdGrp_Cd | A 4* | N | 4-digit code identifying a food group. Only the first 2 digits are currently assigned. In the future, the last 2 digits may be used. Codes may not be consecutive. |
| FdGrp_Desc | A 60 | N | Name of food group |

\* Index field for the Food Group Description file.

**Nutrient Data File**  (file name = NUT_DATA)**.** The Nutrient Data file (Table 6) contains the nutrient values and information about the values, including expanded statistical information.

- Links to the Food Description file by NDB_No.
- Links to the Weight file by NDB_No.
- Links to the Footnote file by NDB_No and when applicable, Nutr_No.
- Links to the Nutrient Definition file by Nutr_No.
- Links to the Source Code file by Src_Cd
- Links to the Derivation Code file by Deriv_Cd

**Table 6.—Nutrient Data File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| NDB_No | A 5* | N | 5-digit Nutrient Databank number |
| Nutr_No | A 3* | N | Unique 3-digit identifier code for a nutrient |
| Nutr_Val | N 10.3 | N | Amount in 100 grams, edible portion † |
| Num_Data_Pts | N 5.0 | N | Number of data points (previously called Sample_Ct) |
| Std_Error | N 8.3 | Y | Standard error of the mean. Null if could not be calculated |
| Src_Cd | A 2 | N | Code indicating type of data |

| Deriv_Cd | A 4 | Y | Data Derivation Code giving specific information on how the value was determined |
|---|---|---|---|
| Ref_NDB_No | A 5 | Y | NDB number of the item used to impute a missing value. Populated only for items added or updated starting with SR14 |
| Add_Nutr_Mark | A 1 | Y | Indicates a vitamin or mineral added for fortification or enrichment. This field is populated for ready-to-eat breakfast cereals and many brand name hot cereals in food group 8. |
| Num_Studies | N 2 | Y | Number of studies |
| Min | N 10.3 | Y | Minimum value |
| Max | N 10.3 | Y | Maximum value |
| DF | N 2 | Y | Degrees of Freedom |
| Low_EB | N 10.3 | Y | Lower 95% error bound |
| Up_EB | N 10.3 | Y | Upper 95% error bound |
| Stat_cmt | A 10 | Y | Statistical comments. See definitions below. |
| CC | A 1 | Y | Confidence Code indicating data quality, based on evaluation of sample plan, sample handling, analytical method, analytical quality control, and number of samples analyzed. Not included in this release, but is planned for future releases. |

\* Index field for the Nutrient Data file.

† Nutrient values have been rounded to a specified number of decimal places for each nutrient. Number of decimal places is listed in the Nutrient Definition file.

Definitions of each Statistical Comment included in the Nutrient Data table follow:
1. The displayed summary statistics were computed from data containing some less-than values. Less-than, trace, and not-detected values were calculated.
2. The displayed degrees of freedom were computed using Satterthwaite's approximation (Korz and Johnson, 1988).
3. The procedure used to estimate the reliability of the generic mean requires that the data associated with each study be a simple random sample from all the products associated with the given data source (for example, manufacturer, variety, cultivar, and species).
4. For this nutrient, one or more data sources had only one observation. Therefore, the standard errors, degrees of freedom, and error bounds were computed from the between-group standard deviation of the weighted groups having only one observation.

**Nutrient Definition File** (file name = NUTR_DEF). The Nutrient Definition file (Table 7) is the support file to the Nutrient Data file. It provides the 3-digit nutrient code, unit of measure,

INFOODS tagname, and description.

- Links to the Nutrient Data file by Nutr_No.

**Table 7.—Nutrient Definition File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| Nutr_No | A 3* | N | Unique 3-digit identifier code for a nutrient |
| Units | A 7 | N | Units of measure (mg, g, μg, and so on.) |
| Tagname | A 20 | Y | International Network of Food Data Systems (INFOODS) Tagnames.† A unique abbreviation for a nutrient/food component developed by INFOODS to aid in the interchange of data |
| NutrDesc | A 60 | N | Name of nutrient/food component |
| Num_Dec | A 1 | N | Number of decimal places to which a nutrient value is rounded |
| SR_Order | N 6 | N | Used to sort nutrient records in the same order as various reports produced from SR |

\* Index field for the Nutrient Definition file.
† INFOODS, 2006.

**Source Code File**  (file name = SRC_CD). The Source Code file (Table 8) contains codes indicating the type of data (analytical, calculated, assumed zero, and so on) in the Nutrient Data file. To improve the usability of the database and to provide values for the FNDDS, NDL staff imputed nutrient values for a number of proximate components, total dietary fiber, total sugar, and vitamin and mineral values.

- Links to the Nutrient Data file by Src_Cd

**Table 8.—Source Code File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| Src_Cd | A 2* | N | 2-digit code |
| SrcCd_Desc | A 60 | N | Description of source code that identifies the type of nutrient data |

\* Index field for the Source Code file.

**Data Derivation Code Description File**  (file name = DERIV_CD). This file (Table 9) is a support file for the Nutrient Data file and contains information on how the nutrient values were determined. The file contains the derivation codes and their descriptions.

- Links to the Nutrient Data file by Deriv_Cd

**Table 9.—Data Derivation Code File Format**

| Field name | Type | Blank | Description |
|------------|------|-------|-------------|
| Deriv_Cd | A 4* | N | Derivation Code |
| Deriv_Desc | A 120 | N | Description of derivation code giving specific information on how the value was determined |

\* Index field for the Data Derivation Code file.

For example, the data derivation code that indicates how α-tocopherol (Nutrient No. 323) in Emu, fan fillet, raw (NDB. No. 05623) was calculated is BFSN. The breakdown of the code is as follows:

B = based on another form of the food or a similar food;
F = concentration adjustment used;
S = solids, the specific concentration adjustment used; and
N = retention factors not used

The Ref_NDB_No is 05621 Emu, ground, raw. This means that the analytical α-tocopherol value in the total solids of emu, ground, raw is used to calculate the α-tocopherol in the total solids of emu, fan fillet, raw.

$$N_t = (N_s * S_s)/S_t$$

where
$N_t$ = the nutrient content of the target item,
$N_s$ = the nutrient content of the source item,

For NDB No. 05621, α-tocopherol = 0.24 mg/100 g

$S_s$ = the total solids content of the source item, and
For NDB No. 05621, solids = 25.38 g/100 g
$S_t$ = the total solids content of the target item.
For NDB No. 05623, solids = 27.13 g/100 g

So, using this formula for the above example:

$$N_t = (0.24 \times 25.38)/27.13 = 0.22 \text{ mg/100 g α-tocopherol in Emu, fan fillet, raw}$$

Only items that were imputed starting with SR14 (2001) will have both derivation codes and reference NDB numbers. Other items that were imputed outside the NDBS will have data derivation codes, but the Ref_NDB_No field will be blank.

**Weight File**  (file name = WEIGHT). This file (Table 10) contains the weight in grams of a number of common measures for each food item.

- Links to Food Description file by NDB_No.
- Links to Nutrient Data file by NDB_No.

**Table 10.— Weight File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| NDB_No | A 5* | N | 5-digit Nutrient Databank number |
| Seq | A 2* | N | Sequence number |
| Amount | N 5.3 | N | Unit modifier (for example, 1 in "1 cup") |
| Msre_Desc | A 80 | N | Description (for example, cup, diced, and 1-inch pieces) |
| Gm_Wgt | N 7.1 | N | Gram weight |
| Num_Data_Pts | N 3 | Y | Number of data points |
| Std_Dev | N 7.3 | Y | Standard deviation |

* Index field for the Weight file.

**Footnote File**  (file name = FOOTNOTE). This file (Table 11) contains additional information about the food item, household weight, and nutrient value.

- Links to the Food Description file by NDB_No.
- Links to the Nutrient Data file by NDB_No and Nutr_No.

**Table 11.—Footnote File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| NDB_No | A 5 | N | 5-digit Nutrient Databank number |
| Footnt_No | A 4 | N | Sequence number. If a given footnote applies to more than one nutrient number, the same footnote number is used. As a result, this file cannot be indexed. |
| Footnt_Typ | A 1 | N | Type of footnote. D = footnote adding information to the food description; M = footnote adding information to measure description; N = footnote providing additional information on a nutrient value. If the Footnt_typ = N, the Nutr_No will also be filled in |
| Nutr_No | A 3 | Y | Unique 3-digit identifier code for a nutrient to which footnote applies |
| Footnt_Txt | A 200 | N | Footnote text |

**Sources of Data File** (file name = DATA_SRC). This file (Table 12) provides a citation to the DataSrc_ID in the Sources of Data Link file.

- Links to Nutrient Data file by NDB No. through the Sources of Data Link file

**Table 12.—Sources of Data File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| DataSrc_ID | A 6* | N | Unique number identifying the reference/source |
| Authors | A 255 | Y | List of authors for a journal article or name of sponsoring organization for other documents |
| Title | A 255 | N | Title of article or name of document, such as a report from a company or trade association |
| Year | A 4 | Y | Year article or document was published |
| Journal | A 135 | Y | Name of the journal in which the article was published |
| Vol_City | A 16 | Y | Volume number for journal articles, books, or reports; city where sponsoring organization is located |
| Issue_State | A 5 | Y | Issue number for journal article; State where the sponsoring organization is located |
| Start_Page | A 5 | Y | Starting page number of article/document |
| End_Page | A 5 | Y | Ending page number of article/document |

* Index field for the Sources of Data file.

**Sources of Data Link File** (file name = DATSRCLN). This file (Table 13) is used to link the Nutrient Data file with the Sources of Data table. It is needed to resolve the many-to-many relationship between the two tables.

- Links to the Nutrient Data file by NDB No. and Nutr_No.
- Links to the Sources of Data file by DataSrc_ID.

**Table 13.—Sources of Data Link File Format**

| Field name | Type | Blank | Description |
|---|---|---|---|
| NDB_No | A 5* | N | 5-digit Nutrient Databank number |
| Nutr_No | A 3* | N | Unique 3-digit identifier code for a nutrient |
| DataSrc_ID | A 6* | N | Unique ID identifying the reference/source |

* Index field for the Sources of Data Link file.

## Abbreviated File

The Abbreviated file (file name = ABBREV) is available in ASCII format and is also provided in a Microsoft Excel spreadsheet. It contains all the food items, but fewer nutrients and other related information. The abbreviated file does not include values for starch, fluoride, betaine, added vitamin E and added vitamin $B_{12}$, alcohol, caffeine, theobromine, vitamin D, phytosterols, or individual amino acids, fatty acids, and sugars. Table 14 lists all the nutrients included in the abbreviated file. With SR20 (2007), total choline has been added to the Abbreviated file. The ASCII file (Table 14) is in delimited format. Fields are separated by a caret (^). Text fields are surrounded by a tilde (~). Data refer to 100 g of the edible portion of the food item. Decimal points are included in the fields. Missing values are denoted by the null value of two consecutive carets (^^) or two carets and two tildes (~~). The file is sorted in ascending order by the NDB number. Two common measures are provided, which are the first two common measures in the Weight file for each NDB number. To obtain values per one of the common measures, multiply the value in the desired nutrient field by the value in the desired common measure field and divided by 100. For example, to calculate the amount of fat in 1 tablespoon of butter (NDB No. 01001),

$$V_H = (N*CM_2)/100$$

where:
> Vh = the nutrient content per the desired common measure
> N = the nutrient content per 100 g
> > For NDB No. 01001, fat = 81.11 g/100 g
> CM = grams of the common measure
> > For NDB No. 01001, 1 tablespoon = 9.4 g

So using this formula for the above example:
> Vh = (81.11*9.4)/100 = 7.52 g fat in 1 tablespoon of butter

This file is a flat file and is provided for those users who do not need a relational database. It contains the information in one record per food item and is suitable for importing into a spreadsheet. The data file has been imported into a Microsoft Excel 2000 spreadsheet for users of that application. Users of other software applications can import either the Microsoft Excel 2000 spreadsheet or the ASCII files. It contains all the food items, but less descriptive information and fewer nutrients and weights than the larger relational files. If additional information is needed, this file can be linked to the other files by the NDB number.

### Table 14.—Abbreviated File Format

| Field name | Type | Description |
| --- | --- | --- |
| NDB_No. | A 5* | 5-digit Nutrient Databank number |
| Shrt_Desc | A 60 | 60-character abbreviated description of food item† |
| Water | N 10.2 | Water (g/100 g) |

| Field name | Type | Description |
| --- | --- | --- |
| Energ_Kcal | N 10 | Food energy (kcal/100 g) |
| Protein | N 10.2 | Protein (g/100 g) |
| Lipid_Tot | N 10.2 | Total lipid (fat)(g/100 g) |
| Ash | N 10.2 | Ash (g/100 g) |
| Carbohydrt | N 10.2 | Carbohydrate, by difference (g/100 g) |
| Fiber_TD | N 10.1 | Total dietary fiber (g/100 g) |
| Sugar_Tot | N 10.2 | Total sugars (g/100 g) |
| Calcium | N 10 | Calcium (mg/100 g) |
| Iron | N 10.2 | Iron (mg/100 g) |
| Magnesium | N 10 | Magnesium (mg/100 g) |
| Phosphorus | N 10 | Phosphorus (mg/100 g) |
| Potassium | N 10 | Potassium (mg/100 g) |
| Sodium | N 10 | Sodium (mg/100 g) |
| Zinc | N 10.2 | Zinc (mg/100 g) |
| Copper | N 10.3 | Copper (mg/100 g) |
| Manganese | N 10.3 | Manganese (mg/100 g) |
| Selenium | N 10.1 | Selenium ($\mu$g/100 g) |
| Vit_C | N 10.1 | Vitamin C (mg/100 g) |
| Thiamin | N 10.3 | Thiamin (mg/100 g) |
| Riboflavin | N 10.3 | Riboflavin (mg/100 g) |
| Niacin | N 10.3 | Niacin (mg/100 g) |
| Panto_acid | N 10.3 | Pantothenic acid  (mg/100 g) |
| Vit_B6 | N 10.3 | Vitamin $B_6$ (mg/100 g) |
| Folate_Tot | N 10 | Folate, total ($\mu$g/100 g) |
| Folic_acid | N 10 | Folic acid ($\mu$g/100 g) |
| Food_Folate | N 10 | Food folate ($\mu$g/100 g) |
| Folate_DFE | N 10 | Folate ($\mu$g dietary folate equivalents/100 g) |
| Choline, total | N 10 | Choline, total (mg/100 g) |
| Vit_B12 | N 10.2 | Vitamin $B_{12}$ ($\mu$g/100 g) |
| Vit_A_IU | N 10 | Vitamin A (IU/100 g) |
| Vit_A_RAE | N 10 | Vitamin A ($\mu$g retinol activity equivalents/100g) |
| Retinol | N 10 | Retinol ($\mu$g/100 g) |

| Field name | Type | Description |
| --- | --- | --- |
| Alpha_Carot | N 10 | Alpha-carotene (μg/100 g) |
| Beta_Carot | N 10 | Beta-carotene (μg/100 g) |
| Beta_Crypt | N 10 | Beta-cryptoxanthin (μg/100 g) |
| Lycopene | N 10 | Lycopene (μg/100 g) |
| Lut+Zea | N 10 | Lutein+zeazanthin (μg/100 g) |
| Vit_E | N 10.2 | Vitamin E (alpha-tocopherol) (mg/100 g) |
| Vit_K | N 10.1 | Vitamin K (phylloquinone) (μg/100 g) |
| FA_Sat | N 10.3 | Saturated fatty acid (g/100 g) |
| FA_Mono | N 10.3 | Monounsaturated fatty acids (g/100 g) |
| FA_Poly | N 10.3 | Polyunsaturated fatty acids (g/100 g) |
| Cholestrl | N 10.3 | Cholesterol (mg/100 g) |
| GmWt_1 | N 9.2 | First household weight for this item from the Weight file‡ |
| GmWt_Desc1 | A 120 | Description of household weight number 1 |
| GmWt_2 | N 9.2 | Second household weight for this item from the Weight file‡ |
| GmWt_Desc2 | A 120 | Description of household weight number 2 |
| Refuse_Pct | N 2 | Percent refuse§ |

\* Index field for the Abbreviated file.

† For a 200-character description and other descriptive information, link to the Food Description file.

‡ For the complete list and description of the measure, link to the Weight file.

§ For a description of refuse, link to the Food Description file.

## Update Files

These update files provide changes made between SR19 (2006) and SR20 (2007). Update files in ASCII are provided for those users who reformatted previous releases for their systems and wish to do their own updates. If you are using an earlier release, you will need to first obtain the update files for that release through SR19, update your database to SR19, then use the update files for SR20. These updates are available on NDL's website: http://www.ars.usda.gov/nutrientdata. Added items are given in four files:

- ADD_FOOD for descriptions of the new items,
- ADD_NUTR for added nutrient data,

- ADD_WGT for added weight and measure data,
- ADD_FTNT for added footnotes,

These files are in the same formats as the Food Description file, the Nutrient Data file, Weight file, and Footnote file.

Three files contain changes made since SR19 (2006):
- CHG_FOOD contains records with changes in the descriptive information for a food item.
- CHG_NUTR contains changes to the following fields: nutrient values, standard errors, number of data points, source code, and data derivation code.
- CHG_WGT contains records with changes to the gram weights or measure information.
- CHG_FTNT contains records with changes to footnotes

If the values in any fields have changed, the entire record is included for that file. These files are in the same format as the Food Description, Nutrient Data, Footnote and Weight files. The update files are provided in ASCII format.

Four files contain records that were deleted since SR18 (2005):
- DEL_FOOD file (Table 15) lists those food items that were deleted from the database.
- DEL_NUTR file (Table 16) lists those nutrient values that were removed from the database.
- DEL_WGT contains any gram weights that were removed. These records are in the same format as the Weight file (Table 10).
- DEL_FTNT contains any footnotes that were removed from the database (Table 17). Starting with SR19, if a given footnote applied to more than one nutrient number, the same footnote number can be used. When these footnote numbers are updated, the extra footnotes are deleted.

**Table 15.—Foods Deleted Format**

| Field name | Type | Blank | Description |
| --- | --- | --- | --- |
| NDB_No | A 5* | N | Unique 5-digit number identifying deleted item |
| Shrt_Desc | A 60 | N | 60-character abbreviated description of food item |

* Index field for Foods Deleted file.

**Table 16. —Nutrients Deleted Format**

| Field name | Type | Blank | Description |
| --- | --- | --- | --- |
| NDB_No | A 5* | N | Unique 5-digit number identifying the item that contains the deleted nutrient record |
| Nutr_No | A 3 | N | Nutrient number of deleted record |

*Index field for Nutrients Deleted file.

**Table 17.—Footnotes Deleted Format**

| Field name | Type | Blank | Description |
| --- | --- | --- | --- |
| NDB_No | A 5* | N | Unique 5-digit number identifying the item that contains the deleted nutrient record |

| Footnt_No | A 4 | N | Sequence number |
| Footnt_Typ | A 1 | N | Type of footnote of deleted record |

* Index field for Footnotes Deleted file.

Update files in ASCII are also provided for the Abbreviated file:

- CHG_ABBR file contains records for food items where a food description, household weight, refuse value, or nutrient value was added, changed, or deleted since SR19. This file is in the same format as the Abbreviated file (Table 14).
- DEL_ABBR contains food items that were removed from the database; it is in the same format as DEL_FOOD.
- ADD_ABBR contains food items added since SR19; it is also in the same format as the Abbreviated file.

## Summary

Values for choline have been expanded to include all food items used in the FNDDS. Other food items, including a number of items for the American Indian/Alaskan Native database, and nutrients/food component values have been updated and expanded as described in "Specific Changes for SR20" (p. 1). SR21, which will be released during mid-2008, will contain additional items and updates.

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* Available on NDL's website: http://www.ars.usda.gov/nutrientdata

## Appendix A.    Abbreviations Used in Short Descriptions

| | |
|---|---|
| All purpose | ALLPURP |
| Aluminum | AL |
| And | & |
| Apple | APPL |
| Apples | APPLS |
| Applesauce | APPLSAUC |
| Approximate | APPROX |
| Approximately | APPROX |
| Arm and blade | ARM&BLD |
| Artificial | ART |
| Ascorbic acid | VIT C |
| Aspartame | ASPRT |
| Aspartame-sweetened | ASPRT-SWTND |
| Baby food | BABYFD |
| Baked | BKD |
| Barbequed | BBQ |
| Based | BSD |
| Beans | BNS |
| Beef | BF |
| Beverage | BEV |
| Boiled | BLD |
| Boneless | BNLESS |
| Bottled | BTLD |
| Bottom | BTTM |
| Braised | BRSD |
| Breakfast | BRKFST |
| Broiled | BRLD |
| Buttermilk | BTTRMLK |
| Calcium | CA |
| Calorie, calories | CAL |
| Canned | CND |
| Carbonated | CARB |
| Center | CNTR |
| Cereal | CRL |
| Cheese | CHS |
| Chicken | CHICK |
| Chocolate | CHOC |
| Choice | CHOIC |
| Cholesterol | CHOL |
| Cholesterol-free | CHOL-FREE |
| Chopped | CHOPD |
| Cinnamon | CINN |
| Coated | COATD |
| Coconut | COCNT |

| | |
|---|---|
| Commercial | COMM |
| Commercially | COMMLY |
| Commodity | CMDTY |
| Composite | COMP |
| Concentrate | CONC |
| Concentrated | CONCD |
| Condensed | COND |
| Condiment, condiments | CONDMNT |
| Cooked | CKD |
| Cottonseed | CTTNSD |
| Cream | CRM |
| Creamed | CRMD |
| Dark | DK |
| Decorticated | DECORT |
| Dehydrated | DEHYD |
| Dessert, desserts | DSSRT |
| Diluted | DIL |
| Domestic | DOM |
| Drained | DRND |
| Dressing | DRSNG |
| Drink | DRK |
| Drumstick | DRUMSTK |
| English | ENG |
| Enriched | ENR |
| Equal | EQ |
| Evaporated | EVAP |
| Except | XCPT |
| Extra | EX |
| Flank steak | FLANKSTK |
| Flavored | FLAV |
| Flour | FLR |
| Food | FD |
| Fortified | FORT |
| French fried | FRENCH FR |
| French fries | FRENCH FR |
| Fresh | FRSH |
| Frosted | FRSTD |
| Frosting | FRSTNG |
| Frozen | FRZ |
| Grades | GRDS |
| Gram | GM |
| Green | GRN |
| Greens | GRNS |
| Heated | HTD |
| Heavy | HVY |
| Hi-meat | HI-MT |
| High | HI |

| | |
|---|---|
| Hour | HR |
| Hydrogenated | HYDR |
| Imitation | IMITN |
| Immature | IMMAT |
| Imported | IMP |
| Include, includes | INCL |
| Including | INCL |
| Infant formula | INF FORMULA |
| Ingredient | ING |
| Instant | INST |
| Juice | JUC |
| Junior | JR |
| Kernels | KRNLS |
| Large | LRG |
| Lean | LN |
| Lean only | LN |
| Leavened | LVND |
| Light | LT |
| Liquid | LIQ |
| Low | LO |
| Low fat | LOFAT |
| Marshmallow | MARSHMLLW |
| Mashed | MSHD |
| Mayonnaise | MAYO |
| Medium | MED |
| Mesquite | MESQ |
| Minutes | MIN |
| Mixed | MXD |
| Moisture | MOIST |
| Natural | NAT |
| New Zealand | NZ |
| Noncarbonated | NONCARB |
| Nonfat dry milk | NFDM |
| Nonfat dry milk solids | NFDMS |
| Nonfat milk solids | NFMS |
| Not Further Specified | NFS |
| Nutrients | NUTR |
| Nutrition | NUTR |
| Ounce | OZ |
| Pack | PK |
| Par fried | PAR FR |
| Parboiled | PARBLD |
| Partial | PART |
| Partially | PART |
| Partially fried | PAR FR |
| Pasteurized | PAST |
| Peanut | PNUT |

| | |
|---|---|
| Peanuts | PNUTS |
| Phosphate | PO4 |
| Phosphorus | P |
| Pineapple | PNAPPL |
| Plain | PLN |
| Porterhouse | PRTRHS |
| Potassium | K |
| Powder | PDR |
| Powdered | PDR |
| Precooked | PRECKD |
| Preheated | PREHTD |
| Prepared | PREP |
| Processed | PROC |
| Product code | PROD CD |
| Propionate | PROP |
| Protein | PROT |
| Pudding, puddings | PUDD |
| Ready-to-bake | RTB |
| Ready-to-cook | RTC |
| Ready-to-drink | RTD |
| Ready-to-eat | RTE |
| Ready-to-feed | RTF |
| Ready-to-heat | RTH |
| Ready-to-serve | RTS |
| Ready-to-use | RTU |
| Reconstituted | RECON |
| Reduced | RED |
| Reduced-calorie | RED-CAL |
| Refrigerated | REFR |
| Regular | REG |
| Reheated | REHTD |
| Replacement | REPLCMNT |
| Restaurant-prepared | REST-PREP |
| Retail | RTL |
| Roast | RST |
| Roasted | RSTD |
| Round | RND |
| Sandwich | SNDWCH |
| Sauce | SAU |
| Scalloped | SCALLPD |
| Scrambled | SCRMBLD |
| Seed | SD |
| Select | SEL |
| Separable[1] | |
| Shank and sirloin | SHK&SIRL |
| Short | SHRT |
| Shoulder | SHLDR |

| | |
|---|---|
| Simmered | SIMMRD |
| Skin | SKN |
| Small | SML |
| Sodium | NA |
| Solids | SOL |
| Solution | SOLN |
| Soybean | SOYBN |
| Special | SPL |
| Species | SP |
| Spread | SPRD |
| Standard | STD |
| Steamed | STMD |
| Stewed | STWD |
| Stick | STK |
| Sticks | STKS |
| Strained | STR |
| Substitute | SUB |
| Summer | SMMR |
| Supplement | SUPP |
| Sweet | SWT |
| Sweetened | SWTND |
| Sweetener | SWTNR |
| Teaspoon | TSP |
| Thousand | 1000 |
| Toasted | TSTD |
| Toddler | TODD |
| Trimmed[1] | |
| Trimmed to[1] | |
| Uncooked | UNCKD |
| Uncreamed | UNCRMD |
| Undiluted | UNDIL |
| Unenriched | UNENR |
| Unheated | UNHTD |
| Unprepared | UNPREP |
| Unspecified | UNSPEC |
| Unsweetened | UNSWTND |
| Variety, varieties | VAR |
| Vegetable, vegetables | VEG |
| Vitamin A | VIT A |
| Vitamin C | VIT C |
| Water | H20 |
| Whitener | WHTNR |
| Whole | WHL |
| Winter | WNTR |
| With | W/ |

Without                WO/
Yellow                 YEL

_____
[1] Removed in short description

## Appendix B.    Other Abbreviations

| | |
|---|---|
| ap | as purchased |
| ARS | Agricultural Research Service |
| DFE | dietary folate equivalent |
| dia | diameter |
| DRI | Dietary Reference Intakes |
| fl oz | fluid ounce |
| FNDDS | USDA Food and Nutrient Database for Dietary Studies |
| g | gram |
| INFOODS | International Network of Food Data Systems |
| IU | international unit |
| kcal | kilocalorie |
| kJ | kilojoule |
| lb | pound |
| mg | milligram |
| μg, mcg | microgram |
| ml | milliliter |
| NDB | Nutrient Databank |
| NDBS | Nutrient Databank System |
| NDL | Nutrient Data Laboratory |
| NFNAP | National Food and Nutrient Analysis Program |
| NLEA | Nutrition Labeling and Education Act |
| oz | ounce |
| RAE | retinol activity equivalent |
| RE | Retinol Equivalents |
| RDA | Recommended Dietary Allowances |
| SR | USDA National Nutrient Database for Standard Reference |