Chapter 3 References (Notes on Foods)

See “Chapter 3 1 Notes on Foods” in Food Composition Tables 2015 for detailed descriptions of each food. The following describes notes related to carbohydrates.

The component values in the current Composition Tables are generally determined based on new analytical values. Additionally, from the viewpoint of increasing the number of foods as much as possible, the component values of non-analyzed foods are estimated by the following methods:

[1] For foods when the analytical values for “Raw” form are available, the component values of different forms, such as “Boiled” and “Baked”, are imputed based on the analytical values.

[2] For foods when values cannot be estimated by [1] and there are similar foods in foreign food composition tables, their component data is borrowed.

[3] For processed foods with known proportions of raw ingredients and their carbohydrate compositions, the component values are calculated using such data.

Because the estimated values by the method in [1], [2] or [3] do not consider the possibility of changes of the composition by cooking nor differences between the foods available in Japan and other countries, they are shown in parenthesis ( ) and are also mentioned in the Remarks. [See Chapter 1 2 1) (2) “Outline of listed foods” of the current Composition Tables for the method of calculating the estimated values.]

For foods whose component values are estimated using the [1] and [2] methods and referring to other foods or forms, the referenced foods or forms are shown in the Remarks or in Table 8 at the end of this chapter.

For foods whose component values are estimated using the [3] method based on the proportion of raw ingredients, the proportion data shown in Chapter 3 of Standard Tables of Food Composition in Japan - 2015 - (Seventh Revised Edition) is used for the calculation.

2 Potatoes and starches

02006–02008, 02045–02049 Sweet potato

When raw sweet potatoes are cooked with heat, the enzymes (mainly β-amylase) act and yield maltose from starch by hydrolysis. For this reason, available carbohydrate compositions of cooked foods are considerably different from that of raw foods. When there are discrepancies in the total amount of available carbohydrates between raw and cooked foods, 80 % ethanol-soluble maltodextrin and other saccharides may be present, but they cannot be measured by the analytical methods used in the Food Composition Tables.

3 Sugars and sweeteners

1) 03024, 03025 Glucose syrup (enzyme-converted, and acid-converted)

The main carbohydrates in glucose syrup are glucose, maltose, and dextrin (measured as starch). When these three saccharides are totaled, their content differs greatly from the dry matter (weight) of glucose syrup. This is because glucose syrup contains “80 % ethanol-soluble maltodextrin”, and because analytical method used in Food Composition Tables cannot measure maltodextrin. Because maltodextrin is energy-yielding carbohydrate, it must be included in energy calculation. Glucose syrup

does not contain protein, fat, or ash, and so the content of maltodextrin was calculated by subtraction using the following formula:

Amount of 80 % ethanol-soluble maltodextrin (g)
＝100 − (water + starch + glucose + fructose + maltose [in 100 g edible portion], g)

Amount of 80 % ethanol-soluble maltodextrin (monosaccharide equivalent) (g)
＝Amount of 80 % ethanol-soluble maltodextrin (g) × 1.10

The conversion factor from mass to monosaccharide equivalent is variable ranging from 1.07 to 1.10 by the composition of 80 % ethanol-soluble maltodextrins. Because the composition is unknown, 1.10, which is a conversion factor for starch, was used [1)]. The conversion factor (1.10) can be applicable from maltooctaose with a degree of polymerization (DP) of 8 to starch. Because DP of maltodextrin generally ranges from 3 to 20, it would be a suitable conversion factor.

2) 03026–03028 Sweeteners (glucose fructose syrup, fructose glucose syrup, and high fructose syrup)

The major carbohydrates of sweeteners are glucose, fructose, and maltose. When these three sugars are summed up, their amount differs greatly from the dry matter (weight) of sweeteners. Sweeteners contain oligosaccharides including maltotriose. The direct analytical method for carbohydrates used in the Food Composition Tables cannot measure these oligosaccharides. Because these oligosaccharides are energy-yielding carbohydrates, they need to be included when calculating energy. These sweeteners do not contain protein, fat, or ash. The weight of the oligosaccharides was calculated by difference using the following formula:

Amount of oligosaccharides including maltotriose (g)
＝100 − (water + starch + glucose + fructose + maltose [in 100 g edible portion], g)

Amount of oligosaccharides including maltotriose (monosaccharide equivalent) (g)
＝Amount of oligosaccharides including maltotriose (g) × 1.07

The conversion factor from mass to monosaccharide equivalent ranges from 1.07 to 1.10 depending on the composition of oligosaccharides. Because the composition is unknown, 1.07 which is the conversion factor for trisaccharides was used [1)]. Oligosaccharides, as well as maltose, are considered to be components of reduced sugars other than glucose and fructose as defined in JAS standards.

7 Fruits

1) Estimating sorbitol（proposal 2：Estimation of sorbitol content）

Fruits of the family Rosaceae and their products contain a high amount of sorbitol. （proposal 2：Some of Rosaceae family fruit and their processed products have a high sorbitol content.） Of

these, for food for which sorbitol was not analyzed, component values were estimated as much as possible based on Australian food composition tables and data in literatures [2)3)]. The sorbitol content of "pomegranate", "dates", and "grapes" were also borrowed.

2) 07049, 07050 Persimmon (non-astringent, astringency removed)

When persimmon fruit is crushed or when sugar is extracted from the crushed fruits, the enzyme, invertase, acts and causes hydrolysis of sucrose. （proposal 2：In persimmon fruit, it is known that sucrose is hydrolyzed by invertase enzymatic action when the tissue is crushed for sugar extraction）

For this reason, non-astringent and astringency removed fruit flesh was heated to inactivate the enzyme using a microwave oven according to the method described in a literature [4)], and then sugars were extracted from crushed fruits.

8 Mushrooms

It is known that mushrooms contain glycogen [5)]. The analytical method for starch used in the current Composition Tables (AOAC 996.11) measures α-glucans including starch, glycogen and dextrin without differentiating them. For this reason, although the contents in mushrooms (raw, dry) are tabulated as starch, the values actually indicate glycogen contents, not starch.

10 Fish, mollusks and crustacean, 11 Meat, 12 Eggs

Raw fish, mollusks, crustacean and meat do not contain starch. The enzymatic method used in the current Composition Tables (AOAC 996.11) measures glycogen and dextrin as well as starch without differentiating them, and the contents are tabulated as starch. Because raw seafood and meat possibly contain glycogen, starch content in the Tables would show glycogen content.

Until now, regarding carbohydrates of seafood, meat, and eggs, the total sugar has been analyzed by the direct analytical method, instead of the subtraction method, using the anthrone-sulfuric acid method with glucose as a standard[6)]. As a characteristic of the anthrone-sulfuric acid method, disaccharides and larger saccharides are hydrolyzed to monosaccharides by the addition of sulfuric acid and heating, and the yielded monosaccharides react with anthrone and develop color. For this reason, if it is assumed that the saccharides consist solely of glucose, that there are no interaction among coexisting substances, and that the saccharides are completely hydrolyzed and quantified, the weight of total sugars in the concerned foods are equal to the weight of glucose expressed as the monosaccharide equivalent. However, because there is no information on the sugar composition of total sugars, and there is a lack of comparison data between analytical values of the total amount sugar using the anthrone-sulfuric acid method and monosaccharide equivalents calculated from analytical values of various saccharides, the current Composition Tables only include foods for which sugars have been directly analyzed.

15 Confectionaries

The listed values of many confectioneries were calculated using the proportion of raw ingredients and their component contents. Decomposition and hydrolysis of carbohydrates, caramelization of sugars,

reaction with other components such as protein during heating in processing are not considered.

Many confectioneries on the market are made of not only the raw ingredients on the current Composition Tables but various other sugars, sugar alcohols, and organic acids. For this reason, the component values of confectionery products may differ considerably from the listed values. On carbohydrate and organic acid contents in commercial products, information such as ingredient labeling should also be referred to.

17 Seasonings and spices

17075 Garlic powder

Garlic powder products with/without starch are commercially available. The current Composition Tables include products containing starch. The bulb of garlic does not contain starch, and so the starch content of "06223 Garlic, bulb, raw" is 0 g based on the analytical values. The component values of "Garlic powder" of the Composition Tables 2015 were determined based on the analytical values of products without starch, except the available carbohydrates (monosaccharide equivalent) derived from the current Composition Tables.

References

1) FAO/INFOODS : Guidelines for Converting Units, Denominators and Expressions, version. 1.0 (2012)
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