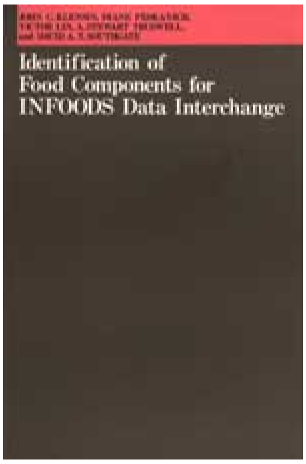

Identification of Food Components for INFOODS Data Interchange

JOHN C. KLENSIN, DIANE FESKANICH, VICTOR LIN, A. STEWART TRUSWELL, and DAVID A. T. SOUTHGATE

The United Nations University is an organ of the United Nations established by the General Assembly in 1972 to be an international of scholars engaged in research, advanced training, and the dissemination of knowledge related to the pressing global problems of human survival, development, and welfare. Its activities focus mainly on peace and conflict resolution, development in a changing world, and science and technology in relation to human welfare. The University operates through a worldwide network of research and post-graduate training centres, with its planning and co-ordinating headquarters in Tokyo, Japan.

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The International Food Data Systems Project (INFOODS) is a comprehensive effort, begun within the United Nations University's Food and Nutrition Programme, to improve data on the nutrient composition of foods from all parts of the world, with the goal of ensuring that eventually adequate and reliable data can be obtained and interpreted properly worldwide. At present in many cases such data do not exist or are incomplete, incompatible, and inaccessible. This volume is the second in a series that provide guidelines on the organization and content of food composition tables and data bases, methods for analysing foods and compiling those tables, and procedures for the accurate international interchange of the data. It presents a comprehensive system for identifying food components precisely, with unique tagnames designed for use in computer data bases, both for international data exchange and for the compilation of national food composition tables.

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Contents

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1. Introduction

The task

One of the fundamental tasks of INFOODS is the design of procedures for the exchange of food composition data. These activities involve the development of rules and guidelines for the *identification of foods*, the definition *of food components*, and the *description of food component data*. Such formal operations are both directly useful and a critical future part of the interchange operation.

Listing of food components

This document is basically a listing of distinct nutritive and non-nutritive components of foods. The list does not presently include all existing food components; however, for those it does include, it is intended that the definitions should be complete and unambiguous. Each food component is represented by an entry which consists of the following information:

1. a single, unique abbreviation called a *tagname*, which is intended for use in interchange,
2. a *name* or descriptive definition,
3. a common or default *unit of measurement* for expressing its quantity per 100 grams of edible portion of food,
4. *sinonymous names* by which the component is known (including common abbreviations that occur in standard tables),
5. *comments* for those food components which require further definition or clarification,
6. a listing of *selected tables* in which data on the specific component occur, and
7.additional information, identified as *notes, keywords, and examples*, which appears with a few entries.

1. Tagname

This entire effort is organized about the fundamental importance of the tagname food composition data exchange. During interchange, each piece of data needs to be associated with a unique tagname which identifies the specific food c component represented by that data point. The underlying constraint, amplified below, is that components represented by different tagnames cannot be directly compared or combined.

2. Name of Food Component

It is intended that each food component entry be described with sufficient specificity to distinguish it from all other entries. Often, a component will have a single entry, such as "copper" (or "cuivre" or "Kupfer"). However, some food components need multiple entries. For example, a food component for which the quantity varies according to the method of analysis must be listed separately for each method, and the method must be a part of the description (e.g., "carbohydrate by difference" versus "carbohydrate by summation"). Alternatively, "fibre" (or "fiber") does not identify a unique food component. The method used to determine the fibre (neutral detergent method, crude fibre method, etc.) must be included as part of its definition, and, as a result, there are multiple fibre entries.

3. Unit

Each food component has a "default" unit of measure associated with it. These units are the ones most commonly employed in food composition tables and they are the units that will be assumed during data exchange. For example, protein is assumed to be expressed in grams of protein per 100 grams of edible portion of food. If the data are expressed in units other than the default units, these units must be specified along with the data.

4. Synonyms

Multiple names or multiple spellings of the same name may exist for a particular food component. In these cases, the preferred name is assigned as the food component name and alternate names are given as synonyms. For example, "moisture" is a synonym for "water". The same tagname is, of course, used for both "moisture" end "water", since this tagname identifies just what the data represent. Common abbreviations used in some of the major tables are also provided.

5. Comments

Comments are included for a food component if a further explanation or description might be helpful in understanding the nature of that food component. For food components that are calculated from other food component data, the comments should include a description or example of these calculations.

6. Food Tables

The goal of this effort is to identify the food components for which data exist and for which data might be exchanged within the nutrition research community. Development of this document began with a review of some major food composition tables from around the world. The food components in these tables were compiled and edited, and similarities or differences between names used in the various tables were examined to ensure a comprehensive list of unique food components. In the accompanying list, each food component definition includes a list of the reviewed food tables in which it was found and could be unambiguously identified. (Consequently, we have not listed tables with "method unknown" tagnames.) In addition, the USDA nutrient number is included with those food components for which data exist in the complete USDA nutrient data base.

7. Notes, Keywords, and Examples

Several food components require additional description, specification, or clarification beyond that provided by the tagname itself. For those components, additional information is provided under "notes", which provide additional information on the food component or tagname; "keywords", which are used with the tagname and data values to provide additional detail; and "examples", which illustrate how the tagname is used.

Other guidelines for the naming and analysis of food components

Guidelines for how food and nutrient data should be identified and reported have been created by a number of authors and organizations. Notable examples of such guidelines include: Generic Descriptors and Trivial Names for Vitamins and Related Compounds (1976) by the

Committee on Nomenclature of the International Union of Nutritional Sciences (TUNS); end Nomenclature end Symbolism of Amino Acids end Peptides (1983) by the Commission on Biochemical Nomenclature of the International Union of Pure and Applied Chemistry (IUPAC). Many of these nomenclature guidelines have already been adopted by major journals of nutritional science. For example, the Committee on Nomenclature of the American Institute of Nutrition (AIN) has designated which nomenclature rules are to be followed in their official journals.

There have also been several important efforts to specify the standard or correct method to use to provide values for a particular nutrient. Perhaps the most important of these have been the specifications of the Association of Official Analytic Chemists (AOAC), the Codex Alimentarius Commission (particularly regarding recommendations for methods of analysis of pesticide residues in foods), and the International Organization for Standardization (ISO). Another set of recommendations appears in the forthcoming INFOODS handbook, *Guidelines for the Production, Management and Use of Food Composition Data*. As is the case with the naming schemes for nutrients, these different sets of standards draw on a common base: where they overlap, they are more often similar than different.

This listing of food components represents a new approach to the issue of how food and nutrient data should be reported. One aspect of this new approach is that the INFOODS tagnames for food components specify a combination of nutrient names and their relevant methods of analysis that have the following properties:

- 1. Methods that are obsolete or "not preferred" are provided for, since values representing those methods may well appear in older food composition tables or data bases.
- 2. Methods that differ in procedures but not in the expected values of the results are not distinguished, since they are then "the same" with regard to comparison of values between food composition data bases.
- 3. At the same time, for food components for which multiple methods have been used, the identifications or "tagnames" are at the nutrient-and-method level rather than at the level of nutrient names. Without that distinction, there is severe danger of comparing values that, while indicative of the same nutrient, have sufficiently different expected values that accidental direct comparison would be very misleading.

Popular naming conventions, though useful for many purposes, do not distinguish among the methods, conversion factors, and other variations of technique (above and beyond experimental variation) that can result in different values for the same "nutrient" even in the same sample.

A second aspect of this new approach is that the INFOODS food component tagnames are designed for data transfer between computers, especially computers located in different countries. Popular naming conventions are better designed for typesetting or direct communications between people. For a naming system to be convenient and flexible for computer use, it is best to avoid systems that require italics or underlining, Greek characters, subscripts or superscripts, and special uses of upper or lower case. It is not that these cannot be accommodated; rather it is that accommodating them limits the computer and communications systems that can be used.

The infoods interchange scheme for food component's

The general context for this document is the INFOODS interchange scheme, a formalized model of how food composition data can be identified and organized so that they can be exchanged between various individuals and organizations within the food composition community. This model is described in memo INFOODS/IS N6 and its addenda, which are currently being transformed into an IN FOODS guideline manual, *INFOODS Data Interchange Handbook*, by Klensin, Romberg, and Peterson.

Any scheme for interchange of food composition data requires that the data be identified and, in particular, that each value be associated with the nutrient to which it applies. As the INFOODS work has progressed, it has become clear that this identification must be quite specific, in order to meet requirements of both the users and the data base compilers for comparison and combination of food composition data. In addition, there are computer-processing requirements which are important in deciding how to organize, name, and structure the food component tagnames. Wherever possible, the tagnames have been chosen to facilitate all uses; however, this attempt to optimize several sets of requirements has led us to several decisions about the organization and structure of the tagnames that may not be obvious from the tagnames themselves but that strongly influenced the scheme. Below we describe the general design principle, and a series of sometimes conflicting considerations. Much of our effort has gone into balancing these considerations and ensuring that they be consistent, if possible, with the general, guiding principle:

The primary use for food component tagnames is to determine whether the associated values can be compared or combined. All other goals and principles must yield to this one.

The reason for developing food component tagnames that are method-specific, rather than using common names for nutrients and other food components, is that often the component names in general use are insufficiently specific to determine if direct comparison of values is appropriate. Even assuming that the units in which values are expressed are consistent, one cannot compare the values of, e.g., "vitamin A". The term vitamin A is ambiguous without precise knowledge of what has been measured and what is being reported. When a sophisticated user of food composition tables encounters values for vitamin A, he or she immediately searches the preface of the table to determine what the values actually represent. The food component tagnames are intended to facilitate that step and, moreover, to permit an equivalent evaluation to be performed by a relatively unsophisticated computer program. The intent is that, if the tagnames match and the units are reconciled, the values will be comparable. A corollary is that different tagnames should not be used for different methods that produce comparable values. Moreover, when several different methods produce different values (e.g., energy or protein), we need to define a "method unknown" tagname for situations where the methods have been lost. This requires cautioning users against comparing two values associated with "method unknown" tagnames, but we hope that it will work toward creating an intellectual climate in which data generators and compilers become more careful about recording their methods.

Major considerations in the development of this list

1. The INFOODS Context and the User Community

CONSIDERATION 1: The interchange scheme itself should not be sensitive to national usage, although some of the data it supports may be.

Most of the "special characters" that appear in computer character sets or ordinary writing differ from one computerized character set (tied to a national language or national usage) to another. In other words, a given string of bits representing a character may imply different character graphics in different countries once one moves beyond the simple roman alphabet (without diacritical marks) and beyond a few special characters. As a result, we have prohibited many character conventions that would Otherwise make sense, e.g., use of the colon (":") in the names of fatty acids. Clarity and consistency in international usage are more important than conventional usage.

CONSIDERATION 2: This list of food components describes what has been done and is independent of any recommendations about what should be done or reported.

These entries are not offered as a set of suggestions about what should be put in tables either in terms of nutrients to be reported, or of how these nutrients should be analysed, or of what abbreviations should be placed at the top of the columns of a printed table. Those suggestions are the subject of other documents: the forthcoming book by Greenfield and Southgate in the case of analytic methods, and the recommendations from Southgate and Truswell for the questions of what food components to include in tables and how they should be identified there (see "Related Documents", page 11 below).

Inclusion of an entry in the list implies only that the associated food component and method have been used, and might realistically be expected to appear in a table or data base that one might encounter. The identification of some of the entries as "obsolete approaches" is not intended to imply a recommendation; instead, these comments are descriptive of the fact that the method is no longer being used while providing assistance in the task of retrospectively assigning tags to an early table.

CONSIDERATION 3: It is desirable to finish the initial version of this list, standardize it, start using it, and then to add additional food component tagnames in parallel with other work.

This consideration may appear to be obvious, but it has led to a few extremely pragmatic short-term decisions. In particular:

- 1. We have received several suggestions that food additives and contaminants, in general, be included in this list. The list is clearly expandable to include contaminants, and we expect this to be done sooner or later; however. we have deferred the task. There are two reasons for this, in addition to our not wishing to delay the present effort. First, INFOODS has no specific mandate in this area at present and, second, we have not yet encountered anyone who is anxious to interchange these data using arrangements compatible with the INFOODS approach.
- 2. We have defined a separate structure for a number of values that have been identified as reported in food tables but that are not themselves components of foods.

The values affected here fall into two broad categories: (i) various "scores" and other indirect measures of bioavailability (e.g., protein quality), and (ii) expressions of a nutrient value as a fraction of some other nutrient value (e.g., amino acids as percent protein). (The latter, on first inspection, appear to be only different types of units, but are actually not, since both numerator and denominator are analytically determined.) Further, we have then deferred defining tags for all of these except the few that appear very widely.

2. The Character Food Component Information

CONSIDERATlON 4: The food component tagname scheme should reflect "nutrients", not just chemistry.

At least some of the food components that we know as nutrients are not, and do not represent, well-defined chemicals for which straightforward analyses exist (e.g., fibre, protein, vitamin A). These components reflect assumptions and conventions about biological impact. The nutrition community's usage is not that of, e.g., food chemistry. Values derived from computational formulae, mixtures of several chemicals, and individual chemicals are all reported the same way in food composition tables. This represents present scientific reality and knowledge; however, it does have an impact on decisions about what food component tagnames will be defined, and which ones will not (at least at this time). While the list we have assembled can be expanded at any time, we have concluded that, at the present time, it is not sensible - and would eventually create confusion - to include entries for chemicals whose existence can be demonstrated, for which analyses exist, but which no one has taken any interest in. While there are tradeoffs involved, and we have not adopted rigid rules, two criteria have been applied:

- 1. The inclusion of a food component in a published official food table, or a published table that has achieved wide circulation, is sufficient evidence that it should be assigned a tagname.
- 2. The information that someone, someday, might be interested in a particular component, or a variation on an already-registered component, has not been considered sufficient. Nonetheless, some tagnames have been defined for nutrients or methods that are not now included in tables because we have been persuaded that they are important or because they reflect INFOODS recommendations for methods or presentation.

CONSIDERATION 5: Just as the relationship between nutrients and chemicals is not clear cut, neither is the relationship between nutrients and analytic methods. The definitions and associated tagnames should reflect the varying importance of method specificity in individual food component definition.

As mentioned above, what we call "nutrients" are, in many cases, mixtures of species, rather than specific chemicals for which practical analyses exist. For these nutrients there are often different definitions as well as different ways of measurement. Alternatively, there are a number of nutrients for which the different methods of analysis should yield the same result (e.g., GC and HPLC for vitamin E analyses) and making a distinction between method is of no importance for any use of food composition data that we have been able to identify.

The convention for determining when two methods for the same "nutrient" require separate entries is based on what is essentially a statistical criterion: *if one runs a large number of analyses on identical samples using one method, and runs a large number of analyses, also on identical samples, using a second method, the two methods are considered to be "the same" for food component tagging purposes if the means of the two sets of analyses arc statistically indistinguishable.* Stated less formally, if two methods can reasonably be expected to produce the same results if performed well and under good conditions, then they do not receive separate tags. Conversely, two methods that can be expected to produce different results, on average, would be assigned different tags.

It follows from this consideration that the tagnames be logically structured into a nutrient "part" and a method "part", since different nutrients would have to collapse different methods differently.

CONSIDERATION 6. The nutrient identitfication system should facilitate the transmission of any Information that exists and, at the same time, should not suggest the existence Or information when information does not exist.

The reporting of two values for the same basic nutrient in different units, but with an obvious conversion factor (energy in calories and joules) does not add any information to the content of a data base, since the conversion could be performed at the receiving end. Ideally, if two values appear, they should represent different information - different modes of analysis or different ways of getting to the values. Thus, in reporting energy, in spite of the fact that many food tables show both kilocalorie and kilojoule values, only one should appear in an interchange file unless they represent either different measurements or application of different conversion factors. When the two are provided for user convenience, but one results from simply multiplying or dividing the other by a constant, we recommend that only one be included in an interchange file.

3. Specific Form of the Tagnames

CONSIDERATION 7: The names chosen for the tags should be optimized for computer use, with human use being secondary.

The tagnames are central to the food component naming scheme, in that they are in one-to-one correspondence with the nutritionally different food components. Original recommendations for the structure of tagnames (formulated in the first draft of the interchange scheme [INFOODS/IS N6, December 1985]) included strong suggestions that they should be kept as short as feasible. At the same time, information theory concerns argue strongly against very short names: longer names provide more redundancy and raise the likelihood that errors will be detected rather than mistaken for other nutrients. Moreover, the tagnames should not interfere with processing interchange-format data with simple computer programs; in general, processing of interchange-format data should require the minimum amount of computer sophistication possible, consistent with the other goals of INFOODS data interchange. These three general principles led to two basic rules in tagname construction:

- 1. The ideal tagname should be three to five characters long. Tagnames consisting of only a single character are strongly discouraged on error-avoidance grounds. (See, however, consideration 8). Tagnames longer than six characters are discouraged on the grounds of unwieldiness. However, occasionally longer tagnames are specified, particularly for the fatty acids, where using shorter ones causes other problems.

- 2. There is no distinction made between upper and lower case for the alphabetic characters, and characters such as commas and leading digits are prohibited in order to facilitate processing by simple programs.

Two other conventions were proposed but, after consideration, were rejected as general principles:

- 1. It was decided not to try to make the tagnames pronounceable by including extra vowels. While pronounceable tagnames might well be an advantage, they would usually be longer, and this was considered an undesirable tradeoff. Moreover, making the names pronounceable would encourage more arguments about "better" and "worse" names, which we have wanted to discourage.
- 2. It was decided not to incorporate "check digits" or some other scheme for detecting transcription errors in the tagnames. While such an approach would have merit, it would increase the effective length of the tagnames and make them more difficult for humans to understand and remember. Moreover, in the anticipated use of the interchange scheme it would probably be preferable to apply such checks at the food record level rather than at the nutrient level.

Additionally, the convention was adopted of reserving tagnames ending in a hyphen for nutrients measured by an unknown method where the method is important to comparison of values. Values associated with these tagnames cannot, in general, be compared across tables and therefore their use is strongly discouraged except in interchanging existing tables for which the method and source information for the data has been lost.

CONSIDERATION 8: Standard abbreviations should be used for the tagnames when they exist and when using them would not conflict with other principles.

Unfortunately, this has not proved to be a very useful guideline. With two exceptions - the names of the elements (which are typically based on Latin and date from over a century ago) and the abbreviations for the names of the amino acids - the "standard abbreviations" are standard within rather particular communities of scientists rather than across the entire community of users and producers of food composition data. In earlier drafts of this document, the tagname "H20" was used, but we have changed it back to "WATER" because the former led to a large number of suggestions of the nature of "if you are going to do that, then, for consistency, there are a lot of other chemical symbols you should use also". We disagree with the conclusion, and now suggest eliminating its cause. Even with the elements, there has been some controversy: many of the relevant names are one character in length, violating a rule against such names (see above). In addition, while "F', and "CL" have been suggested as tagnames, fluorine and chlorine are not measured in foods except in compounds. Consequently, FD and CLD (for fluoride and chloride) are included instead.

In general, "standard abbreviations" on which there is less general agreement than on those for the elements and amino acids, or which violate other principles, have not been used as tagnames.

4. The Units of Measurement

CONSIDERATION 9: While the interchange scheme should not require everyone to use the same units of measurement, the notion of "unit" must be treated consistently with the requirements of comparison and interchange.

Inherent in the describing of food components is the concept of "units". For each entry, we have defined as the "default unit" (the unit that will be assumed if no unit is specified) the unit that we have most frequently encountered (e.g., for protein, the default is grams per 100 grams of edible portion of food). However, users of the interchange scheme are not constrained to use these defaults; they can use whatever units they choose, provided the information necessary for the appropriate comparison of the data with defaulted data is available. With respect to the default, there are three basic types of unit: (i) those which can easily be converted to the default by a universal constant (e.g., ounces per pound), (ii) those which require special information about the particular food in general (e.g., grams per unit volume), and (iii) those which require information derived from the particular samples chosen for analysis (e.g., grams of a particular fatty acid relative to total fat). While certain universal constants can be assumed and built into quite simple computer programs in order to compare data that differ in terms of type i above, types ii and iii require that additional information be included with the data base. We are currently working on the formalization of how this can best be effected.

The underlying consideration here is that an interchange should not include redundant information (consideration 6 above). An example of the complexity that can be encountered is the situation with respect to vitamin A. Classically, both IU (international units) and RE (retinol equivalents) are calculated as linear combinations of micrograms of retinol and beta-carotene. Thus, given any two of the four, one can calculate the other two (e.g., from IU and retinol one can calculate RE and/or beta but one cannot determine any of the others if only one measurement is present (e.g., one cannot calculate RE, retinol, or beta-carotene from only IU). Therefore we include all four as entries. This situation has become even more complex with the consideration of additional carotenes.

5. Organization of this document

The following consideration has had to be abandoned.

CONSIDERATION 10: Insofar as possible, consistent with other goals, the structure of interchange should reflect the organization of food composition tables. In particular, the organization and order of nutrients should be considered.

While it is not necessary for interchange purposes, there would be some convenience in having a structure provided for the nutrients. Moreover, the initial review of the interchange model produced repeated requests for some internal organizational structure. However, since different tables are not organized the same way, this goal clearly cannot be satisfied beyond the organization of nutrients into very broad, and traditional, groups. The second draft of the food component tagname list proposed such groupings, but the comments that were received in response, collectively, implied that there is no general agreement on the details of even very broad groupings. Two major problems were identified:

- 1. It is not clear what should be included in "proximates". all tables that have this category (most do) include moisture and energy; beyond those, there are variations. Several of the reviewers of the first and second drafts of the food component tagname list pointed out that, in a computer interchange scheme, it was irrational to separate "protein" and the protein components, nitrogen compounds, and amino acids and that, similarly, it was irrational to place "total fat" under proximates and then have a "lipids" category that contained everything but "total fat". One possibility would be to have only moisture and energy in the proximate category, but it appears that this would simply cause more confusion.

- 2. There is an inevitable desire to create a "miscellaneous" category to handle the selection of food components that don't belong in any of the other categories but don't seem to justify a category of their own. At the same time, there are strong classification and information-theory reasons for having "closed" definitions for all categories so that new categories can be added without reshuffling old ones. This criterion is especially important when we realize the potential impact of adding tagnames for contaminants (discussed above), since there appear to be more known contaminants and additives of interest than there are nutrients. This conflict and the desire to avoid "miscellaneous" led to the somewhat arbitrary (and much objected to) AANOA category in the second draft list of the food component tagnames.

We have consequently concluded that, attractive as this goal looks on first glance, it should be abandoned and no intermediate groupings of food components created in the interchange mechanism itself. This, of course, does not prevent creating groupings *external* to the interchange mechanism. In a way, it facilitates such groupings on the basis of local needs and conventions, rather than trying to impose a uniform international convention. However, the interchange scheme does not specify any nutrient ordering since the benefits of such a structure would be outweighed by the difficulties of resorting tables and data bases.

Related documents

This description of tagnames and food components is intended to be self-contained. However, it was produced in the context of other INFOODS efforts. The draft manuals and working documents produced as pan of those efforts provide additional information. The relevant documents are listed below.

- The interchange model itself is described in a forthcoming manual by Klensin, Romberg, and Peterson, *INFOODS Data Interchange Handbook*, which provides details about the need for the tagnames discussed here, how they are used in data interchange, and the syntax used with them as well as information about other components and tagnames of the interchange system.
- Many of the analysis and calculation methods mentioned here are described in more detail in the forthcoming manual by Greenfield and Southgate, *Guidelines for the Production, Management and Use of Food Composition Data.* Recommendations are also made there about the best methods of data generation. Additional calculation methods are discussed in the forthcoming manual by Rand, Pennington, Murphy, and Klensin, *Compiling Data for Food Composition Databases.*
- Recommendations about which nutrients should be included in a new food composition table will appear in a document prepared by Truswell and Southgate.
- Documents that specify how foods should be described and classified for international interchange are being prepared. No document is yet available on the general-purpose international classification system.
- Preliminary specification for the representation of zero, trace, and unavailable values appears in an INFOODS Secretariat working paper, INFOODS/IS N22. A preliminary

set of common tagnames to be used subsidiary to those in this document has also been proposed; both are available from the Secretariat.

2. Tagnames for food components

The actual food component tagnames and their definitions follow. Tagnames for derived food components and indicators of nutritional quality are listed in chapter 3. Each definition includes the name of the food component and its default (most common) unit of expression per 100 grams of edible portion of food. Synonym food component names and additional comments are included to further define many of the tagnames. For convenience, the definitions also include some of the food composition tables in which the associated food components are found. A list of these food composition tables and their assigned abbreviations can be found on page 98.

When the tagnames described in this chapter are used in interchange files, they are all subsidiary to the <COMP> element.

<AAA>	amino acids, total aromatic Unit: mg Comments: The total value is the sum of phenylalanine plus tyrosine only, in spite of the fact that tryptophan is also chemically aromatic. Tables: USDA 523, EA, SWD
<AAE8>	amino acids, total essential; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine Unit: mg Comments: These eight amino acids are included in all definitions of the essential amino acids for man.
<AAE1OA>	amino acids, total essential; includes the eight basic essential amino acids plus arginine and histidine Unit: mg Comments: Arginine and histidine are included in this definition of essential amino acids because they are essential for infants.
<AAE1OB>	amino acids, total essential; includes the eight basic essential amino acids plus cystine and tyrosine Unit: mg Comments: Cystine and tyrosine are included in this definition of essential amino acids because of their sparing effects on the requirements for methionine and phenylalanine respectively. Tables: MW

<AAE12>	amino acids, total essential; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine Unit: mg Comments: Arginine and histidine are included in this definition of essential amino acids because they are essential for infants. Cystine and tyrosine are included because of their sparing effects on the requirements for methionine and phenylalanine respectively. Tables: ETH, NE, EA
<AAE>	amino acids, total essential; unknown which amino acids are included in the total Unit: mg
<AAS>	amino acids, total sulphur-containing Unit: mg Comments: The total value is the sum of cystine plus methionine. Tables: USDA 522, NE, EA, SWD)
<AAT->	amino acids, total, precise definition not specified Unit: mg Tables: SFK, ETH, NE, EA Comments: When total amino acids are reported, they are usually the sum of whatever amino acids were analysed for that particular food. Consequently, this term is not precisely defined. Additional tagnames will be introduced when precise definitions exist. See page 79 for additional discussion.
< ACEAC >	acetic acid Unit: mg Tables: USDA 230, SFK
< AG >	silver Unit: mcg Tables: USDA 378
< AGAR >	agar-agar Synonyms: agar Unit: g
< AL >	aluminium Unit: mcg Synonyms: aluminum Tables: USDA 348, SFK
<ALA>	alanine Unit: mg Comments: Includes only L-alanine. Tables: USDA 513, SFK, ETH, NE, EA, DAN, SWD

< ALBU >	albumin Unit: mg
< ALC >	alcohol Unit: g Synonyms: ethanol; ethyl alcohol Tables: USDA 221, MW, DAN
<ALGL>	albumin and globulin Unit: mg Tables: SFK
<ALGNT>	alginates Unit: g
< AMMON >	ammonia Unit: mg Tables: USDA 519
< AMYP >	amylopectin Unit: g Tables: USDA 219
<AMYPM>	amylopectin; expressed in monosaccharide equivalents Unit: g
< AMYS >	amylose Unit: g
<AMYSM>	amylose; expressed in monosaccharide equivalents Unit: g
<ARAFB>	arabinose in dietary fibre Unit: mg
< ARAN >	arabinan Unit: g
< ARAS >	arabinose Unit: g Comments: L-arabinose only; includes only the free monosaccharide. Tables: SFK
< ARG >	arginine Unit: mg Comments: Includes only L-arginine. Tables: USDA 511, SFK, ETH, NE, EA, DAN, SWD
< AS >	arsenic Unit: mcg Tables: USDA 350

< ASCL>	L-ascorbic acid Unit: mg Tables: USDA 402, SWD
<ASCDL>	L-dehydroascorbic acid Unit: mg
< ASH >	ash Unit: g Synonyms: minerals Tables: USDA 207, SKF, ETH, EGP, IND, NE, EA, PRC, DAN, SWD
< ASN >	asparagine Unit: mg Comments: Includes only L-asparagine. Tables: USDA 525, SFK
< ASP >	aspartic acid Unit: mg Synonym: aspartate Comments: Includes only L-aspartic acid. Tables: USDA 514, SFK, ETH, NE, EA, DAN, SWD
< AU >	gold Unit: mcg Tables: USDA 363
< AVED5 >	delta 5-avenasterol Unit: mg Synonyms: delta 5-avenastenol Tables: USDA 649, SFK, FRN
<AVED7>	delta 7-avenasterol Unit: mg Synonyms: avenasterol; delta 7-avenastenol Tables: USDA 648, SFK, FRN
< B >	boron Unit: mcg Tables: USDA 354, SFK, PRC
<BA>	barium Unit: mcg Tables: USDA 351
<BENAC>	benzoic acid Unit: mg Tables: USDA 232, SFK
< BIOT >	biotin Unit: mcg Synonyms: vitamin H Tables: USDA 416, SFK, MW, DAN, SWD

< BRASTR >	brassicasterol Unit: mg Tables: USDA 640, SFK, FRN
<CA>	calcium Unit: mg Tables: USDA 301, SFK, MW, ETH, EGP, IND, NE, EA, PRC, DAN, SWD
< CAFFN >	caffeine Unit: mg Tables: USDA 262, SFK
< CAMD5 >	delta 5-campesterol Unit: mg Synonyms: campesterol; delta 5-campestenol Tables: USDA 639, SFK, FRN
<CAMD7>	delta 7-campesterol Unit: mg Synonyms: delta 7-campestenol Tables: FRN
< CARGN >	carageenan Unit: g
< CAROT>	carotene, total Unit: mcg Synonyms: vitamin A precursors Comments: *All-trans* carotene only. Tables: SFK, MW, PRC
< CARTA >	alpha-carotene Unit: mcg Comments: *All-trans* alpha-carotene only. Tables: USDA 322
< CARTB >	beta-carotene Unit: mcg Comments: All~trans beta-carotene only. Tables: USDA 321, DAN
< CARTBEQ >	beta-carotene equivalents Unit: mcg Synonyms: provitamin A carotenoids Comments: This value is the sum of the beta-carotene plus 1/2 the quantity of the other carotenoids with vitamin A activity. Tables: USDA 320, NE, EA
< CARTG >	gamma-carotene Unit: mcg Comments: *All-trans* gamma-carotene only. Tables: USDA 332

<CASN>.	casein Unit: mg Tables: SFK
< CD >	cadmium Unit: mcg Tables: USDA 356
<CELLO>	cellulose Unit: g Tables: USDA 225, SFK, DAN, SWD
< CHLNP>	phosphatidyl choline Unit: g Synonyms: lecithin Tables: USDA 662, SFK
< CHLRAC >	chlorogenic acid Unit: mg Tables: USDA 234, SFK
< CHOAVL >	carbohydrate, available Unit: g Comments: This value includes the free sugars plus dextrins, starch, and glycogen. Tables: SFK
<CHOAVLM>	carbohydrate, available; expressed in monosaccharide equivalents Unit: g Comments: This value includes the free sugars plus dextrins, starch, and glycogen. Tables: MW
<CHOCAL>	cholecalciferol Unit: mcg Synonyms: vitamin D-3 Comments: Naturally occurring form. Tables: DAN
<CHOCDF>	carbohydrate, total; calculated by difference Unit: g Comments: This value is calculated using the following formula: *100 g minus total grams of water, protein, fat, and ash* Tables: USDA 205, ETH, EGP, IND, NE, EA, DAN, SWD
< CHOCSM >	carbohydrate, total; calculated by summation Unit: g Comments: This value is the sum of the sugars, starches, oligosaccharides, and carbohydrate dietary fibre. Tables: USDA 254

<CHOLC>	cholesterol; determined by chemical method (classical) Unit: mg
<CHOLE>	cholesterol; determined by enzymatic or chromatographic method Unit: mg Tables: MW
< CHOLM >	24 methylcholest-7-erol Unit: mg Tables: USDA 651, SFK, FRN
<CHOLN >	choline Unit: mcg Tables: USDA 421, SFK, IND
<CHOL>	cholesterol; method of determination unknown Unit: mg
<CHO->	carbohydrate, total; method of determination unknown Unit: g
< CITAC >	citric acid Unit: mg Tables: USDA 236, SFK
< CLD >	chloride Unit: mg Note: If the value is expressed in millimoles, mmol must be explicitly stated with the secondary tagname < UNIT/> . Synonyms: chlorine Tables: USDA 302, SFK, MW, IND, PRC
< CO >	cobalt Unit: mcg Tables: USDA 311, SFK, IND, EA, PRC
< COLG >	collagen Unit: mg
<CONPRO>	connective tissue protein Unit: mg Tables: SFK Comments: This term is not precisely defined in the table in which it appears. The tagname should be construed as "connective tissue protein as the term is used by Souci-Fachmann-Kraut".
< CR >	chromium Unit: mcg Tables: USDA 310, SFK DAN, SWD
< CREATN >	creatinine Unit: mg Tables: SFK

< CRYPX >	cryptoxanthin Unit: mcg Tables: USDA 334
< CU >	copper Unit: mg Tables: USDA 312, SFK, MW, EA, PRC, DAN, SWD
<CYS>	cystine Unit: mg Comments: Cysteine is often the natural form, which is converted to cystine during chromatography; includes only the L-amino acid. Tables: USDA 507, SFK, ETH, NE, EA, DAN, SWD
< DEXTN >	dextrins Unit: g Tables: SFK
<DEXTNM>	dextrins; expressed in monosaccharide equivalents Unit: g Tables: MW
< DGLY >	diglycerides, total Unit: g Tables: USDA 656
<DISAC>	disaccharides, total Unit: g
<DISACM>	disaccharides, total; expressed in monosaccharide equivalents Unit: g
< DOPN >	dopamine Unit: mg Tables: SFK
<ENERA>	energy, gross; determined by direct analysis using bomb calorimetry Unit: kJ. The value for <ENERA> may be expressed in kilocalories instead of the default unit of kilojoules. However, if expressed in kilocalories, kcal must be explicitly stated with the secondary tagname < UNIT/ > . Note: It would be confusing and would imply additional information that does not exist if two <ENERA> values, i.e., one expressed in kilocalories and the other expressed in kilojoules, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 kcal = 4.184 kJ. Consequently, one or the other should be used, but not both. Synonyms: kilojoules; kilocalories; Calories; food energy

< ENERC >	energy, total metabolizable; calculated from the energy-producing food components Unit: kJ. The value for <ENERC> may be expressed in kilocalories instead of the default unit of kilojoules. However, if expressed in kilocalories, kcal must be explicitly stated with the secondary tagname <UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <ENERC> values, i.e., one expressed in kilocalories and the other expressed in kilojoules, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 kcal = 4.184 kJ. Consequently, one or the other should be used, but not both. Synonyms: kilojoules; kilocalories; Calories; food energy Comments: In addition to a value for the quantity of total metabolizable energy, <ENERC> includes a description or listing of the conversion factors used to calculate this energy value from the proximate quantities. The conversion factors may be described by a keyword, or the conversion factors may be listed using secondary tagnames within <ENERC>. (More than one <ENERC> tagname may exist for a single food item if the values were calculated from the proximate components using different conversion factors.) *Keywords*: Following are the available keywords to describe the conversion factors that were used for calculating total metabolizable energy: *KJA* kilojoule conversion factors using available carbohydrate *kilojoules = (17 x g total protein) + (16 x g available carbohydrate expressed as monosaccharides) + (37 x g total fat) + (29 x g alcohol)* Tables: MW *STDA* standard conversion factors originally derived by Atwater using available carbohydrate *kilocalories= (4 x g total protein) + (3. 75 x g available carbohydrate expressed as monosaccharides) + (9 x g total fat) + (7 x g alcohol)* Tables: MW *STDT* standard conversion factors originally derived by Atwater using total carbohydrate *kilocalories = (4 x g total protein) + (4 x g total carbobydrate) + (9 x g total fat) + (7 x g alcohol)* Tables: EGP,IND *CDXC CODEX* conversion factors for nutritional labelling of total kilocalories *kilocalories = (4x8 total protein) + (4x8 total carbohydrate) + (9 x g total fat) + (7 x g alcohol) + (3 x g organic acid)* *CDXJ CODEX* conversion factors for nutritional labelling of total kilojoules *kilojoules = (17 x g total protein) + (17 x g total carbohydrate) + (37 x g total fat) + (29 x g alcohol) + (13 x g organic acid)* *FDS* conversion factors based on type of food as reported in World Health Organization Technical Report Series No. 522 (3) and the United States Department of Agriculture Handbooks No. 8 (12) and No. 74 (9). Tables: USDA 208 and 268, ETH, NE, EA

	Note: The following two codes, RUBA and RUBT, represent conversion factors that were used primarily for calculating the energy data in early editions of McCance and Widdowson. It is believed that the Rubner conversion factors are no longer in active use. *RUBA* Rubner conversion factors using available carbohydrate *kilocalories = (4.1 x g total protein) + (3. 75 x g available carbohydrate expressed as monosaccharides) + (9.3 x g total fat) + (7 x g alcohol*). <*XCT*> conversion factors for calculating energy from total carbohydrate <*XCA*>conversion factors for calculating energy from available carbohydrate <*XF*> conversion factors for calculating energy from fat <*XA*>conversion factors for calculating energy from alcohol <*XO*>conversion factors for calculating energy from organic acid Note: If these secondary tagnames are used ,conversion factors for <*XP*> and <*XF*> are required; a conversion factors for <*XA*> and <*XO*> are optional. <*ENERC*> may not be used without either one of the keywords specified above or a set of specific conversion factors (or both).If the conversion system and factors are unknown ,<*ENER-*> should be used. Exemples : The 76 kcal/100 g energy value for whole cow's milk in the Ethiopian food tables was calculated from proximate values using conversion factors from the USDA Agriculture Handbook No. 8. Therefore ,the energy value would be listed using the <*ENERC*> tagname and the USDA keyword calculate from proximate value using conversion factors from the USDA Agriculture Handbook No. 8 with the kilocalorie unit of kilojoules: <*ENERC*> 76 USDA <*UNIT*/> kcal </*UNIT*/> <*ENERC*> The 272 kj/100 g energy for fresh ,whole cow's milk in the McCance and Widdowson food table was calculated with the kilojoule conversion factors that use available carbohydrate. Therefore ,the energy value would be listed using the <*ENERC*> tagname and the KJA keyword: <*ENERC*> 272 KJA </*ENERC*> If an energy value expressed in kilocalories were calculated for whole cow's milk using conversion factors for protein, fat, and total carbohydrate ,and the se conversion factors did not conform to any of the factors described by the available keywords,the energy value would be listed using the <*ENERC*> tagname and the <*XP*>,<*XF*> and <*XCT*> secondary tagnames.The kilocalorie unit would be stated with the secondary tagname <*UNIT*/> to replace the default unit of kilojoules: <*ENERC*> 76.42 <*XP*> 4.3 <*XF*> 8.8 <*XCT*> 3.9 <*UNIT*/ kcal </*UNIT*/> <*ENERC*> Note: In these examples, </*UNIT*/> and </*ENERC*> are end-tags required in interchange format to indicate the end of the unit and energy information. See the INFOODS Data Interchange Handbook format: for details on interchange

<ENER->	energy; method of determination unknown Unit: kJ. The value for <*ENER-*> may be expressed in kilocalories instead of the default unit of kilojoules. However, if expressed in kilocalories, kcal must be explicitly stated with the secondary tagname < *UNIT/* >. Note: It would be confusing and would imply additional information that does not exist if two <*ENER-*> values, i.e., one expressed in kilocalories and the other expressed in kilojoules, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 kcal = 4.184 kJ. Consequently, one or the other should be used, but not both. Synonyms: kilojoules; kilocalories; Calories; food energy Comments: The <*ENER-*> tagname should be used if it is not known whether the energy value represents gross energy or total metabolizable energy. It should also be used if it is known that the energy value was calculated from the proximate components but the conversion factors used are unknown. (It is meaningless to have <*ENER-*> in combination with either <*ENERA*> or <*ENERC*> for a given food item.)
< ERGCAL >	ergocalciferol Unit: mcg Synonyms: vitamin D-2
< ETHAM >	ethanolamines, total Unit: g Tables: SFK
<F4D0>	fatty acid 4:0 Unit: g Synonyms: butyric acid; tetranoic acid; butanoic acid Tables: USDA 607, SFK, FRN, DAN, SWD
<F6D0>	fatty acid 6:0 Unit: g Synonyms: caproic acid; hexanoic acid Tables: USDA 608, SFK, PRC, FRN, DAN, SWD
< F8D0>	fatty acid 8:0 Unit: g Synonyms: caprylic acid; octanoic acid Tables: USDA 609, SFK, PRC, FRN, DAN, SWD
<F10D0>	fatty acid 10:0 Unit: g Synonyms: capric acid; decanoic acid Tables: USDA 610, SFK, PRC, FRN, DAN, SWD

< F12D0>	fatty acid 12:0 Unit: g Synonyms: lauric acid; dodecanoic acid Tables: USDA 611, SFK, NE, PRC, FRN, DAN, SWD
< F13D0 >	fatty acid 13:0 Unit: g Synonyms: tridecanoic acid Tables: FRN
<F14D0>	fatty acid 14:0 Unit: g Synonyms: myristic acid; tetradecanoic acid Tables: USDA 612, SFK, NE, PRC, FRN, DAN, SWD
< F15DO>	fatty acid 15:0 Unit: g Synonyms: pentadecylic acid; pentadecanoic acid Tables: USDA 652, PRC, FRN, DAN
< F16D0 >	fatty acid 16:0 Unit: g Synonyms: palmitic acid; hexadecanoic acid Tables: USDA 613, SFK, NE, EA, PRC, FRN, DAN, SWD)
< F17D0 >	fatty acid 17:0 Unit: g Synonyms: margaric acid; heptadecanoic acid Tables: USDA 653, SFK, PRC, FRN, DAN
< F18D0 >	fatty acid 18:0 Unit: g Synonyms: stearic acid; octadecanoic acid Tables: USDA 614, SFK, NE, EA, PRC, FRN, DAN, SWD
<F20D0>	fatty acid 20:0 Unit: g Synonyms: arachidic acid; eicosanoic acid Tables: USDA 615, SFK, PRC, FRN, DAN, SWD
< F22D0 >	fatty acid 22:0 Unit: g Synonyms: behenic acid; docosanoic acid Tables: USDA 624, SFK, PRC, FRN, DAN, SWD
<F23D0>	fatty acid 23:0 Unit: g Synonyms: tricosanoic acid Tables: FRN

<F24D0>	fatty acid 24:0 Unit: g Synonyms: lignoceric acid; tetracosanoic acid Tables: USDA 654, SFK, FRN
< F12D1 >	fatty acid 12:1 Unit: g Synonyms: lauroleic acid Tables: FRN
<F14D1>	fatty acid 14:1 Unit: g Synonyms: myristoleic acid; tetradecenoic acid Tables: USDA 625, PRC, FRN, DAN
<F15D1>	fatty acid 15:1 Unit: g Synonyms: pentadecenoic acid Tables: FRN, DAN
<F16D1>	fatty acid 16:1 Unit: g Synonyms: palmitoleic acid; hexadecenoic acid Tables: USDA 626, SFK, NE, PRC, FRN, DAN, SWD
<F17D1>	fatty acid 17:1 Unit: g Synonyms: heptadecenoic acid Tables: FRN, DAN
< F18D1 >	fatty acid 18:1 Unit: g Synonyms: oleic acid; octadecenoic acid Tables: FRN, DAN, SWD
<F18D1TN9>	fatty acid bans 18:1 omega-9 Unit: g Synonyms: elaidic acid; octadecenoic acid Tables: USDA 617, SFK, NE, EA, FRN
<F20D1>	fatty acid 20:1 Unit: g Synonyms: gadoleic acid; eicosenoic acid Tables: USDA 628, NE, PRC, FRN, DAN, SWD
<F22D1->	fatty acid 22:1, unspecified mixture Unit: g Synonyms: erucic acid; cetoleic acid; docosenoic acid Tables: USDA 630, NE, PRC, FRN, DAN, SWD

<F22D1CN9>	fatty acid cis 22:1 omega-9 Unit: g Synonyms: erucic acid; docosenoic acid Tables: SFK, FRN, SWD
<F22D1N11>	fatty acid cis 22:1 omega-11 Unit: g Synonyms: cetoleic acid, 11-docosenoic acid
<F22D1TN9>	fatty acid bans 22:1 omega-9 Unit: g Synonyms: brassidic acid Tables: FRN
<F24D1>	fatty acid 24:1 Unit: g Synonyms: selacholeic acid, nervonic acid, tetracosenoic acid Tables: FRN
<F18D2CN6>	fatty acid cis,cis 18:2 omega-6 Unit: g Synonyms: linoleic acid; octadecadienoic acid Tables: USDA 618, SFK, NE, EA, PRC, FRN, DAN, SWD
<F18D3N3>	fatty acid 18:3 omega-3 Unit: g Synonyms: alpha-linolenic acid; octadecatrienoic acid Tables: USDA 619, SFK, NE, EA, PRC, FRN, DAN, SWIG
<F18D3N6>	fatty acid 18:3 omega-6 Unit: g Synonyms: gamma-linolenic acid Tables: FRN
< F18D4 >	fatty acid 18:4 Unit: g Synonyms: parinaric acid; stearidonic acid; octadecatetraenoic acid Tables: USDA 627, NE, FRN
< F18D4N3 >	fatty acid 18:4 omega-3 Unit: g Tables: FRN
<F20D2>	fatty acid 20:2 Unit: g Synonyms: eicosadienoic acid Tables: PRC, FRN
< F20D3 >	fatty acid 20:3 Unit: g Synonyms: eicosatrienoic acid Tables: FRN, DAN

<F20D4>	fatty acid 20:4 Unit: g Synonyms: arachidonic acid Tables: FRN
<F20D4N6>	fatty acid 20:4 omega-6 Unit: g Synonyms: arachidonic acid; eicosatetraenoic acid Tables: USDA 620, SFK, NE, PRC, FRN, DAN, SWD
<F20D5>	fatty acid 20:5 Unit: g Synonyms: eicosapentaenoic acid Tables: FRN
< F20D5N3 >	fatty acid 20:5 omega-3 Unit: g Synonyms: eicosapentaenoic acid; EPA; timnodonic acid Tables: USDA 629, NE, FRN, DAN, SWD
<F22D2>	fatty acid 22:2 Unit: g Synonyms: docosadienoic acid Tables: FRN
<F22D4>	fatty acid 22:4 Unit: g Synonyms: docosatetraenoic acid Tables: FRN
< F22D5 >	fatty acid 22:5 Unit: g Synonyms: docosapentaenoic acid Tables: FRN
<F22D5N3>	fatty acid 22:5 omega-3 Unit: g Synonyms: docosapentaenoic acid Tables: USDA 631, NE, PRC, FRN, DAN, SWD
< F22D6 >	fatty acid 22:6 Unit: g Synonyms: docosahexaenoic acid Tables: FRN
<F22D6N3>	fatty acid 22:6 omega-3 Unit: g Synonyms: docosahexaenoic acid; DHA Tables: USDA 621, NE, PRC, FRN, DAN, SWD

< FACID >	fatty acids, total Unit: g Comments: Two data items are required for tagname <FACID>: the total quantity of fatty acids and identification of the conversion factor used to calculate this value from the quantity of total fat. If the conversion factor was taken from a table in one of the sources identified by the keywords listed below, the keyword should be used during data interchange. Otherwise, the conversion factor can be explicitly stated within a secondary tagname. It is also acceptable to include both a keyword and the specific conversion factor in the data. Keywords: The available keywords for those tables that list the conversion factors for calculating total fatty acids from total fat are: MW McCance and Widdowson (10) USDA USDA Handbook No. 8 (12) The secondary tagname for identifying a specific fatty acid conversion factor is: <XFA> conversion factor for calculating total fatty acids from total fat
<FADT>	fatty acids, total double trans Unit: g Comments: Some countries are planning actions to Emit these acids (not single trans) from foods, e.g., chocolate.
<FAESS>	fatty acids, total essential Unit: g Comments: This value is the sum of linoleic acid, linolenic acid, and arachidonic acid. Tables: FRN
<FAFRE>	fatty acids, total free Unit: g Tables: USDA 658
<FAMS>	fatty acids, total monosaturated Unit: g Tables: USDA 645, NE, FRN, DAN, SWD
<FAPU>	fatty acids, total polyunsaturated Unit: g Tables: USDA 646, IND, NE, FRN, DAN, SWD
<FAPUN3>	fatty acids, total omega-3 polyunsaturated Unit: g
<FAPUN6>	fatty acids, total omega-6 polyunsaturated Unit: g

<FASAT>	fatty acids, total saturated Unit: g Tables: USDA 606, SFK, NE, EA, FRN, DAN, SWD
< FAT>	fat, total Unit: g Synonyms: total lipid Tables: USDA 204, SFK, MW, ETH, EGP, IND, NE, EA, PRC, FRN, DAN, SWD
<FATCE>	fat, total; derived by analysis using continuous extraction Unit: g Comments: The Soxhlet method has often been used to analyse for total fat using continuous extraction. This method tends to underestimate the total fat value of a food.
<FATRN>	fatty acids, total trans Unit: g Tables: USDA 605
< FD >	fluoride Unit: mcg Synonyms: fluorine Tables: USDA 313, SFK, EA, SWD
< FE >	iron, total Unit: mg Comments: Includes both haem and non-haem iron. Tables: USDA 303, SFK, MW, ETH, IND, NE, EA, PRC, DAN, SWD
< FERAC >	ferulic acid Unit: mg Tables: SFK
<FIBAD>	fibre; determined by acid detergent method Unit: g Comments: Includes cellulose, lignin, and some hemicelluloses.
< FIBC >	fibre, crude Unit: g Comments: The crude fibre method of fibre analysis is obsolete. Tables: USDA 206, SFK, ETH, EGP
<FIBHEX>	hexoses in dietary fibre Unit: g Tables: DAN

< FIBINS >	fibre, water-insoluble Unit: g Comments: Sum of insoluble components from the AOAC total dietary fibre method; includes primarily lignin, cellulose, and most of the hemicellulose. Note: Values for <FIBINS> may also be obtained by subtracting soluble fibre from total dietary fibre, i.e., by subtracting the value of < FIBSOL> from the value of < FIBTG > . Tables: SFK, MW
<FIBND >	fibre; determined by neutral detergent method Unit: g Comments: Includes lignin, cellulose, and insoluble hemicellulose. Tables: USDA 273
<F1BPEN>	pentoses in dietary fibre Unit: g Tables: USDA 223, DAN
< FIBSOL>	fibre, water-soluble Unit: g Comments: Sum of soluble components from the AOAC total dietary fibre method; includes primarily algal polysaccharides, gums, pectins, and mucilages. Tables: SFK
< FIBTG>	fibre, total dietary; determined gravimetrically by the AOAC total dietary fibre method Unit: g Comments: Sum of the water-soluble components and the water insoluble components of dietary fibre; can be calculated by adding the values of <FIBSOL> and <FIBINS>; includes all non-starch polysaccharides and lignin. Tables: SFK
<FIBTS>	fibre, total dietary; sum of non-starch polysaccharide components and lignin Unit: g Comments: Sum of the polysaccharide components of dietary fibre measured sequentially on the same sample (for example, by using the Southgate colorimetric procedure) plus lignin measured gravimetrically.
<FIB->	fibre; method of determination unknown Unit: g Note: Tagname < FIB-> is used to identify fibre values which represent unknown fibre components or which were obtained by unknown methods. Additional tagnames for fibre may be created to identify fibre components or specific methods of analysis that are not currently addressed in this listing.

< FOL>	folate, total Unit: mcg Synonyms: folacin; folic acid Comments: Includes both conjugated and free folate. Tables: USDA 417, SFK, MW, ETH, IND, EA, DAN, SWD
< FOLFRE >	folate, free Unit: mcg Tables: USDA 419, MW, IND, DAN
<FRUFB>	fructose in dietary fibre Unit: mg
< FRUS >	fructose Unit: g Comments: D-fructose only, includes only the free monosaccharide. Tables: USDA 212, SFK, DAN, SWD
< FRUTN >	fructan Unit: g
< FUMAC >	fumaric acid Unit: mg
< GALAAC>	Tables: USDA 237, SFK galacturonic acid Unit: mg Tables: USDA 238, SFK
<GALFB>	galactose in dietary fibre Unit: mg
<GALLAC>	garlic acid Unit: mg Tables: USDA 239, SFK
< GALS >	galactose Unit: g Comments: Includes only the free monosaccharide. Tables: SFK
< GALTN >	galactan Unit: g
< GLN>	glutamine Unit: mg Comments: Includes only L-glutamine. Tables: SFK
GLOB >	globulin Unit: mg

< GLU>	glutamic acid Unit: mg Synonym: glutamate Comments: Includes only L-glutamic acid. Tables: USDA 515, SFK, ETH, NE, EA, DAN, SWD
< GLUAKAC >	alpha-keto-glutaric acid Unit: mg Tables: SFK
< GLUCAC >	gluconic acid Unit: mg Tables: SFK
< GLUCNB >	betaglucan Unit: g
<GLUFB>	glucose in dietary fibre Unit: mg
< GLUMN >	glucomannan Unit: g
< GLUS >	glucose Unit: g Comments: D-glucose only; includes only the free monosaccharide. Tables: USDA 211, SFK, DAN, SWD
< GLUTN >	gluten Unit: mg
< GLY >	glycine Unit: mg Comments: Includes only L-glycine. Tables: USDA 516, SFK, ETH, NE, EA, DAN, SWD
<GLYC>	glycogen Unit: g Tables: USDA 272,SFK
<GLYCERA>	glycerides, total; determined by analysis Unit: g
<GLYCERC>	glycerides, total; calculated from fatty acid composition Unit: g
<GLYCER->	glycerdes, total; method of determination unknow Unit: g
<GLYCLAC>	glycolic acid Unit: mg Tables: USDA 240,SFK
<GLYCM>	glycogen; expressed in monosaccharide equivalents Unit: g

<GLYLIP>	glycolipids, total Unit: g Tables: USDA 604
<GLYRL>	glycerol Unit: mg Tables: SFK
<GUMS>	gums Unit: g
<HAEM>	iron, haem Unit: mg
<HEMCEL>	hemicellulose Unit: g Comments: Includes hexose and pentose. Tables: USDA 224,SFK
<HEXSN>	hexosan Unit: g Tables: SFK
<HG>	mercury Unit: mcg Tables: USDA 370
< HIS >	histidine Unit: mg Comments: Includes only L-histidine. Tables: USDA 512, SFK, ETH, NE, EA, DAN, SWD
< HISTN >	histamine Unit: mg Tables: SFK
< HYP >	hydroxyproline Unit: rag Comments: Includes only L-hydroxyproline. Tables: USDA 521, SFK
< ID >	iodide Unit: mcg Synonyms: iodine Tables: USDA 314, SFK, EA, PRC, DAN, SWD
< ILK >	isoleucine Unit: mg Comments: Includes only L-isoleucine. Tables: USDA 503, SFK, ETH, NE, EA, DAN, SWD
<INOTL>	inositol Unit: mcg Tables: USDA 422, SFK

<INULN>	inulin Unit: g
< ISOCAC >	isocitric acid Unit: mg Tables: USDA 241, SFK
< K>	potassium Unit: mg Note: If the value is expressed in millimoles, mmol<NA> must be explicitly stated with the secondary tagname <UNIT/>. Tables: USDA 306, SFK, MW, IND, NE, EA, PRC, DAN, SWD
<LACAC>	lactic acid Unit: mg Tables: USDA 242, SFK
< LACS >	lactose Unit: g Tables: USDA 213, SFK, DAN, SWD
<LACSM>	lactose; expressed in monosaccharide equivalents Unit: g Tables: MW
< LEU >	leucine Unit: mg Comments: Includes only L-leucine. Tables: USDA 504, SFK, ETH, NE, EA, DAN, SWD
< LI >	lithium Unit: mcg Tables: USDA 368
< LION>	lignin Unit: g Tables: SFK, DAN, SWD
< LYS >	Iysine Unit: mg Comments: Includes only L-lysine. Tables: USDA 505, SFK ETH, NE, EA, DAN, SWD
< MALAC >	malic acid Unit: mg Tables: USDA 243, SFK
< MALS >	maltose Unit: g Tables: USDA 214, SFK, DAN, SWD
<MALSM>	maltose; expressed in monosaccharide equivalents Unit: g
< MALTRS >	maltotriose Unit: g

<MALTRSM>	maltotriose; expressed in monosaccharide equivalents Unit: g
<MANFB>	mannose in dietary fibre Unit: mg
< MANN >	mannan Unit: g
< MANTL >	mannitol Unit: mg Tables: USDA 260, SFK
<MET>	methionine Unit: mg Comments: Includes only L-methionine. Tables: USDA 506, SFK, ETH, NE, EA, DAN, SWD
< METH >	methyl alcohol Unit: mg Synonyms: methanol Tables: SFK
< MG >	magnesium Unit: mg Tables: USDA 304, SFK, MW, IND, NE, EA, PRC, DAN, SWD
<MGLY>	monoglycerides, total Unit: g Tables: USDA 655
< MN >	manganese Unit: mcg Tables: USDA 315, SFK, EA, PRC, DAN, SWD
< MNSAC >	monosaccharides, total Unit: g Comments: Includes only the free monosaccharides.
< MO >	molybdenum Unit: mcg Tables: USDA 316, SFK, EA, PRC, DAN, SWD
<MUCIL>	mucilages Unit: g
< NA >	sodium Unit: mg Note: If the value is expressed in millimoles, mmol must be explicitly stated with the secondary tagname <UNIT/>. Tables: USDA 307, SFK, MW, IND, NE, EA, PRC, DAN, SWD

<NACL>	salt Unit: mg Synonyms: NACL Tables: USDA 375, SFK
< NAM >	nitrogen, amino Unit: g
< NHAEM >	iron, non-haem Unit: mg
< NI >	nickel Unit: mcg Tables: USDA 371, SFK, PRC
< NIA >	niacin, preformed Unit: mg Synonyms: nicotinic acid; nicotinamide (These terms are not true synonyms but are often used in food tables to refer to niacin.> Comments: Nicotinic acid and nicotinamide. Tables: USDA 406, SFK, MW, ETH, IND, NE, EA, PRC, DAN, SWD
<NIAAVL>	niacin, available Unit: mg Comments: total niacin minus bound niacin
<NIAEQ>	niacin equivalents, total Unit: mg Comments: Preformed niacin plus niacin equivalents from tryptophan. Tables: USDA 409, DAN, SWD
<NIATRP>	niacin equivalents from tryptophan Unit: mg Comments: 1/60 x tryptophan. Tables: USDA 407 & 408, MW, DAN
< NITRA >	nitrates Unit: mg Tables: USDA 264, SFK
< NITRI >	nitrites Unit: mg Tables: USDA 265, SFK
< NITRN- >	nitrosamine, total Unit: mg Tables: USDA 266
< NITRNN >	nitrosamine, non-volatile Unit: mg

< NITRNV >	nitrosamine, volatile Unit: mg Comments: Subject of forthcoming regulations.
< NNP>	nitrogen, non-protein Unit: mg
< NPRO >	nitrogen, protein Unit: g
<NT>	nitrogen, total Unit: g Comments: Determined by Kjeldahl method. Tables: USDA 202, MW, ETH, EGP, IND, NE, EA
<OLSAC>	oligosaccharides, total available Unit: g
<OLSACM>	oligosaccharides, total available; expressed in monosaccharide equivalents Unit: g
< OXACAC >	oxaloacetic acid Unit: mg Tables: USDA 244, SFK
< OXALAC >	oxalic acid Unit: mg Tables: USDA 245, SFK, IND
< P >	phosphorus Unit: mg Tables: USDA 305, SFK, MW, ETH, EGP, IND, NE, EA, PRC, DAN, SWD
< PANTAC>	pantothenic acid Unit: mg Synonyms: D-pantothenate; vitamin B-5 (obsolete term, may still appear in some tables) Tables: USDA 410, SFK, MW, EA, DAN, SWD
< PARHBAC >	parahydrobenzoic acid Unit: mg Tables: SFK
< PB >	lead Unit: mcg Tables: USDA 367

< PECT>	pectin Unit: g Comments: Reflects AOAC or equivalent procedure. Polymers of galacturonic acid unspecified. Note: Additional tagnames will be added, when needed by food composition tables and data bases, to reflect the very large number of polysaccharides present in foods and, specifically, to reflect different degrees of methoxylation in pectic substances. Tables: USDA 220, SFK, SWD
< PENSN >	pentosan Unit: g Tables: USDA 222, SFK
< PHE >	phenylalanine Unit: mg Comments: Includes only L-phenylalanine. Tables: USDA 508, SFK, ETH, NE, EA, DAN, SWD
< PHOLIP>	phospholipids, total Unit: g Tables: USDA 603
< PHYSTR >	phytosterols, total Unit: mg Synonyms: total plant sterols Comments: Includes avenasterol, brassicasterol, campesterol, sitosterol, spinasterol, and stigmasterol. Tables: USDA 636
<PHYTAC>	physic acid Unit: mg Synonyms: phytin P Tables: USDA 246,SFK,MW, IND
<PIPN>	piperine Unit: g Tables: USDA 259
<PRO>	proline Unit: mg Comments: Includes only L-proline. Tables: USDA 517, SFK, ETH,NE, EA, DAN, SWD
<PROA>	protein, total; determined by direct analysis Unit: g

<PROCNA>	protein, total; calculated from amino nitrogen Unit: g Comments: Two pieces of data are associated with the tagname <PROCNA>. The first is the quantity of total protein and the second is the conversion factor used to calculate total protein from amino nitrogen. Note: The total protein found in food tables is rarely calculated from amino nitrogen. <PROCNT> is the appropriate tagname for total protein in most cases.
<PROCNP>	protein, total; calculated from protein nitrogen Unit: g Comments: Two pieces of data are associated with the tagname <PROCNP>. The first is the quantity of total protein and the second is the conversion factor used to calculate total protein from protein nitrogen. Note: The total protein found in food tables is rarely calculated from protein nitrogen. <PROCNT> is the appropriate tagname for total protein in most cases.

< PROCNT>	protein, total; calculated from total nitrogen Unit: g Comments: Three pieces of data are associated with the tagname <PROCNT>. The first is the quantity of total protein; the second is a keyword which identifies the source of the conversion factor used to calculate the total protein from total nitrogen; and the third is the actual conversion factor used. If possible, all three pieces of data should be included with <PROCNT>. However, it is acceptable to include only the keyword or the conversion factor (rather than both) with the total protein value if one or the other is unknown. If the conversion factor used was generated from a source other than one of those identified without any keyword information. Keywords: Following are the available keywords that can be used as the second value for the < PROCNT> tagname: JONES conversion factor originally derived by Jones (7) Tables: EGP, NE, EA FAO conversion factor from a table in the FAO Nutritional Studies No. 24 (4), reprinted in the World Health Organization Technical Report Series No. 522 (3) Tables: MW, DAN USDA conversion factor from a table in the United States Department of Agriculture Handbook No. 8 (12) Tables: USDA 203 STD standard conversion factor of 6.25, not specific for the type of food. (If this keyword is used, the 6.25 conversion factor should not be listed with the secondary tagname < XN> .) Tables: SFK, IND,PRC The following secondary tagname may be used to identify 'the specific conversion factor used when a keyword other than STD is present, or instead of a keyword (see above). <XN> conversion factor for calculating total protein from total nitrogen Examples: The 3.2 g/100 g of protein in cow's milk which is listed in the Nutritive Value of Indian Foods was calculated from total nitrogen using the 6.25 conversion factor. Therefore, the protein value would be listed using the <PROCNT> tagname and the STD keyword: < PROCNT> 3.2 STD < /PROCNT> The 3.3 g/100 g of protein in cow's milk which is listed in McCance and Widdowson was calculated from total nitrogen using a 6.38 conversion factor. This factor was obtained from the FAO publication. Therefore, the protein value would be listed using the <PROCNT> tagname, the FAO keyword, and the <XN> secondary tagname: <PROCNT> 3.3 FAO <XN> 6.38 </PROCNT> As a hypothetical example, if a value of 0.3 g/100 g of protein in watermelon seeds were calculated from total nitrogen using the conversion factor 5.30, and this value had not been taken from one of the tables identified by the list of keywords, the protein value would be listed using the <PROCNT> tagname in the following manner: <PROCNT> 0.3 <XN> 5.30 </PROCNT> Note: In these examples, </PROCNT> is an end-tag required in interchange format to indicate the end of the information about protein calculated from total nitrogen. See the INFOODS Data Interchange Handbook for details on interchange format.

<PRO->	protein, total; method of determination unknown Unit: g Comments: The <PRO-> tagname should be used for a total protein value when it is not known whether the value was the result of a direct analysis or whether it was calculated from total nitrogen, protein nitrogen, or amino nitrogen. The <PRO-> tagname should also be used if it is known that the total protein value was calculated from one of the nitrogen components, but the conversion factor used in the calculation is unknown. (It is meaningless to have <PRO-> in combination with either <PROCNA>, <PROCNP>, or <PROCNT> for a given food item.)
< PROPAC >	propionic acid Unit: mg Tables: SFK
<PSACALG>	polysaccharides, algal Unit: g Comments: Includes carageenan, agar, and alginates.
< PSACNC >	polysaccharides, non-cellulosic Unit: g Comments: Includes hemicellulose, pectin, gums, algal polysaccharides, and mucilages. Tables: SWD
<PSACNCI>	polysaccharides, non-cellulosic, water-insoluble Unit: g Tables: SWD
<PSACNCS>	polysaccharides, non-cellulosic, water-soluble Unit: g Tables: SWD
< PSACNS>	polysaccharides, non-starch Unit: g Comments: Includes non-cellulosic polysaccharides and cellulose.
<PSACNSI>	polysaccharides, non-starch, water-insoluble Unit: g
< PSACNSS >	polysaccharides, non-starch, water-soluble Unit: g
<PURAC>	polyuronic acids Unit: mg Tables: SE;K, DAN
< PURN >	purines Unit: mg Tables: SFK

< PYRUAC >	pyruvic acid Unit: mg Tables: USDA 247, SFK
< PYRXL>	pyridoxal Unit: mg Comments: Vitamin B_6 aldehyde form. Tables: USDA 412
< PYRXM >	pyridoxamine Unit: mg Comments: Vitamin B 6 amine form. Tables: USDA 413
< PYRXN >	pyridoxine Unit: mg Comments: Vitamin B 6 alcohol form. Tables: USDA 411, EA
< QUINAC >	quinic acid Unit: mg Tables: USDA 248, SFK
< RAFS >	raffinose Unit: g Comments: Not available for humans. Tables: SFK
< RETAL >	retinal Unit: mcg
< RETALD >	retinaldehyde Unit: mcg
< RETOL >	retinol Unit: mcg Synonyms: preformed vitamin A Comments: All-trans retinol only. Tables: USDA 319, MW, NE, EA, DAN, SWD
< RETOL13 >	13-cis retinol Unit: mcg
< RHAFB>	rhamnose in dietary fibre Unit: mg
< RHAS >	rhamnose Unit: g Comments: Includes only the free sugar.
< RIBF>	riboflavin Unit: mg Synonyms: Vitamin B-2; riboflavine. Tables: USDA 405, SFK, MW, ETH, IND, NE, EA, PRC, DAN, SWD

<RIBS>	ribose Unit: g Comments: D-ribose only; includes only the free monosaccharide.
< S >	sulphur Unit: mg Tables: USDA 308, MW, IND
< SALAC>	salicylic acid Unit: mg Tables: USDA 249
< SE >	selenium, total Unit: mcg Tables: USDA 317, SE;K, EA, PRC, DAN, SWD
< SEIO>	selenium, inorganic Unit: mcg
< SEO >	selenium, organic Unit: mcg
< SER >	serine Unit: mg Comments: Includes only L-serine. Tables: USDA 518, SFK, ETH, NE, EA, DAN, SWD
< SEROTN >	serotonin Unit: mg Tables: SFK
< SHIKAC>	shikimic acid Unit: mg Tables: SFK
< SI >	silicon Unit: mcg Tables: USDA 378, SFK, PRC
< SITSTR >	sitosterol Unit: mg Comments: Beta-sitosterol only. Tables: USDA 641, SFK
<SN>	tin Unit: mcg Tables: USDA 385, SFK
< SORTL >	sorbitol Unit: mg Tables: USDA 261, SFK
< SPISTR >	spinasterol Unit: mg Comments: Alpha-spinasterol only. Tables: USDA 650, FRN

<SR>	strontium Unit: mcg Tables: USDA 380
< STARCH >	starch, total Unit: g Comments: The sum of all polysaccharides yielding glucose after hydrolysis with suitable enzymes; includes amylose, amylopectin, glycogen, and dextrins. Tables: USDA 209, SFK, DAN, SWD
<STARCHM>	starch, total; expressed in monosaccharide equivalents Unit: g Comments: The sum of all polysaccharides yielding glucose after hydrolysis with suitable enzymes; includes amylose, amylopectin, glycogen, and dextrins. Tables: MW
< STARES >	starch, resistant Unit: g Synonyms: retrograded starch
< STAS >	stachyose Unit: g Comments: Not available for humans. Tables: SFK
< STERFRE >	sterols, free Unit: mg Tables: USDA 660, SFK
<STERT>	sterols, total Unit: mg Comments: Non-specific colorimetric method or sum of cholesterol and phytosterols. Tables: USDA 634, SFK
< STID7>	delta 7-stigmasterol Unit: mg Comments: Values reported as "stigmasterol" in food tables are usually a measure of the delta 7 form only. Tables: USDA 038, SFK
<SUCAC>	succinic acid Unit: mg Tables: USDA 250, SFK
<SUCS>	sucrose Unit: g Tables: USDA 210, SFK DAN, SWD
<SUCSM>	sucrose; expressed in monosaccharide equivalents Unit: g

< SUGAR>	sugars, total Unit: g Comments: Sum of free monosaccharides and disaccharides. Tables: USDA 269, SFK, DAN, SWD
<SUGARM>	sugars, total; expressed in monosaccharide equivalents Unit: g Comments: Sum of free monosaccharides and disaccharides expressed in monosaccharide equivalents. Tables: MW
< SUGIN>	invert sugar Unit: g Comments: Obsolete. Tables: SFK
< SUGNRD>	sugars, non-reducing Unit: g Comments: Obsolete. Tables: USDA 270, SFK
< SUGRD >	sugars, reducing Unit: g Comments: Obsolete. Tables: USDA 274, SFK
<TARAC>	tartaric acid Unit: mg Tables: USDA 251, SFK
< TGLY >	triglycerides, total Unit: g Tables: USDA 657
< THEBRN >	theobromine Unit: mg Tables: USDA 263, SFK
< THIA >	thiamin Unit: mg Synonyms: vitamin B-1; aneurin; thiamine Tables: USDA 404, SE;K, MW, ETH, IND, NE, EA, PRC, DAN, SWD
< THR >	threonine Unit: mg Comments: Includes only L<threonine. Tables: USDA 502, SFK, ETH, NE, EA, DAN, SWD
< TOCPHA >	alpha-tocopherol Unit: mg Tables: USDA 323, SFK, DAN, SWD

< TOCPHB >	beta-tocopherol Unit: mg Tables: USDA 341, SFK
<TOCPHD>	delta-tocopherol Unit: mg Tables: USDA 343, SFK
<TOCPHG >	gamma-tocopherol Unit: mg Tables: USDA 342, SFK
< TOCTRA >	alpha-tocotrienol Unit: mg Tables: USDA 344, SFK, DAN
< TOCTRB >	beta-tocotrienol Unit: mg Tables: USDA 345, SFK
<TOCTRD>	delta-tocotrienol Unit: mg Tables: USDA 347
< TOCTRG >	gamma-tocotrienol Unit: mg Tables: USDA 346,SFK
< TRP >	tryptophan Unit: mg Comments: Includes only L-tryptophan. Tables: USDA 501,SFK, ETH, NE, EA, DAN, SWD
<TRYPN>	tryptamine Unit: mg Tables: SFK
<TYR>	tyrosine Unit: mg Comments: Includes only L-tyrosine. Tables: USDA509, SFK, ETH, NE, EA, DAN, SWD
<UNSAP>	unsaponifiable matter Unit: g Tables: USDA 643,EA
<V>	vanadium Unit: mcg Tables: USDA 389,SFK

<VAL>	valine Unit: mg Comments: Includes only L-valine. Tables: USDA510, SFK, ETH, NE, EA, DAN, SWD
<VERS>	verbascose Unit: g
< VITA>	vitamin A; calculated by summation of the vitamin A activities of retinol and the active carotenoids Unit: mcg. The value for < VITA> may be expressed in international units instead of the default unit of micrograms. International units are *not preferred*; however, if they are used, IU must be explicitly stated with the secondary tagname <UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <VITA> values, i.e., one expressed in mcg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the following conversion equation: 1 retinol equivalent = 3.33 IU vitamin A activity from retinol = 10 IU vitamin A activity from beta-carotene. Consequently, one or the other should be used, but not both. Synonyms: retinol equivalents Comments: *Total vitamin A activity = mcg retinol + 1/6 mcg beta carotene + 1/12 mcg other provitamin A carotenoids.* Tables: USDA 392 and 318, ETH, IND, DAN
<VITAA>	vitamin A; determined by bioassay Unit: IU

<VITA->	vitamin A; method of determination unknown Unit: mcg. The value for <VITA-> may be expressed in international units instead of the default unit of micrograms. International units are *not preferred*; however, if they are used, IU must be explicitly stated with the secondary tagname < UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <VITA-> values, i.e., one expressed in mcg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the following conversion equation: 1 retinol equivalent = 3.33 IU vitamin A activity from retinol = 10 IU vitamin A activity from beta-carotene. Consequently, one or the other should be used, but not both. Comments: The <VITA-> tagname should be used if it is not known whether the vitamin A value was determined by bioassay or by calculation. (It is meaningless to have <VITA-> in combination with either <VITA> or <VITAA> for a given food item.)
<VITAACT>	vitamin A acetate Unit: mcg Tables: USDA 325
<VITAPAL>	vitamin A palmitate Unit: mcg Tables: USDA 326
< VITB6A>	vitamin B 6, total; determined by analysis Unit: mg Tables: USDA 415, MW
< VITB6C>	vitamin B 6, total; calculated by summation Unit: mg Comments: Pyridoxal plus pyridoxamine plus pyridoxine. Tables: USDA 414, SFK, MW, DAN
< VITB6- >	vitamin B 6, total; method of determination unknown Unit: mg Comments: The < V1TB6- > tagname should be used if it is not known whether the vitamin B 6 value was determined by analysis or by calculation. (It is meaningless to have < VITB6- > in combination with either <VITB6A> or <VITB6C> for a given food item.)
<V1TB12>	vitamin B-12 Unit: mcg Synonyms: cobalamin Comments: Includes all the active forms of vitamin B-12 in food. Tables: USDA 418, SFK MW, ETH, IND, EA, PRC, DAN, SWD

<VITC>	vitamin C Unit: mg Synonyms: ascorbic acid; ascorbate (Note that these terms are not true synonyms but are often found in food tables to refer to vitamin C.) Comments: L-ascorbic acid plus L-dehydroascorbic acid. Tables: USDA 401, SFK, MW, ETH, IND, NE, EA, PRC, DAN
<VITD>	vitamin D; calculated by summation of ergocalciferol and cholecalciferol Unit: mcg. The value for <VITD> may be expressed in international units instead of the default unit of micrograms. International units are not preferred; however, if they are used, IU must be explicitly stated with the secondary tagname <UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <VITD> values, i.e., one expressed in mcg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 mcg vitamin D = 40 IU. Consequently one or the other should be used, but not both. Synonyms: calciferol Comments: Ergocalciferol plus cholecalciferol. Tables: USDA 324, MW
< VITDA>	vitamin D; determined by bioassay Unit: IU Synonyms: calciferol Tables: MW
<VITD->	vitamin D; method of determination unknown Unit: mcg. The value for <VITD-> may be expressed in international units instead of the default unit of micrograms. International units are not preferred; however, if they are used, IU must be explicitly stated with the secondary tagname <UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <VITD-> values, i.e., one expressed in mcg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 mcg vitamin D = 40 IU. Consequently, one or the other should be used, but not both. Comments: The <VITD-> tagname should be used if it is not known whether the vitamin D value was determined by bioassay or by calculation. (It is meaningless to have <VITD-> in combination with either < VITD> or < VITDA> for a given food item.)

<VITE>	vitamin E; calculated by summation of the vitamin E activities of the active tocopherols and tocotrienols; expressed as alpha-tocopherol equivalents Unit: mg The value for <VITE> may be expressed in international units instead of the default unit of milligrams. International units are not preferred; however, if they are used, IU must be explicitly stated with the secondary tagname<UNIT/>. Note: It would be confusing and would imply additional information that does not exist if two <VITE> values, i.e., one expressed in mg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 mg alpha-tocopherol equivalents = 1.49 IU. Consequently, one or the other should be used, but not both. Comments: In addition to a value for the quantity of vitamin E expressed as alpha-tocopherol equivalents, <VITE> includes a description or listing of the conversion factors used to calculate this vitamin E value from the active tocopherols and tocotrienols. The conversion factors may be described by a keyword or may be listed using secondary tagnames within <VITE>. (More than one <VITE> tagname may exist for a single food item if the values were calculated from the active tocopherols and tocotrienols using different conversion factors.) *Keywords*: The available keywords for describing the conversion factors used for calculating vitamin E in alpha-tocopherol equivalents are listed below: *USDA* United States Department of Agriculture conversion factors as reported by McLaughlin & Weibrauch (8) alpha-tocopherol= 1.00 beta-tocopherol = 0.40 gamma-tocopherol = 0.10 delta-tocopherol = 0.01 alpha-tocotrienol = 0.30 beta-tocotrienol = 0.05 gamma-tocotrienol = 0.01 Tables: USDA 340 *MW* conversion factors cited by McCance and Widdowson (10), pages 13 and 14. These values are not used in the vitamin E values in that table. alpha-tocopherol= 1.00 beta-tocopherol = 0.30 gamma-tocopherol = 0.15 alpha-tocotrienol = 0.30 Tables MW RDA conversion factors reported in the ninth edition of the Recommended Dietary Allowances for the United States (2) alpha-tocopherol= 1.00 beta-tocopherol = 0.50 gamma-tocopherol = 0.10 alpha-tocotrienol = 0.30

	If none of the above keywords apply, the actual conversion factors used to calculate vitamin E should be listed using the following secondary tagnames: <XATP> alpha-tocopherol conversion factor <XBTP> betatocopherol conversion factor <XGTP> gamma-tocopherol conversion factor <XDTP> delta-tocopherol conversion factor < XATT> alphatocotrienol conversion factor <XBTT> beta-tocotrienol conversion factor <XGTT> gamma-tocotrienol conversion factor Examples: The 0.10 mg/100 g vitamin E value for fresh, whole cow's milk in the McCance and Widdowson food table represents alphatocopherol only. Consequently, the value 0.10 would be shown with the <TOCPHA> tagname, no' the <VITE> tagname and the associated keyword: <TOCPHA> 0.10 </TOCPHA> If a vitamin E value of 0.12, expressed in alpha-tocopherol equivalents, were calculated for whole cow's milk from the alphatocopherol, betatocopherol, gamma-tocopherol, and alphatocotrienol values, and the conversion factors used did not conform to any of the factors described by the available keywords, the vitamin E value would be listed using the <VITE> tagname and the < XBTP >, < XGTP >, and < XATT > secondary tagnames: <VITE> 0.12 <XBTP> 0.4 <XGTP> 0.1 <XATT> 0.25 < /VITE > Note: In these examples, </VITE> and </TOCPHA> are end-tags required in interchange format to indicate the end of the vitamin E information. See the *INFOODS Data Interchange Handbook* for details on interchange format

<VITEA>	vitamin E; determined by bioassay Unit: IU Comments: Rarely used, not in major tables.
<VITE->	vitamin E, method of determination unknown; expressed as alpha-tocopherol equivalents. Unit: mg The value for <VITE-> may be expressed in international units instead of the default unit of milligrams. International units are not preferred; however, if they are used, IU must be explicitly stated with the secondary tagname < UNIT/ > . Note: It would be confusing and would imply additional information that does not exist if two <VITE-> values, i.e., one expressed in mg and the other expressed in IU, were included for a single food item when one value has simply been calculated from the other using the conversion equation: 1 mg alpha-tocopherol equivalents = 1.49 IU. Consequently, one or the other should be used, but not both. Comments: The <VITE-> tagname should be used if it is not known whether the vitamin E value was determined by bioassay or by calculation. It should also be used if it is known that the vitamin E value was determined by calculation but the conversion factors used in the calculation are not known. (It is meaningless to have < VITE- > in combination with either < VITE > or <VITEA> for a given food item.)
<VITK>	vitamin K Unit: mcg Comments: Vitamin K-1 plus vitamin K-2. Tables: SFK, DAN, SWD
< WATER >	water Unit: g Synonyms: moisture Tables: USDA 255, SFK, MW, ETH, EGP, IND, NE, EA PRC, DAN, SWD
< WAX >	wax, total Unit: mg Synonyms: wax esters Tables: USDA 661
<WHEY>	whey protein Unit: mg Tables: SFK
<XYLFB>	xylose in dietary fibre Unit: mg
< XYLN >	xylan Unit: g

< XYLS >	xylose Unit: g Comments: D-xylose only; includes only the free monosaccharide. Tables: SFK
< XYLTL >	xylitol Unit: mg Tables: SF
< ZN >	zinc Unit: mg Tables: USDA 309, MW, EA, PRC, DAN, SWD

3. Derived food components

When the tagnames described in this chapter are used in interchange files, they are all subsidiary to the <DRVD-COMP> element.

<AAAN>	amino acids, total aromatic; expressed per quantity of nitrogen Unit: mg/g nitrogen Comments: Phenylalanine plus tyrosine only, in spite of the fact that tryptophan is also chemically aromatic. Tables: EA, SWD
<AAAP>	amino acids, total aromatic; expressed per quantity of protein Unit: mg/100 g protein Comments: Phenylalanine plus tyrosine only, in spite of the fact that tryptophan is also chemically aromatic.
<AAET8->	essential to total amino acid ratio; includes the eight basic essential amino acids : isoleucine, leucine, lysine, methionine , phenylalanine , threonine, tryptophan, and valine Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.) Synonym: E/T Comments: See page 79 for a discussion of the denominator of this ratio.
<AAET10A>	essential to total amino acid ratio; includes the eight basic essential amino acids plus arginine and histidine Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.) Synonym: E/T Comments: Arginine and histidine are included in this essential amino acid total because they are essential for infants. See page 79 for a discussion of the denominator of this ratio.
<AAET10B>	essential to total amino acid ratio; includes the eight basic essential amino acids plus cystine and tyrosine Unit: % (The use of < UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.) Synonym: E/T Comments: Cystine and tyrosine are included in this essential amino acid total because of their sparing effect on methionine and phenylalanine respectively. See page 79 for a discussion of the denominator of this ratio.

<AAET12>	essential to total amino acid ratio; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.) Synonym: E/T Comments: Arginine and histidine are included in this essential amino acid total because they are essential for infants; cystine and histidine are included in the total because of their sparing effects on methionine and phenylalanine respectively. See page 79 for a discussion of the denominator of this ratio. Tables: ETH
<AAET->	essential to total amino acid ratio; neither the numerator (which amino acids are considered essential) nor the denominator (which amino acids are included in the total) is specified Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.) Synonym: E/T Comments: See page 79 for a discussion of the denominator of this ratio.
<AAE8N>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine Unit: mg/g nitrogen
<AAE8P>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine Unit: mg/100 g protein
<AAE1OAN>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus arginine and histidine Unit: mg/g nitrogen Comments: Arginine and histidine are included in this total essential amino acid value because they are essential for infants.

<AAE1OAP>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus arginine and histidine Unit: mg/100 g protein Comments: Arginine and histidine are included in this total essential amino acid value because they are essential for infants.
<AAE1OBN>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus cystine and tyrosine Unit: mg/g nitrogen Comments: Cystine and tyrosine are included in this total essential amino acid value because of their sparing effects on methionine and phenylalanine respectively.
<AAE10BP>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus cystine and tyrosine Unit: mg/100 g protein Comments: Cystine and tyrosine are included in this total essential amino acid value because of their sparing effects on methionine and phenylalanine respectively.
<AAE12N>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine Unit: mg/g nitrogen Comments: Arginine and histidine are included in this total essential amino acid value because they are essential for infants; cystine and tyrosine are included because of their sparing effects on methionine and phenylalanine respectively. Tables: ETH, NE, EA
<AAE12P>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine Unit: mg/100 g protein Comments: Arginine and histidine are included in this total essential amino acid value because they are essential for infants; cystine and tyrosine are included because of their sparing effects on methionine and phenylalanine respectively.

<AAEN->	amino acids, total essential; expressed per quantity of nitrogen; unknown which amino acids are included in the total value Unit: mg/g nitrogen
<AAEP->	amino acids, total essential; expressed per quantity of protein; unknown which amino acids are included in the total value Unit: mg/100 g protein
<AALB>	limiting amino acid; determined through biological experiment Unit: None (The use of <UNIT/> is prohibited with this tagname since no unit is required for its value.) Comments: Two pieces of data are associated with the tagname <AALB>. he first is the tagname of the limiting amino acid; the second is a keyword identifying the animal used in the biological experiments which determined the limiting amino acid. Keywords: The following keywords are available for identifying the animal in which the biological experiments were conducted: MAN experiments conducted with human subjects RAT experiments conducted with rats
<AALC>	limiting amino acid; determined through calculation Unit: None (The use of <UNIT/> is prohibited with this tagname since no unit is required for its value.) Comments: The limiting amino acid is determined by comparing the quantity of each essential amino acid in the food to the quantity of the same amino acid in a reference protein or amino acid mixture. The amino acid found in the lowest ratio is the limiting amino acid. Two data items are associated with tagname <AALB>. The first is the tagname of the limiting amino acid; the second is a keyword identifying the reference protein or amino acid pattern used in calculation of the chemical (amino acid) score. Keywords: The keywords to designate the reference pattern are identical to those for the chemical score. See tagname < CHEMSC > on page 65. Tables: EA Example: In the FAO Food Composition Table for Use in East Asia, lysine is listed as the limiting amino acid in sesame seeds. This determination was made through calculations of chemical score using the FAO reference protein pattern recommended in 1973. Therefore, the <AALC> tagname would be used to convey this information in the following manner: <AALC> LYS FA073 < /AALC> Note: In this example, </AALC> is an end-tag required in interchange format to indicate the end of the information about the limiting amino acid. See the INFOODS Data Interchange Handbook for details on interchange format.

<AASN>	amino acids, total sulphur-containing; expressed per quantity of nitrogen Unit: mg/g nitrogen Comments: Cystine plus methionine. Tables: NE, EA, SWD
<AASP>	amino acids, total sulphur-containing; expressed per quantity of protein Unit: mg/100 g protein Comments: Cystine plus methionine.
<AATN>	amino acids, total; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: ETH, NE, EA
<AATP>	amino acids, total; expressed per quantity of protein Unit: mg/100 g protein
<ALAN>	alanine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD
<ALAP>	alanine; expressed per quantity of protein Unit: mg/100 g protein
<ARGN>	arginine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<ARGP>	arginine; expressed per quantity of protein Unit: mg/100 g protein
<ASNN>	asparagine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA
<ASNP>	asparagine; expressed per quantity of protein Unit: mg/100 g protein
<ASPN>	aspartic acid; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD
< ASPP>	aspartic acid; expressed per quantity of protein Unit: mg/100 g protein

< CHEMSC >	chemical score Unit: None (The chemical score should be expressed as a ratio, not as a percentage value. Also, the use of <UNIT/> is prohibited with this tagname since no unit is required.) Synonyms: protein score, amino acid score Comments: Chemical score is the ratio of the quantity of the limiting amino acid in the food per quantity of this same amino acid in the protein of egg or a standard amino acid reference mixture. Keywords: Three data items are associated with the tagname <CHEMSC>: the calculated chemical score, a keyword to identify the reference protein or amino acid mixture that was used in determining the chemical score, and an optional second keyword to indicate the basis of the calculation. The available values of the first keyword are: EGG egg protein, as described by Block and Mitchell (1) or an equivalent method. MILK human milk protein FA057 reference protein pattern based on human amino acid requirements and recommended by FAO in 1957 (5) FAO65 reference protein pattern based on egg protein and suggested by the Joint FAD/WHO Expert Committee on Energy and Protein Requirements in 1965 (6) FA073 reference protein pattern based on human amino acid requirements and suggested by the Joint FAD/WHO Expert Committee on Energy and Protein Requirements in 1973 (3) Note: Additional keywords will be added as reference mixtures are defined and used in food composition data bases. Keywords: If it is known whether the calculation is based on values determined with respect to total protein or with respect to total nitrogen, this can be specified with an additional keyword, whose possible values are: N values calculated per gram of nitrogen in test mixture P values calculated per gram of protein in test mixture See chapter 3 of Pellett and Young (11) for additional discussion. Tables: ETH, EA Example: In the FAO Food Composition Table For Use in East Asia, the chemical score for sesame seeds is listed as 58 (this is a percentage: 0.58 x 100). The value was calculated using the 19 73 FAO reference protein pattern. This information would be conveyed using the <CHEMSC> tagname in the following manner: < CHEMSC > 0.58 FAO73 < /CHEMSC > Note: In this example, </CHEMSC> is an end-tag required in interchange format to indicate the end of the chemical score information. See the INFOODS Data Interchange Handbook for details on interchange format.

< CYSN >	cystine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<CYSP>	cystine; expressed per quantity of protein Unit: mg/100 g protein
<ENERPA>	energy, percent contributed by alcohol Unit: % (The use of < UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.)
< ENERPC >	energy, percent contributed by carbohydrate Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.)
<ENERPF>	energy, percent contributed by fat Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.)
< ENERPP >	energy, percent contributed by protein Unit: % (The use of <UNIT/> is prohibited with this tagname; the value must be expressed as a percentage.)
<F4DOF>	fatty acid 4:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: butyric acid; tetranoic acid Tables: MW, FRN, DAN, SWD
<F6DOF>	fatty acid 6:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: caproic acid; hexanoic acid Tables: MW, FRN, DAN, SWD
<F8DOF>	fatty acid 8:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: caprylic acid; octanoic acid Tables: MW, FRN, DAN, SWD
<F1ODOF>	fatty acid 10:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: capric acid; decanoic acid Tables: MW, FRN, DAN, SWD
<F12DOF>	fatty acid 12:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: lauric acid; dodecanoic acid Tables: MW, NE, FRN, DAN, SWD
<F13DOF>	fatty acid 13:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: tridecanoic acid Tables: FRN

<F14DOF>	fatty acid 14:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: myristic acid; tetradecanoic acid Tables: MW, NE, FRN, DAN, SWD
< F15DOF>	fatty acid 15:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: pentadecylic acid; pentadecanoic acid Tables: FRN, DAN
<F16DOF>	fatty acid 16:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: palmitic acid; hexadecanoic acid Tables: MW, NE, FRN, DAN, SWD
< F17DOF>	fatty acid 17:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: margaric acid; heptadecanoic acid Tables: FRN, DAN
< F18DOF>	fatty acid 18:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: stearic acid; octadecanoic add Tables: MW, NE, FRN, DAN, SWD
<F20DOF>	fatty acid 20:0; expressed per quantity of total fatty acids Unit: g/100 g fatty add Synonyms: arachidic acid; eicosanoic acid Tables.- MW, FRN, DAN, SWD
<F22DOF>	fatty acid 22:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: behenic add; docosanoic acid Tables: MW, FRN, DAN, SWD
<F23DOF>	fatty acid 23:0; expressed per quantity of tote] fatty acids Unit: g/100 g fatty acid Synonyms: tricosanoic acid Tables: FRN
< F24DOF>	fatty acid 24:0; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: lignoceric acid; tetracosanoic acid Tables: MW, FRN
<F12D1F>	fatty acid 12:1; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: lauroleic acid Tables: FRN

<F14D1F>	fatty acid 14:1; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: myristoleic acid; tetradecenoic acid Tables: FRN, DAN
< Fl5D1F>	fatty acid 15:1; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: pentadecenoic acid Tables: FRN, DAN
<F16D1F>	fatty acid 16:1; expressed per quantity of total fatty adds Unit: g/100 g fatty acid Synonyms: palmitoleic acid; hexadecenoic acid Tables: MW, NE, FRN, DAN, SWD
<F17D1F>	fatty acid 17:1; expressed per quantity of total fatty adds Unit: g/100 g fatty add Synonyms: heptadecenoic add Tables: FRN, DAN
<F18D1F>	fatty acid 18:1; expressed per quantity of total fatty adds Unit: g/100 g fatty acid Synonyms: oleic acid; octadecenoic acid Tables: FRN, DAN, SWD
< F18D1TN9F>	fatty acid bans 18:1 omega-9; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: elaidic acid; octadecenoic acid Tables: MW, NE, FRN
<F20D1F>	fatty acid 20:1; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: gadoleic acid; eicosenoic add Tables: MW, NE, FRN, DAN, SWD
<F22D1F>	fatty acid 22:1; expressed per quantity of total fatty adds Unit: g/100 g fatty add Synonyms: erucic add; cetoleic acid; docosenoic acid Tables: MW, NE, FRN, DAN, SWD
<F22D1CN9F>	fatty acid cis 22:1 omega-9; expressed pet quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: erucic add; docosenoic add Tables: FRN, SWD
<F22D1TN9F>	fatty acid trans 22:1 omega-9; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: brassidic acid Tables: FRN

< F24D1F>	fatty acid 24:1; expressed per quantity of total fatty adds Unit: g/100 g fatty acid Tables: FRN
< F18D2CN6F>	fatty acid cis,cis 18:2 omega-6; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: linoleic acid; octadecadienoic acid Tables: MW, NE, FRN, DAN, SWD
< F18D3N3F>	fatty acid 18:3 omega-3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: alpha-linolenic acid; octadecatrienoic acid Tables: MW, NE, FRN, DAN, SWD
<F18D3N6F>	fatty add 18:3 omega-6; expressed per quantity of total fatty adds Unit: g/100 g fatty add Synonyms: gamma-linolenic acid Tables: FRN
< F18D4F>	fatty acid 18:4; expressed per quantity of total fatty adds Unit: g/100 g fatty add Synonyms: parinaric acid; stearidonic acid; octadecatetraenoic acid Tables: NE, FRN
<F18D4N3F>	fatty acid 18:4 omega-3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Tables: FRN
<F20D2F>	fatty add 20:2; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: eicosadienoic acid Tables: FRN
<F20D3F>	fatty acid 20:3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: eicosatrienoic acid Tables: FRN, DAN
<F20D4F>	fatty acid 20:4; expressed per quantity of total fatty adds Unit: g/100 g fatty add Synonyms: arachidonic acid Tables: FRN

< F20D4N6F>	fatty acid 20:4 omega-6; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: arachidonic acid; eicosatetraenoic acid Tables: MW, NE, FRN, DAN, SWD
< F20D5F>	fatty acid 20:5; expressed per quantity of total fatty acids Unit: g/100 g fatty add Synonyms: eicosapentaenoic acid Tables: FRN
<F20D5N3F>	fatty acid 20:5 omega-3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: eicosapentaenoic add; EPA; timnodonic acid Tables: NE, FRN, DAN, SWD
<F22D2F>	fatty acid 22:2; expressed per quantity of total fatty acids Unit: g/100 g fatty add Synonyms: docosadienoic acid Tables: FRN
<F22D4F>	fatty acid 22:4; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: docosatetraenoic acid Tables: FRN
< F22D5F>	fatty acid 22:5; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: docosapentaenoic acid Tables: FRN
<F22D5N3F>	fatty acid 22:5 omega-3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: docosapentacnoic acid Tables: NE, FRN, DAN, SWD
<F22D6F>	fatty acid 22:6; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: docosahexaenoic acid Tables: FRN
< F22D6N3F>	fatty acid 22:6 omega-3; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Synonyms: docosahexaenoic acid; DHA Tables: NE, FRN, DAN, SWD

<FAESSF>	fatty acids, total essential; expressed per quantity of total fatty acids Unit: g/100 g Comments: Linoleic acid plus linolenic acid plus arachidonic acid. Tables: FRN
<FAFREF>	fatty acids, total free; expressed per quantity of total fatty acids Unit: g/100 g fatty acid
< FAMSF>	fatty acids, total monosaturated; expressed per quantity of total fatty adds Unit: g/100 g fatty add Tables:NE, FRN, DAN, SWD
< FAPUF>	fatty acids, total polyunsaturated; expressed per quantity of total fatty adds Unit: g/100 g fatty acid Tables: NE, FRN, DAN, SWD
< FAPUN3F>	fatty adds, total omega-3 polyunsaturated; expressed per quantity of total fatty acids Unit: g/100 g fatty add
< FAPUN6F>	fatty adds, total omega-6 polyunsaturated; expressed per quantity of total fatty acids Unit: g/100 g fatty acid
<FASATF>	fatty acids, total saturated; expressed per quantity of total fatty acids Unit: g/100 g fatty acid Tables: NE, FRN, DAN, SWD
<FATRNF>	fatty acids, total bans; expressed per quantity of total fatty acids Unit: g/100 g fatty add
<GLNN>	glutamine; expressed per quantity of nitrogen Unit: mg/g nitrogen
<GLNP>	glutamine; expressed per quantity of protein Unit: mg/100 g protein
<GLUN>	glutamic acid; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD
<GLUP>	glutamic add; expressed per quantity of protein Unit: mg/100 g protein
<GLYN>	glycine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD

<GLYP>	glycine; expressed per quantity of protein Unit: mg/100 g protein
<HISN>	histidine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables:MW, IND, ETH, NE, EA, DAN, SWD
<HISP>	histidine; expressed per quantity of protein Unit: mg/100 g protein
< HYPN >	hydroxyproline; expressed per quantity of nitrogen Unit: mg/g nitrogen
<HYPP>	hydroxyproline; expressed per quantity of protein Unit: mg/100 g protein
<ILEN>	isoleucine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
< ILEP>	isoleucine; expressed per quantity of protein Unit: mg/100 g protein
<LEUN>	leucine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<LEUP>	leucine; expressed per quantity of protein Unit: mg/100 g protein
<LYSN>	lysine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<LYSP>	Iysine; expressed per quantity of protein Unit: mg/100 g protein
<METN>	methionine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<METP>	methionine; expressed per quantity of protein Unit: mg/100 g protein

<NPU>	net protein utilization Unit: None (The use of <UNIT/> is prohibited with this tagname since no unit is required for its value.) Synonyms: NPU Comments: Net protein utilization is the proportion of nitrogen intake that is retained. This value is the product of digestibility and the proportion of absorbed nitrogen that is retained (biological value). Keywords: The tagname <NPU> requires two data items: the NPU value and a keyword identifying the animal used to experimentally determine digestibility and biological value. The available keywords are: MAN experiments conducted with human subjects RAT experiments conducted with rats Tables: USDA 267
<PER>	protein efficiency ratio Unit: None (The use of <UNIT/> is prohibited with this tagname since no unit is required for its value.) Synonyms: PER Comments: Protein efficiency ratio is defined as weight gain per weight of protein eaten. Keywords: The tagname <PER> requires two data items: the PER value and a keyword identifying the animal used to biologically determine this value. The available keywords are: MAN experiments conducted with human subjects RAT experiments conducted with rats fed 10% protein Tables: USDA 229
<PHEN>	phenylalanine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<PHEP>	phenylalanine; expressed per quantity of protein Unit: mg/100 g protein
<PRON>	proline; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD
<PROP>	proline; expressed per quantity of protein Unit: mg/100 g protein
<SERN>	serine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, ETH, NE, EA, DAN, SWD

<SERP>	serine; expressed per quantity of protein Unit: mg/100 g protein
<THRN>	threonine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, WTH, NE, EA, DAN, SWD
<THRP>	threonine; expressed per quantity of protein Unit: mg/100 g protein
<TRPN>	tryptophan; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<TRPP>	tryptophan; expressed per quantity of protein Unit: mg/100 g protein
<TYRN>	tyrosine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<TYRP>	tyrosine; expressed per quantity of protein Unit: mg/100 g protein
<VALN>	valine; expressed per quantity of nitrogen Unit: mg/g nitrogen Tables: MW, IND, ETH, NE, EA, DAN, SWD
<VALP>	valine; expressed per quantity of protein Unit: mg/100 g protein

4. Assigning the correct food component tagnames to the nutrient data

Introduction

Nutrient names used to label data values in food composition tables are sometimes not sufficient to identify precisely what those data actually represent. For example, do the "niacin" values in a specific food table represent only nicotinic acid, or do they include the quantity of nicotinamide in the foods? Do they represent only preformed niacin, or do they include the niacin equivalents from tryptophan?

In order to eliminate the ambiguity inherent in some of the commonly used food component names, INFOODS tagnames have been created for identifying food component data values. When necessary, multiple tagnames were created which correspond to one common nutrient name. Three situations have required the creation of multiple tagnames: (1) to identify values for the individual active components of a nutrient, (2) to specify the method used for determining a nutrient value, and (3) to distinguish between the terms in which the values may be expressed. As a result, some consideration may be required to determine exactly what a particular data value represents before a specific tagname can be assigned. Those food components that are likely to pose the most difficulty for tagname assignment are discussed below.

Alcohol

"Alcohol" values in food composition usually refer to ethyl alcohol (ethanol). These values should be assigned tagname <ALC>. Occasionally, values for methyl alcohol appear in food composition tables, and should be identified with the tagname <METH >.

Amino acids: total essential amino acids

Different definitions exist for which amino acids should be included in total essential amino acid values. Some definitions include only the eight amino acids that cannot be synthesized in the human body: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. Other definitions also include arginine and histidine because they are essential for infants, or cystine and tyrosine because of their sparing effects on the dietary requirements for methionine and phenylalanine. The tagnames for total essential amino acid values specify which amino acids were included in the total. Tagnames are also available to identify values for which it is unknown which amino acids were included in the total.

The total essential amino acid tagnames also distinguish whether the value is expressed per quantity of edible portion of food, per quantity of nitrogen in the food, or per quantity of protein in the food. The tagnames for values expressed per quantity of edible portion of food are subsidiary to the <comp> structural tag, while the tagnames for values expressed per quantity of nitrogen or protein are subsidiary to the < drvd-comp > structural tag.

All tagnames that can be assigned to total essential amino acid values are listed below with their respective structural tags.

<comp> <AAE8>	amino acids, total essential; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
<drvd-comp> <AAE8N>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
<drvd-comp> <AAE8P>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
<comp> <AAE1OA>	amino acids, total essential; includes the eight basic essential amino acids plus arginine and histidine
<drvd-comp> <AAE1OAN>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus arginine and histidine
<drvd-comp> <AAE10AP>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus arginine and histidine
<comp> <AAE10B>	amino acids, total essential; includes the eight basic essential amino acids plus cystine and tyrosine
<drvd-comp> <AAE10BN>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus cystine and tyrosine
<drvd-comp> <AAE10BP>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus cystine and tyrosine
<comp> <AAE12>	amino acids, total essential; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine
<drvd-comp> <AAE12N>	amino acids, total essential; expressed per quantity of nitrogen; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine

<drvd-comp> <AAE12P>	amino acids, total essential; expressed per quantity of protein; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine
<comp> <AAE->	amino acids, total essential; unknown which amino acids are included in the total
<drvd-comp> <AAEN->	amino acids, total essential; expressed per quantity of nitrogen; unknown which amino acids are included in the total
<drvd-comp> <AAEP->	amino acids, total essential; expressed per quantity of protein; unknown which amino acids are included in the total

Amino acids: essential to total amino acid ratio

In order to assign an appropriate tagname to values for the essential to total amino acid ratio, one must consider which amino acids were included in the total essential amino acid value in the numerator of this ratio. (See the preceding section for the various definitions of which amino acids are considered to be essential.) The available tagnames are listed below. A similar problem arises with the denominator of these ratios. The exact list of amino acids that are included in the "total" varies from table to table, usually simply comprising the sum of whatever amino acids were measured and reported on for that particular table. Consequently, these values may not be exactly comparable from table to table. Therefore, all of them have been assigned tagnames ending in hyphens. When a clear standard emerges for the denominator, more specific tagnames will be assigned. All are subsidiary to the <drvd-comp> structural tag.

<AAET8->	essential to total amino acid ratio; includes the eight basic essential amino acids: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine
<AAET10A->	essential to total amino acid ratio; includes the eight basic essential amino acids plus arginine and histidine
<AAET10B->	essential to total amino acid ratio; includes the eight basic essential amino acids plus cystine and tyrosine
<AAET12->	essential to total amino acid ratio; includes the eight basic essential amino acids plus arginine, histidine, cystine, and tyrosine
<AAET->	essential to total amino acid ratio; unknown which amino acids are included in the total essential amino acid value

Amino acids

For amino acid values, tagnames are assigned which identify whether the values are expressed per quantity of edible portion of food, per quantity of nitrogen in the food, or per quantity of protein in the food. The tagnames for values expressed per quantity of edible portion of food are subsidiary to the <comp> structural tag, while the tagnames for values expressed per quantity of nitrogen or protein are subsidiary to the <drvd-comp> structural tag. All amino acid tagnames are listed below with their respective structural tags.

< comp > < ALA >	alanine
<drvd-comp> <ALAN>	alanine; expressed per quantity of nitrogen
<drvd-comp> <ALAP>	alanine; expressed per quantity of protein
< comp > < ARG > <drvd-comp> <ARGN> <drvd-comp> <ARGP>	arginine arginine; expressed per quantity of nitrogen arginine; expressed per quantity of protein
< comp> <ASN> < drvd-comp > < ASNN > < drvd-comp> <ASNP>	asparagine asparagine; expressed per quantity of nitrogen asparagine; expressed per quantity of protein
< comp> <ASP> <drvd-comp> <ASPN> <drvd-comp> <ASPP>	aspartic acid aspartic acid; expressed per quantity of nitrogen aspartic acid; expressed per quantity of protein
< comp> <CYS> <drvd-comp> <CYSN> <drvd-comp> <CYSP>	cystine cystine; expressed per quantity of nitrogen cystine; expressed per quantity of protein
< comp > < GLN > <drvd-comp> <GLNN> <drvd-comp> <GLNP>	glutamine glutamine; expressed per quantity of nitrogenglutamine; expressed per quantity of protein
<comp> <GLU> <drvd-comp> <GLUN> <drvd-comp> <GLUP>	glutamic acid glutamic acid; expressed per quantity of nitrogen glutamic acid; expressed per quantity of protein
< comp > < GLY > < drvd-comp > < GLYN > <drvd-comp> <GLYP>	glycine glycine; expressed per quantity of nitrogen glycine; expressed per quantity of protein
<comp> <HIS> <drvd-comp> <HISN> <drvd-comp> <HISP>	histidine histidine; expressed per quantity of nitrogen histidine; expressed per quantity of protein
<comp> <HYP> <drvd-comp> <HYPN>	hydroxyproline hydroxyproline; expressed per quantity of nitrogen
<drvd-comp> <HYPP>	hydroxyproline; expressed per quantity of protein

< comp > < ILE > <drvd-comp> <ILEN> <drvd-comp> <ILEP>	isoleucine isoleucine; expressed per quantity of nitrogen isoleucine; expressed per quantity of protein
< comp > < LEU > <drvd-comp> <LEUN> < drvd-comp > < LEUP >	leucine leucine; expressed per quantity of nitrogen leucine; expressed per quantity of protein
< comp > < LYS> <drvd-comp> <LYSN> < drvd-comp> <LYSP>	lysine lysine; expressed per quantity of nitrogen lysine; expressed per quantity of protein
< comp > < MET> <drvd-comp> <METN> <drvd-comp> <METP>	methionine methionine; expressed per quantity of nitrogen methionine; expressed per quantity of protein
< comp > < PHE> <drvd-comp> <PHEN>	phenylalanine phenylalanine; expressed per quantity of nitrogen
<drvd-comp> <PHEP>	phenylalanine; expressed per quantity of protein
< comp > < PRO > Drvd-comp <PRON> <drvd-comp> <PROP>	proline praline; expressed per quantity of nitrogen proline; expressed per quantity of protein
<comp> <SER> <drvd-comp> <SERN> <drvd-comp> <SERP>	serine serine; expressed per quantity of nitrogen serine; expressed per quantity of protein
< comp> <THR> <drvd-comp> <THRN> <drvd-comp> <THRP>	threonine threonine; expressed per quantity of nitrogen threonine; expressed per quantity of protein
< comp> <TRP> <drvd-comp> <TRPN> <drvd-comp> <TRPP>	tryptophan tryptophan; expressed per quantity of nitrogen tryptophan; expressed per quantity of protein
< comp> <TYR> <drvd-comp> <TYRN> <drvd-comp> <TYRP>	tirosine tyrosine; expressed per quantity of nitrogen tyrosine; expressed per quantity of protein
< comp > < VAL> <drvd-comp> <VALN> <drvd-comp> <VALP>	valine valine; expressed per quantity of nitrogen valine; expressed per quantity of protein
<comp> <AAA> <drvd-comp> <AAAN>	total aromatic amino acids total aromatic amino acids; expressed per quantity of nitrogen
<drvd-comp> <AAAP>	total aromatic amino acids; expressed per quantity of protein

<comp> <AAS> < drvd-comp > < AASN >	total sulphur-containing amino acids total sulphur-containing amino acids; expressed per quantity of nitrogen
<drvd-comp> <AASP>	total sulphur-containing amino acids; expressed per quantity of protein
<comp> <AAT>	total amino acids
<drvd-comp> <AATN>	total amino acids; expressed per quantity of nitrogen
<drvd-comp> <AATP>	total amino acids; expressed per quantity of protein

Carbohydrate

Values labelled "carbohydrate" in different food composition tables may actually represent different components of the carbohydrate content. A major difference is that some carbohydrate values represent only available carbohydrate, while others represent total (available plus unavailable) carbohydrate. As a finer distinction. available carbohydrate values may be expressed as a quantity of carbohydrate or in terms of monosaccharide equivalents, and total carbohydrate may be calculated by difference or by summation. The specific tagnames for identifying carbohydrate values are listed below. Included is a tagname that can be assigned to carbohydrate values when it is not known which of the specific carbohydrate tagnames is appropriate for the data. All tagnames are subsidiary to the <comp> structural tag.

<CHOAVL> < CHOAVLM >	available carbohydrate available carbohydrate; expressed in monosaccharide equivalents
<CHOCDF> <CHOCSM> <CHO->	total carbohydrate; calculated by difference total carbohydrate; calculated by summation total carbohydrate; method of determination unknown

Carbohydrates and monosaccharide equivalents

A carbohydrate value may be expressed as a quantity of carbohydrate or as a quantity of its monosaccharide equivalent. Therefore, there are two possible tagnames corresponding to these two modes of expression for identifying each carbohydrate or carbohydrate component value. These carbohydrate tagnames are listed below. All are subsidiary to the <comp> structural tag.

< AMYP > <AMYPM>	amylopectin amylopectin; expressed in monosaccharide equivalents
< AMYS > <AMYSM>	amylose amylose; expressed in monosaccharide equivalents

< CHOAVL > <CHOAVLM>	available carbohydrate available carbohydrate; expressed in monosaccharide equivalents
< DEXTN > <DEXTNM>	dextrins dextrins; expressed in monosaccharide equivalents
< DISAC > <DISACM>	disaccharides disaccharides; expressed in monosaccharide equivalents
< GLYC > <GLYCM>	glycogen glycogen; expressed in monosaccharide equivalents
< LACS > <LACSM>	lactose lactose; expressed in monosaccharide equivalents
< MALS > <MALSM>	maltose maltose; expressed in monosaccharide equivalents
<OLSAC > <OLSACM>	oligosaccharides oligosaccharides; expressed in monosaccharide quivalents
< STARCH > <STARCHM>	starch starch; expressed in monosaccharide equivalents
<SUCS> <SUCSM>	sucrose sucrose; expressed in monosaccharide equivalents
< SUGAR > <SUGARM>	sugars sugars; expressed in monosaccharide equivalents

Cholesterol

Values for the quantity of cholesterol in a food may differ depending on the method used for analysis. Therefore, cholesterol tagnames have been created which are method-dependent. These tagnames are listed below, along with a tagname that can be assigned to cholesterol values when the method of determination is not known. AH of these tagnames are subsidiary to the <comp> structural tag.

<CHOLC>	cholesterol; determined by chemical method (classical)
<CHOLE>	cholesterol; determined by enzymatic or chromatographic method
<CHOL->	cholesterol; method of determination unknown

Energy

Values representing the energy content of a food may differ depending on whether the energy was determined by direct analysis of the food or whether it was calculated from the energyproducing components using appropriate conversion factors. Therefore, energy tagnames have been created which are method-dependent. These tagnames are listed below, along with a tagname that can be assigned to energy values when the method of determination is not known. AH of these tagnames are subsidiary to the < comp > structural tag.

<ENERA>	gross energy; determined by direct analysis using bomb calorimetry
<ENERC>	total metabolizable energy; calculated from the energy-producing food components. <ENERC> requires, in addition to a data value, either a keyword or a set of specific conversion factors, or both. If the conversion system and factors are not known, <ENER-> should be used.
<ENER->	energy; method of determination unknown

Fat

Values for the quantity of total fat in a food may differ depending on the methods used to determine the values. Values derived by analysis using continuous extraction have been found to be consistently different from values derived using other methods. Therefore, two tagnames for total fat values have been created to specify this difference. These tagnames, listed below, are subsidiary to the <comp> structural tag.

<FAT>	total fat
<FATCE>	total fat; derived by analysis using continuous extraction

Fatty acids

For fatty acid values, tagnames are assigned which identify whether the values are expressed per quantity of edible portion of food or per quantity of total fatty acids in the food. The tagnames for values expressed per quantity of edible portion of food are subsidiary to the < comp> structural tag, while the tagnames for values expressed per quantity of total fatty acids are subsidiary to the <drvd-comp> structural tag. If the quantity of total fatty acids appears, it is identified with the <FACID> tagname, subsidiary to <comp>. All fatty acid tagnames are listed below with their respective structural tags.

<comp> <F4D0> <drvd-comp> <F4D0F>	fatty acid 4:0 fatty acid 4:0; expressed per quantity of total fatty acids

<comp> <F6D0> <drvd-comp> <F6D0F>	fatty acid 6:0 fatty acid 6:0; expressed per quantity of total fatty acids
< comp > < F8D0 > <drvd-comp> <F8D0F>	fatty acid 8:0 fatty acid 8:0; expressed per quantity of total fatty acids
< comp > < F10D0 > <drvd-comp> <F10D0F>	fatty acid 10:0 fatty acid 10:0; expressed per quantity of total fatty acids
< comp> < F12D0> <drvd-comp> <F12D0F>	fatty acid 12:0 fatty acid 12:0; expressed per quantity of total fatty acids
<comp> <F13D0> <drvd-comp> <F13D0F>	fatty acid 13:0 fatty acid 13:0; expressed per quantity of total fatty acids
<comp> <F14D0> <drvd-comp> <F14D0F>	fatty acid 14:0 fatty acid 14:0; expressed per quantity of total fatty acids
<comp> <F15D0> <drvd-comp> <F15D0F>	fatty acid 15:0 fatty acid 15:0; expressed per quantity of total fatty acids
< comp > < F16D0 > <drvd-comp> <F16D0F>	fatty acid 16:0 fatty acid 16:0; expressed per quantity of total fatty acids
< comp > < F17D0 > <drvd-comp> <F17D0F>	fatty acid 17:0 fatty acid 17:0; expressed per quantity of total fatty acids
< comp > < F18D0 > <drvd-comp> <F18D0F>	fatty acid 18:0 fatty acid 18:0; expressed per quantity of total fatty acids
< comp > < F20D0 > <drvd-comp> <F20D0F>	fatty acid 20:0 fatty add 20:0; expressed per quantity of total fatty acids
< comp > < F22D0 > drvd-comp <F22D0F>	fatty acid 22:0 fatty acid 22:0; expressed per quantity of total fatty acids
<comp> <F23D0> <drvd-comp> <F23D0F>	fatty acid 23:0 fatty acid 23:0; expressed per quantity of total fatty acids
<comp> <F24D0> <drvd-comp> <F24D0F>	fatty acid 24:0 fatty acid 24:0; expressed per quantity of total fatty acids

<comp> <F12D1> <drvd-comp> <F12D1F>	fatty acid 12:1 fatty acid 12:1; expressed per quantity of total fatty acids
<comp> <F14D1> <drvd-comp> <F14D1F>	fatty acid 14:1 fatty acid 14:1; expressed per quantity of total fatty acids
<comp> <F15D1> <drvd-comp> <F15D1F>	fatty acid 15:1 fatty acid 15:1; expressed per quantity of total fatty acids
<comp> <F16D1> <drvd-comp> <F16D1F>	fatty acid 16:1 fatty- acid 16:1; expressed per quantity of total fatty acids
<comp> <F17D1> <drvd-comp> <F17D1F>	fatty acid 17:1 fatty acid 17:1; expressed per quantity of total fatty acids
<comp> <F18D1> <drvd-comp> <F18D1F>	fatty acid 18:1 fatty acid 18:1; expressed per quantity of total fatty acids
<comp> <F18D1N9> <drvd-comp> <F18D1N9F>	fatty acid 18:1 omega-9 fatty acid 18:1 omega-9; expressed per quantity of total fatty acids
<comp> <F18D1TN9> <drvd-comp> <F18D1TN9F>	fatty acid bans 18:1 omega-9 fatty acid bans 18:1 omega-9; expressed per quantity of total fatty acids
<comp> <F20D1> <drvd-comp> <F20D1F>	fatty acid 20:1 fatty acid 20:1; expressed per quantity of total fatty acids
< comp> < F22D1 > <drvd-comp> <F22D1F>	fatty acid 22:1 fatty acid 22:1; expressed per quantity of total fatty acids
<comp> <F22D1CN9> <drvd-comp> <F22D1CN9F>	fatty acid cis 22:1 omega-9 fatty acid cis 22:1 omega-9; expressed per quantity of total fatty acids
<comp> <F22D1TN9> <drvd-comp> <F22D1TN9F>	fatty acid bans 22:1 omega-9 fatty acid bans 22:1 omega-9; expressed per quantity of total fatty acids
<comp> <F24D1> <drvd-comp> <F24D1F>	fatty acid 24:1 fatty acid 24:1; expressed per quantity of total fatty acids
<comp> <F18D2CN6> <drvd-comp> <F18D2CN6F>	fatty acid cis,cis 18:2 omega-6 fatty acid cis,cis 18:2 omega-6; expressed per quantity of total fatty acids

<comp> <F18D3N3> <drvd-comp> <F18D3N3F>	fatty acid 18:3 omega-3 fatty acid 18:3 omega-3; expressed per quantity of total fatty acids
< comp > < F18D3N6> <drvd-comp> <F18D3N6F>	fatty acid 18:3 omega-6 fatty acid 18:3 omega-6; expressed per quantity of total fatty acids
<comp> <F18D4> <drvd-comp> <F18D4F>	fatty add 18:4 fatty acid 18:4; expressed per quantity of total fatty acids
<comp> <F18D4N3> <drvd-comp> <F18D4N3F>	fatty acid 18:4 omega-3 fatty acid 18:4 omega-3; expressed per quantity of total fatty acids
<comp> <F20D2> <drvd-comp> <F20D2F>	fatty acid 20:2 fatty acid 20:2; expressed per quantity of total fatty acids
<comp> <F20D3> <drvd-comp> <F20D3F>	fatty acid 20:3 fatty acid 20:3; expressed per quantity of total fatty acids
< comp > < F20D4 > <drvd-comp> <F20D4F>	fatty acid 20:4 fatty acid 20:4; expressed per quantity of total fatty acids
< comp > < F20D4N6 > <drvd-comp> <F20D4N6F>	fatty acid 20:4 omega-6 fatty acid 20:4 omega-6; expressed per quantity of total fatty acids
< comp > < F20D5 > <drvd-comp> <F20D5F>	fatty acid 20:5 fatty acid 20:5; expressed per quantity of total fatty acids
< comp > < F20D5N3 > <drvd-comp> <F20D5N3F>	fatty acid 20:5 omega-3 fatty acid 20:5 omega-3; expressed per quantity of total fatty acids
<comp> <F22D2> <drvd-comp> <F22D2F>	fatty acid 22:2 fatty acid 22:2; expressed per quantity of total fatty acids
<comp> <F22D4> <drvd-comp> <F22D4F>	fatty acid 22:4 fatty acid 22:4; expressed per quantity of total fatty acids
<comp> <F22D5> <drvd-comp> <F22D5F>	fatty acid 22:5 fatty acid 22:5; expressed per quantity of total fatty acids

<comp> <F22D5N3> <drvd-comp> <F22D5N3F>	fatty acid 22:5 omega-3 fatty acid 22:5 omega-3; expressed per quantity of total fatty acids
<comp> <F22D6> <drvd-comp> <F22D6F>	fatty acid 22:6 fatty acid 22:6; expressed per quantity of total fatty acids
<comp> <F22D6N3> <drvd-comp> <F22D6N3F>	fatty acid 22:6 omega-3 fatty acid 22:6 omega-3; expressed per quantity of total fatty acids
< comp > < FAESS > <drvd-comp> <FAESSF>	fatty acids, total essential fatty acids, total essential; expressed per quantity of total fatty acids
< comp > < FAFRE: > <drvd-comp> <FAFREF>	fatty acids, total free fatty acids, total free; expressed per quantity of total fatty acids
< comp > < FAMS > <drvd-comp> <FAMSF>	fatty acids, total monosaturated fatty acids, total monosaturated; expressed per quantity of total fatty acids
< comp > < FAPU > <drvd-comp> <FAPUF>	fatty acids, total polyunsaturated fatty acids, total polyunsaturated; expressed per quantity of total fatty acids
<comp> <FAPUN3> <drvd-comp> <FAPUN3F>	fatty acids, total omega-3 polyunsaturated fatty acids, total omega-3 polyunsaturated; expressed per quantity of total fatty acids
<comp> <FAPUN6> <drvd-comp> <FAPUN6F>	fatty acids, total omega-6 polyunsaturated fatty acids, total omega-6 polyunsaturated; expressed per quantity of total fatty acids
<comp> <FASAT> <drvd-comp> <FASATF>	fatty acids, total saturated fatty acids, total saturated; expressed per quantity of total fatty acids
< comp> < FATRN > <drvd-comp> <FATRNF>	fatty acids, total bans fatty acids, total bans; expressed per quantity of total fatty acids

Fibre

There is no standard definition for dietary fibre. Dietary fibre values are highly dependent on the analytical method used to determine those values and the chemical components included in the measurements. Therefore, before a tagname can be assigned to a dietary fibre value, it is necessary to know exactly how that value was determined. The available tagnames for dietary fibre are listed below. They include a tagname that can be assigned to fibre values when the method of determination is not known. All fibre tagnames are subsidiary to the < comp> structural tag.

< FIBTG >	total dietary fibre; determined gravimetrically by the AOAC total dietary fibre method
< FIBTS>	total dietary fibre; sum of non-starch polysaccharide components and lignin
< FIBAD > < FIBND > <FIBSOL> <FIBINS>	fibre; determined by acid detergent method fibre; determined by neutral detergent method water-soluble fibre water-insoluble fibre
< FIBC > <FIB->	crude fibre fibre; method of determination unknown

Values for the non-starch and non-cellulosic polysaccharide components of dietary fibre should be identified using the following tagnames:

< PSACNCI >< PSACNS> <PSACNSS> <PSACNSI>	polysaccharides, non-starch polysaccharides, non-starch, water-soluble polysaccharides, non-starch, water-insoluble

Tagnames also exist for identifying data on the individual components of dietary fibre: algal polysaccharides, cellulose, gums, hemicellulose, lignin, mucilages, pectins, and resistant starch.

Folate

"Folate", "folacin", and "folic acid" are three terms used to describe the same food component. Most frequently, folate values represent total folate and should be assigned the tagname < FOL > . Some food composition tables also include values for free folate; these values are identified by tagname < FOLFRE >.

Glycerides

Values representing the quantity of total glycerides in a food are dependent on whether they were determined by analysis or by calculation from the fatty acid composition using conversion factors. The tagnames for total glyceride values are method-dependent and are listed below, along with a tagname that can be assigned to total glyceride values when the method of determination is not known. All of these tagnames are subsidiary to the <comp> structural tag.

<GLYCERA> <GLYCERC>	total glycerides; determined by analysis total glycerides; calculated from fatty acid composition
<GLYCER->	total glycerides; method of determination unknown

Iron

The iron values in food composition tables usually represent the quantity of total iron in the foods. Tagname <FE> is used to identify such values. Some food tables also contain values for haem and non-haem iron, which should be identified by the tagnames < HARM > and < NHAEM > respectively.

Niacin

Most niacin values in food composition tables include both the nicotinie acid and the nicotinamide found in the food. Historically, however, niacin was synonymous with nicotinic acid, so one must be certain before assigning a tagname to a "niacin" value whether that value includes the quantity of nicotinamide.

Another factor to consider before an appropriate tagname can be assigned to a niacin value is whether that value represents only the preformed niacin in the food or whether it also includes the niacin equivalents derived from tryptophan.

The selection of tagnames for niacin data are listed below. All are subsidiary to the <comp> structural tag.

< NIA > <NIATRP> < NIAEQ > < NIAAVL >	preformed niacin niacin equivalents from tryptophan total niacin equivalents available niacin

Nitrogen

Most nitrogen values in food composition tables represent total nitrogen. However, some sources also include data for the protein, non-protein, and amino nitrogen components. Individual tagnames,listed below, are used to identify the particular nitrogen component. All are subsidiary to the <comp> structural tag.

< NT> < NPRO > < NNP > < NAM>	total nitrogen protein nitrogen non-protein nitrogen amino nitrogen

Protein

By far the most popular method of determining the total protein content of a food is by calculation from the total nitrogen value using an appropriate conversion factor (i.e., tagname < PROCNT> is appropriate in most cases). It is also possible to determine a value for total protein by calculation from the amino nitrogen or protein nitrogen components or by direct protein analysis. The tagnames for total protein values, as listed below, reflect these various methods of determination. A tagname is also provided for identifying total protein values for which the method of determination is unknown. All of these tagnames are subsidiary to the <comp> structural tag.

< PROCNT>	total protein; calculated from total nitrogen. This tagname requires that either a keyword specifying the source of the conversion factor or the specific conversion factor used, or both, be supplied. If neither the source of the conversion factor nor the conversion factor itself is available, then the method of calculation is not known and <PRO-> must be used.
< PROCNA>	total protein; calculated from amino nitrogen
<PROCNP>	total protein, calculated from protein nitrogen
<PROA>	total protein; determined by direct analysis
<PRO->	total protein; method of determination unknown

Selenium

The selenium values in food composition tables usually represent the total selenium in a food. Such values should be assigned tagname <SE>. Interest in the distinction between organic and inorganic selenium has also generated data for these two components, which should be identified by the tagnames < SEO > and < SEIO > respectively.

Starch

Most starch values in food composition tables represent the quantity of total starch in a food. These values may be expressed as a quantity of starch or in terms of its monosaccharide equivalents. Values for resistant starch, a measure of the quantity of non-digestible starch (see the section "Fibre" above), also appear in sources of food composition data. The relevant tagnames for starch values are listed below. All are subsidiary to the < comp > structural tag.

< STARCH > <STARCHM>	total starch total starch; expressed in monosaccharide equivalents
< STARES >	resistant starch

Sugar

Data labelled as "sugar" usually represent the quantity of total sugars (free monosaccharides plus disaccharides) in a food. These values may be expressed either as a quantity of sugars or in terms of their monosaccharide equivalents. Data also exist for the quantity of reducing and non-reducing sugars and for the quantity of invert sugar in a food. The appropriate tagnames for all of these data values are listed below. All are subsidiary to the <comp> structural tag.

< SUGAR > <SUGARM>	total sugars total sugars; expressed in monosaccharide equivalents
<SUGIN>	invert sugar
< SUGNRD >	non-reducing sugars
< SUGRD >	reducing sugars

It is also quite common to find data values in food composition tables for individual sugar components. When not further specified, these values usually include only the free monosaccharide or disaccharide. However, some food tables also contain values for the sugar components found in dietary fibre. Therefore, two tagnames have been created for each sugar component in order to specify this distinction. These tagnames are listed below. All are subsidiary to the <comp> structural tag.

< ARAS > < ARAFB >	arabinose arabinose in dietary fibre
<FRUS> <FRUFB>	fructose fructose in dietary fibre
< GALS > <GALFB>	galactose galactose in dietary fibre
< GLUS > <GLUFB>	glucose glucose in dietary fibre
<XYLS> <XYLFB>	xylose xylose in dietary fibre

Vitamin A

Nutrient values labelled "vitamin A" in different food composition tables and nutrient data bases may represent different portions of the total vitamin A activity in a food. Therefore, it is essential to know what is included in a particular "vitamin A" value before a tagname is assigned to that value.

Total vitamin A includes both retinol (also called "preformed vitamin A") and carotene (also called "vitamin A precursor"). Total vitamin A is usually calculated as the total vitamin A activity contributed by retinol, beta-carotene, and other active carotenoids. This calculated value is expressed in retinol equivalents (RE) and is sometimes referred to simply as "retinol equivalents". It is calculated according to the following formula:

total vitamin A (RE) = mcg of retinol + 1/6 mcg of beta-carotene + 1/12 mcg of other active carotenoids

Total vitamin A may also be determined directly by bioassay and expressed in international units (IU). The tagnames for identifying total vitamin A values distinguish between those values that were calculated from retinol and the active carotenoids and those determined by bioassay. A tagname is also available for use when the method of vitamin A determination is not known. These three tagnames are listed below. All are subsidiary to the <comp> structural tag.

<VITA>	vitamin A; calculated by summation of the vitamin A activities of retinol and the active carotenoids
<VITAA>	vitamin A; determined by bioassay
<VITA->	vitamin A; method of determination unknown

<VITA> values are usually expressed in retinol equivalents, and <VITAA> values are usually expressed in international units. However, a value expressed in one unit may be converted to the other unit according to the following formulae:

1 mcg retinol = 3.3 IU of retinol
1 RE from beta-carotene = 10 IU of beta-carotene

Beta-carotene equivalents (also called "provitamin A carotenoids") are a measure of the vitamin A activity contributed by the active carotenoids. As indicated in the above formula for calculating vitamin A in retinal equivalents, beta-carotene has twice the vitamin A activity of the other active carotenoids. Therefore, beta-carotene equivalents are calculated according to the following formula:
mcg of beta-carotene equivalents = mcg of betacarotene + 1/2 the mcg of other active carotenoids

The tagname for beta-carotene equivalents is listed below, as are the tagnames for identifying data on the retinol and active carotenoid components that can contribute to the calculated total vitamin A value. All are subsidiary to the <comp> structural tag.

< CARTBEQ >	beta-carotene equivalents
< CARTA > < CARTB > < CARTG > < CAROT>	alpha-carotene beta-carotene gamma-carotene total carotene
< RETOL>	retinol

Vitamin B-6

The quantity of vitamin B-6 in a food can be determined either by direct analysis or by summation of the component quantities of pyridoxal, pyridoxamine, and pyridoxine. Since these two methods tend to produce different results, separate tagnames have been created to identify the method used to determine the vitamin B-6 values. These tagnames are listed below, along with a tagname that can be used for vitamin B-6 values when the method of determination is unknown. All are subsidiary to the <comp> structural tag.

< VITB6A>	total vitamin B-6; determined by analysis
<VITB6C>	total vitamin B-6; calculated by summation
< VITB6 >	total vitamin B-6; method of determination unknown

Tagnames are also available for data on the pyridoxal, pyridoxamine, and pyridoxine components of vitamin B-6.

Vitamin C

Vitamin C is a measure of the sum of the L-ascorbic acid and the L-dehydroascorbic acid in a food. The tagname < VITC > is used to identify data values which represent this sum, the tagname <ASCL> is used to identify data values which represent only the quantity of L-ascorbic acid, and the tagname <ASCDL> is used to identify data values which represent only the quantity of L-debydroascorbic acid. Some food composition tables commonly label vitamin C values as "ascorbic acid", so it is essential before assigning a tagname to determine whether the values truly represent only L-ascorbic add or whether they are a measure of L-ascorbic acid plus L-dehydroascorbic acid (vitamin C).

Vitamin D

Vitamin D is most commonly determined by calculation as the sum of ergocalciferol (also called vitamin D-2) and cholecalciferol (also called vitamin D-3). Historically, it was determined by bioassay. In some food tables and nutrient data bases, vitamin D is labelled as "calciferol", so it is important not to confuse this name with the ergocalciferol and cholecalciferol components of vitamin D.

Tagnames for vitamin D, based on its method of determination, and the components of vitamin D are listed below. All are subsidiary to the < comp> structural tag.

< VITD >	vitamin D; calculated by summation of ergocalciferol and cholecalciferol
< VITDA > <VITD->	vitamin D; determined by bioassay vitamin D; method of determination unknown
<CHOCAL> < ERGCAL>	cholecalciferol ergocalciferol

Vitamin E

Vitamin E is most commonly determined by calculation as the sum of the vitamin E activities of the active tocopherols and tocotrienols in a food. This calculated vitamin E value is expressed as alpha-tocopherol equivalents. It is important not to confuse values for alpha-tocopherol equivalents, a measure of total vitamin E, with values for alpha-tocopherol, one of the tocopherol components contributing to the total vitamin E activity.

Historically, vitamin E has also been determined by bioassay. These values are usually expressed in international units (IU). It is possible to convert between alpha-tocopherol equivalents and international units by using the following equation:

1 mg alpha-tocopheroJ equivalents = 1.49 IU

The tagnames for vitamin E, which are based on its method of determination, and for the tocopherol and tocotrienol components of vitamin E are listed below. All are subsidiary to the < comp > structural tag.

<VITE>	vitamin E; calculated by summation of the vitamin E activities of the active tocopherols and tocotrienols; expressed asalpha-tocopherol equivalents.
<VITEA> <VITE->	vitamin E; determined by bioassay vitamin E; method of determination unknown; expressed as alpha-tocopherol equivalents
< TOCPHA > < TOCPHB > < TOCPHD > < TOCPHG >	alpha-tocopherol beta-tocopherol delta-tocopherol gamma-tocopherol
< TOCTRA > <TOCTRB> < TOCTRD > < TOCTRG >	alpha-tocotrienol beta-tocotrienol delta-tocotrienol gamma-tocotrienol

Food Composition Tables Referenced

DAN	Moller A. *Levnedsmiddeltabeller*, 2. udgave [*Food composition tables*, 2nd ea.] Soborg, 1986.
EA	Food and Agriculture Organization. *Food Composition Table for Use in East Asia*. Rome, 1972.
EGP	Nutrition Institute. *Food Composition Tables*. Cairo, 1985.
ETH	Agren G. Gibson R *Food Composition Table for Use in Ethiopia* 1. Uppsala, 1968. Also Agren G. Eklund A, Lieden S-A. *Food Composition Table for Use in Ethiopia* 11. Uppsala, 1975.
FRN	Feinberg M, Favier JC, Ireland-Ripert J. *Répertoire Général des Aliments*. Paris, 1987.
IND	Gopalan C, Rama Sastri BV, Balasubramanian SC. *Nutritive Value of Indian Foods*. Hyderabad, 1984.
MW	Paul AA, Southgate DAT. *McCance and Widdowson's The Composition of Foods*. 4th ed. London, 1978.
NE	Food and Agriculture Organization. *Food Composition Tables for the Near Fast*. Rome, 1982.
PRC	People's Republic of China. *1982 Food Composition Table.*
SFK	Souci SW, Fachmann W. Kraut H. *Food Composition and Nutrition Tables.* Stuttgart, 1986/87.
SWD	Statens Livsmedelsverk [National Food Administration l . *Livsmedelstabeller - Energi och Näringsämnen (Food composition tables - Energy and nutrients)*. Stockholm, 1986.
USDA	United States Department of Agriculture. *Nutrient Data Base for Standard Reference.* release 5. Washington DC, 1985. (Numbers listed with "USDA" are USDA nutrient identification numbers in the USDA nutrient data base.)

References

1. Block RJ, Mitchell HH. The correlation of the amino acid composition of proteins with their nutritive value. Nutr Abst Rev 1946-1947;16:249-278.

2. Committee on Dietary Allowances, Food and Nutrition Board, National Research-Council. Recommended dietary allowances. 9th ed. Washington, DC: National Academy Press, 1980.

3. Food and Agriculture Organization /World Health Organization. Energy and protein requirements: report of a joint FAD/WHO ad hoc expert committee. Geneva: WHO Technical Report Series No 522, 1973.

4. Food and Agriculture Organization. Amino acid content of foods and biological data on proteins. Rome: FAO Nutritional Studies No 24, 1970.

5. Food and Agriculture Organization. Protein requirements: report of the FAO committee. Rome: FAO Nutritional Studies No 16, 1957.

6. Joint FAD/WHO Expert Group. Protein requirements. Geneva: WHO Technical Report Series No 301; Rome: FAO Nutrition Meetings Report Series No 37, 1965.

7.Jones DB. Factors for convening percentages of nitrogen in foods and feeds into percentages of proteins. Washington DC: United States Department of Agriculture Circular No 183, 1941.

8. McLaughlin PJ, Weihrauch JL. Vitamin E content of foods. J Am Diet Assoc1979;75:647.

9.Merrill AL, Watt BK. Energy value of foods: basis and derivation. Washington, DC:United States Department of Agriculture Handbook No 74, 1973.

10. Paul AA, Southgate DAT. McCance and Widdowson's The composition of foods. 4th ed. London: Her Majesty's Stationery Office, 1978.

11. Pellett PL, Young VR, eds. Nutritional evaluation of protein foods. Tokyo: United Nations University, 1980.

12. Watt BK, Merrill AL. Composition of foods. Washington, DC: United States Department of Agriculture Handbook No 8, 1963.