Chapter 1. Introduction

1 Purpose and properties of Amino Acid Composition Tables

1) Purpose

Protein is a polymer of amino acids and serves as a component of body tissues, enzymes, hormones, etc., and is also an essential substance as a nutrient and as a source of energy. The nutritional value of protein is mainly determined by the types and amount (composition) of constituent amino acids. Therefore, the total intake of amino acids (protein intake) as well as the balance of amino acid composition plays important roles when taking in proteins.

To that end, the Amino Acid Composition Tables summarizes the protein content and amino acid composition of foods consumed by people on a daily basis as a basic material utilized for qualitative evaluation of protein in foods.

Therefore, the current Composition Tables aims at a wide range of applications in various related fields as a basic material which can be utilized for consideration of food policy, in the field of research and education, etc., on top of the maintenance and promotion of public health.

2) Properties

The Amino Acid Composition Tables lists the standard component values (composition) of amino acids in important foods regularly consumed in Japan.

It is known that the component values of amino acids vary in accordance with various factors, including the type, species, growing environment, processing method, etc. of plant/animal/fungus as raw material. The component values listed in the current Composition Tables are values considered representing the national average intake in a normal diet throughout the year in Japan, which were determined based on the analysis values of samples obtainable from markets in Japan by normal means, taking into account the variation factors for amino acid component values. In the Tables, one set of standard component values is listed for one food product in principle.

3) Background

The Amino Acid Composition Tables was first formulated and released as the Amino Acid Composition of Food in Japan in 1966 by the Resources Council, Science and Technology Agency (current Subdivision on Resources, Council for Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT)). In response to the diversification in diet, improvement in the analytical technology, etc., the Amino Acid Composition Tables then underwent drastic revision as part of a follow-up of the Standard Tables of Food Composition in Japan Fourth Revised Edition, and in 1986, were released as the Revised Amino Acid Composition of Food (hereinafter referred to as “Revised Amino Acid Composition Tables”).

In December 2010, the Subdivision on Resources, Council for Science and Technology, MEXT summarized and released the Amino Acid Composition of Foods - 2010 - (hereinafter referred to as “Amino Acid Composition Tables 2010”), along with the formulation of the Standard Tables of Food Composition in Japan - 2010 - (hereinafter referred to as “Composition Tables 2010”).

Additionally, the Subdivision on Resources established the Expert Committee on Food Components and has since endeavored to expand the information related to amino acid composition taking into account factors including the change in diet in recent years. As a result, Standard Tables of Food Composition in Japan - 2015 - (Seventh Revised Edition) - Amino Acids - (hereinafter referred to as “Amino Acid Composition Tables 2015”) was summarized associated with the formulation of Standard Tables of Food Composition in Japan - 2015 - (Seventh Revised Edition) (hereinafter referred to as “Food Composition Tables 2015”) in December 2015.

Released Amino Acid Composition Tables are summarized in **Table 1**.

Table 1 History of the Amino Acid Composition Tables

Name	Released Year	No. of foods
Amino Acid Composition of Food in Japan	1966	157
Revised Amino Acid Composition of Food in Japan	1986	295
Amino Acid Composition of Foods - 2010 -	2010	337
Standard Tables of Food Composition in Japan - 2015 - (Seventh Revised Edition) - Amino Acids -	2015	1558

4) Outline of review of the Amino Acid Composition Tables 2010

The changes from the Amino Acid Composition Tables 2010 to the Amino Acid Composition Tables 2015 include an increase in the number of foods by 1221, review of the item number, arrangement, food name, etc. of food listed to be consistent with the Food Composition Tables 2015, and new assignment of index numbers to foods. Additionally, from the viewpoint of ensuring convenience for the users with the increased number of foods listed, the component values calculated from the ratio of raw materials and those estimated from the composition tables available overseas were newly listed for some foods. The components are the same as those in the Amino Acid Composition Tables 2010.

2 Standard Tables of Food Composition in Japan - 2015 - (Seventh Revised Edition) - Amino Acids -

The weights of amino acids listed in the current Composition Tables are shown as per 100 g of edible portion (Amino Acid Table 1) and per 1 g of reference nitrogen (Amino Acid Table 2), consistent with the Food Composition Tables 2015.

Additionally, the weights per 1 g of protein, calculated as the sum of amino acid residues (Amino Acid Table 3) and per 1 g of protein, calculated from reference nitrogen (Amino Acid Table 4, new Table) are tabulated, resulting in a total of four Tables. The Tables are made available on the MEXT website (see the notes below for the details of Tables available on the website). Reference nitrogen is calculated by subtracting the following amount of nitrogen from the total nitrogen to approximate the nitrogen in protein as possible: a) nitrogen in nitrate for Vegetables, b) nitrogen in nitrate and caffeine for Teas, c) nitrogen in caffeine for Coffee, and d) nitrogen in caffeine and theobromine for Cocoa and Chocolates. Therefore, the total nitrogen is the same amount as the reference nitrogen for foods that do not contain nitrate, caffeine or theobromine. Data are presented as the amount of amino acids, not as the amount of amino acid residues.

The Tables are prepared as follows: firstly the weight of each amino acid per 1 g of reference nitrogen (Amino Acid Table 2) is determined based on analytical data, imputed data, or other data, and then the weight of each amino acid per 100 g of edible portion (Amino Acid Table 1) is calculated by multiplying by the weight of reference nitrogen. The “Protein, calculated as the sum of amino acid residues” in Amino Acid Table 3 is calculated as the amount of dehydrated condensates of each amino acid (the sum of each amino acid residue).

The “Protein, calculated from reference nitrogen” in Amino Acid Table 4 is calculated by multiplying the nitrogen-protein conversion factors by the amount of reference nitrogen. The data of each amino acid in Amino Acid Table 3 and Amino Acid Table 4 are also calculated using the data in Amino Acid Table 2. The name of each Table is as follows.

Amino Acid Table 1: Amino acids per 100 g of edible portion
Amino Acid Table 2: Amino acids per g of reference nitrogen
Amino Acid Table 3(note): Amino acids per g of protein, calculated as the sum of amino acid residues (only released online)
Amino Acid Table 4: Amino acids per g of protein, calculated from reference nitrogen (only released online)

(Note): "Amino Acid Table 3" was described as "Amino acids per g of protein of edible portion" in the Amino Acids Composition Tables 2010.

1) Listed foods

(1) Classification and arrangement of food groups

The classification and arrangement of food groups are as shown below, according to the Food Composition Tables 2015.

1 Cereals, 2 Potatoes and starches, 3 Sugars and sweeteners, 4 Pulses, 5 Nuts and seeds, 6 Vegetables, 7 Fruits, 8 Mushrooms, 9 Algae, 10 Fish, mollusks and crustaceans, 11 Meat, 12 Eggs, 13 Milk and milk products, 14 Fats and oils, 15 Confectionaries, 16 Beverages, 17 Seasonings and spices, 18 Prepared foods

(2) Outlines

Foods have been selected under the following concepts used at the time of formulation of the Revised Amino Acid Composition Tables and the Amino Acid Composition Tables 2010:

[1] Foods with high protein content and with large intake;
[2] Raw materials shall be those in a form closer to the form consumed; such as fish in fillet not whole and,
[3] Regularly consumed processed foods with possibly altered amino acid composition.

On formulating the Amino Acid Composition Tables 2015, while ensuring the consistency with the Food Composition Tables 2015 and utilizing the data in the Revised Amino Acid Composition Tables and the Amino Acid Composition Tables 2010, reviews were made from the viewpoint of ensuring convenience for users including the addition of newly analyzed foods and estimates from similar foods or food composition tables available overseas. Specifically,

[1] For main foods widely consumed in Japan, selection is made from foods not listed in the Amino Acid Composition Tables 2010 and foods newly listed in the Food Composition Tables 2015;
[2] Foods not listed in the Food Composition Tables 2015 are not listed in the Amino Acid Composition Tables 2015 in principle, excluding foods in Table 4;
[3] For foods with analysis values for "Raw", the composition values of "Boiled", "Baked", etc. per 100 g of edible portion are estimated based on it;
[4] Among unanalyzed foods, for foods unable to be estimated by [3] above and with similar foods in food composition tables of foreign countries etc., the component values are estimated using the data for the similar foods; and,
[5] Among unanalyzed foods, for processed foods with known raw material blending ratio and amino acid component values, the component values are estimated using such values.

The estimated values derived by the method in [3], [4] or [5] do not reflect changes to the amino acid composition by cooking nor differences between the foods available in Japan and overseas, and therefore are listed in parenthesis. It is also described in the Remarks that the value is an estimated value.

For the methods in [3] and [4], the estimated values are derived by applying the amount of each amino acid per 1 g of reference nitrogen (per 1 g of nitrogen for overseas database) of the referencing food to the amount of reference nitrogen of the subject food [1) 2)]. The referenced food is shown in the Remarks for [3] and in **Chapter 3** for [4]).

For the method in [5], the estimated values are derived by (a): multiplying the raw material blending ratio by the amount of each amino acid per 100 g of edible portion of raw material that constitutes at least 1% of total protein for the subject food and adding them up, (b): multiplying the raw material blending ratio by the amount of protein per 100 g of edible portion of the relevant raw material and adding them up, (c): dividing (a) by (b), and (d): multiplying the amount of protein per 100 g of edible portion of the subject food by (c). The raw material blending ratio used is those listed in **Chapter 3** of the Food Composition Tables 2015.

As a result, the number of foods listed in the Amino Acid Composition Tables 2015 is 1558 (Table 1), as shown in **Table 2** by food group.

Table 2 Number of foods listed in food group

Food group		No. of foods (Table 1)
1	Cereals	139
2	Potatoes and starches	32
3	Sugars and sweeteners	1
4	Pulses	81
5	Nuts and seeds	38
6	Vegetables	264
7	Fruits	102
8	Mushrooms	43
9	Algae	36
10	Fish, mollusks and crustaceans	320
11	Meat	233
12	Eggs	16
13	Milk and milk products	51
14	Fats and oils	5
15	Confectionaries	122
16	Beverages	8
17	Seasonings and spices	63
18	Prepared foods	4
Total		1558

(3)Notes on foods

See the Notes on Food Group in the Food Composition Tables 2015 for a detailed description on each food.

[1] Foods shown in the column of Amino Acid Composition Tables 2015 in **Table 3** are those that cannot be clearly collated with foods listed in the Revised Amino Acid Composition Tables. Therefore, amino acids per g of reference nitrogen (Amino Acid Table 2) for the relevant foods are listed for foods listed in the column of Revised Amino Acid Composition Tables. The component values of amino acids for Amino Acid Table 1, Amino Acid Table 3 and Amino Acid Table 4 were calculated based on it, using the amount of reference nitrogen, etc., obtained from the 5th Enlarged Composition Tables and

the Composition Tables 2010.

Table 3 Correspondence table I for foods in the Amino Acid Composition Tables 2015 and Revised Amino Acid Composition Tables

Amino Acid Composition Tables 2015		Revised Amino Acid Composition Tables	
Item No.	Food name	Item No.	Food name
10100	Fish, righteye flounder, brown sole, raw	08-060	Righteye flounder, raw
10237	Fish, puffer, purple puffer, cultured, raw	08-138	Puffer, raw
10241	Fish, yellowtail*, mature, raw [*Syn. five-ray yellowtail]	08-141-a	Yellowtail, wild, mature, raw
10292	Mollusks, Pacific oyster, cultured, raw	08-179-a	Oyster, raw
10321	Crustacean, Kuruma prawn, cultured, raw	08-219-a	Prawn, Kuruma prawn, raw
11003	Rabbit, meat, lean, raw	09-004	Rabbit, meat
11109	Horse, meat, lean, raw	09-034	Horse, meat
11150	Pork, medium type breed, loin, without subcutaneous fat, raw	09-068	Pork, loin, without fatty meat
11204	Goat, meat, lean, raw	09-095	Goat, meat
11240	Guinea fowl, meat without skin, raw	09-090	Guinea fowl, meat

[2] Foods shown in the column of Amino Acid Composition Tables 2015 in **Table 4** are those not listed in the Food Composition Tables 2015, and only the item numbers that appear in the Amino Acid Composition Tables are assigned. Amino acids per g of reference nitrogen (Amino Acid Table 2) for the foods are the amino acid composition of foods listed in the column of Revised Amino Acid Composition Tables (note that the component values analyzed at the time of formulating the Amino Acid Composition Tables 2010 were listed for “Mutton, loin, without subcutaneous fat, raw (11245)” and “Lamb, loin, without subcutaneous fat, raw (11246)”).

The component values of amino acids in Table 1 are calculated by:

(a) deriving the amount of reference nitrogen using the amount of protein listed in Amino Acid Table 1 of the Revised Amino Acid Composition Tables and the nitrogen-protein conversion factors listed in **Table 8** for foods other than those listed in b) and c) below;

(b) deriving the amount of reference nitrogen using the pre-revision nitrogen-protein conversion factor for “Sunflower seeds, dried (05038)” since its nitrogen-protein conversion factor was revised in the 5th Enlarged Composition Tables; or,

(c) using the amount of reference nitrogen obtained by analyzing at the time of formulating the Amino Acid Composition Tables 2010 are listed for “Mutton, loin, without subcutaneous fat, raw (11245)” and “Lamb, loin, without subcutaneous fat, raw (11246)”.

Table 4 Correspondence table II for foods in the Amino Acid Composition Tables 2015 and Revised Amino Acid Composition Tables

Amino Acid Composition Tables 2015			Revised Amino Acid Composition Tables	
Item No.	Food name	Nitrogen-protein conversion factor	Item No.	Food name
01144	Common wheat, instant Chinese noodles, dried by frying	5.70	01-031-a	Common wheat, instant Chinese noodles, dried by frying
01145	Common wheat, instant Chinese noodles, dried by hot air	5.70	01-031-c	Common wheat, instant Chinese noodles, dried by hot air
05038	Sunflower seeds, dried	5.30 *	06-019	Sunflower seeds, dried
05039	Hazel nuts, roasted	5.30	06-021	Hazel nuts, roasted
09048	Algae, "Wakame", fruit-bearing leaves, blanched and salted products, salted	6.25	15-036-a	"Wakame", fruit-bearing leaves, blanched and salted products, salted
11245	Mutton, loin, without subcutaneous fat, raw	6.25	09-092-a	Mutton, without fatty meat, loin
11246	Lamb, loin, without subcutaneous fat, raw	6.25	09-092-b	Lamb, without fatty meat, loin

* Changed from “5.40” in the 5th Enlarged Composition Tables.

(4) Name, classification, arrangement, item number and index number of foods

The name, classification, arrangement and item number of foods conform to those in the Food Composition Tables 2015. Index numbers were newly assigned to each food. The index numbers are common with those in the Food Composition Tables 2015 etc. Since the number of foods listed varies depending on the composition table, there are index numbers that do not appear in the current Composition Tables.

2) Components

(1) Components and their arrangement

The arrangement of components is as shown below.

Amino Acid Table 1: Water, protein, protein calculated as the sum of amino acid residues each amino acid, total amino acids, ammonia

Amino Acid Table 2: Each amino acid, total amino acids, ammonia, nitrogen-protein conversion factor for protein calculated as the sum of amino acid residues

Amino Acid Table 3 and Amino Acid Table 4: Amino acid, total amino acids, ammonia

(2) Amino acids (Note)

[1] Data on the following 18 amino acids are included (19 amino acids for Fish, mollusks and crustaceans, and Meat): isoleucine, leucine, lysine, sulfur-containing amino acids (methionine, cystine), aromatic amino acids (phenylalanine, tyrosine), threonine, tryptophan, valine, and histidine as essential amino acids that cannot be synthesized in the body at all or sufficiently, and arginine, alanine, aspartic acid, glutamic acid, glycine, proline, and serine as other amino acids. In addition, hydroxyproline is listed for Fish, mollusks and crustaceans and Meat.

Asparagine and glutamine are hydrolyzed into aspartic acid and glutamic acid, respectively, during protein hydrolysis, i.e., the pretreatment for amino acid analysis, and because it is impossible to distinguish asparagine from aspartic acid or glutamine from glutamic acid present in protein, asparagine and glutamine are included into aspartic acid and glutamic acid, respectively. Cystine is a sum of cysteine and cystine (consisting of two cysteine molecules), and is expressed as an amount of half-cystine. Amino acids constituting the protein and free amino acids are not differentiated.

The name, symbol and molecular weight (Mw) of amino acids are listed in **Table 5**.

(Note): See the explanation of amino acids (Page 15).

Table 5 Amino acids and their symbols and molecular weights

Amino acid	Symbol	Mw
Isoleucine	Ile	131.17
Leucine	Leu	131.17
Lysine	Lys	146.19
Methionine	Met	149.21
Cystine	Cys-Cys	240.30
Half-cystine		120.15
Phenylalanine	Phe	165.19
Tyrosine	Tyr	181.19
Threonine	Thr	119.12
Tryptophan	Trp	204.23
Valine	Val	117.15
Histidine	His	155.16
Arginine	Arg	174.20
Alanine	Ala	89.09
Aspartic acid	Asp	133.10
Glutamic acid	Glu	147.13
Glycine	Gly	75.07
Proline	Pro	115.13
Serine	Ser	105.09
Hydroxyproline	Hyp	131.13
(Reference)		
sulfur-containing amino acids	SAA	–
aromatic amino acids	AAA	–

[2] The amino acids are arranged with essential amino acids first in alphabetical order, and then non-essential amino acids in alphabetical order, in principle. Because part of methionine and phenylalanine can be nutritionally replaced by cystine and tyrosine, respectively, cystine is placed after methionine and tyrosine after phenylalanine.
Histidine is an essential amino acid because children cannot synthesize it in their bodies. However, adults can synthesize histidine in their bodies, setting histidine apart from other essential amino acids. For that reason, histidine is placed next to valine.
Arginine can be recognized as an essential amino acid or as a semi-essential amino acid depending on the type of animal. For that reason, arginine is placed between essential amino acids and non-essential amino acids to facilitate comparison with other non-essential amino acids.
Additionally, a subtotal column is added for methionine and cystine as sulfur-containing amino acids and for phenylalanine and tyrosine as aromatic amino acids, where the subtotal amount was shown as “Amino acids, total”.

[3] The measurement methods for amino acids are outlined in **Table 6**.

Table 6 Measurement methods for amino acids

Subject amino acids	Item	Outline
General amino acids* Hydroxyproline Ammonia	Measurement method	Column chromatography (with amino acid automatic analyzer)
	Hydrolysis condition	6 mol/L hydrochloric acid (containing 0.04% 2-mercaptoethanol) 110°C, 24 hours [Measurement method for foods analyzed for the Revised Amino Acid Composition Tables] 6 mol/L hydrochloric acid (containing 0.04% 2-mercaptoethanol) 100°C, 24 hours
Cystine Methionine	Measurement method	Column chromatography (with amino acid automatic analyzer)
	Hydrolysis condition	After oxidizing with performic acid, 6 mol/L hydrochloric acid 130-140°C, 20 hours [Measurement method for foods analyzed for the Revised Amino Acid Composition Tables] After oxidizing with performic acid, 6 mol/L hydrochloric acid (containing 0.04% 2-mercaptoethanol) 150°C, 20 hours
Tryptophan	Measurement method	High performance liquid chromatography
	Hydrolysis condition	Barium hydroxide (containing thiodiethylene glycol) 110 °C, 12 hours

* Isoleucine, leucine, lysine, phenylalanine, tyrosine, threonine, valine, histidine, arginine, alanine, aspartic acid, glutamic acid, glycine, proline, and serine

(3) Water and protein (protein, calculated from reference nitrogen)

From the viewpoint of ensuring convenience for users, regarding water and protein, the values listed in the Food Composition Tables 2015 are included except for foods shown in **Table 4**. The component values of foods shown in **Table 4**:

(a) conform to the 4th Composition Tables for foods other than those listed in b) or c) below.

(b) The component value of protein was calculated based on the nitrogen-protein conversion factor revised in the 5th Enlarged Composition Tables for “Sunflower seeds, dried (05038)”.

(c) The component values of water and protein conform to the re-analyzed component values for “Mutton, loin, without subcutaneous fat, raw (11245)” and “Lamb, loin, without subcutaneous fat, raw (11246)”.

The measurement methods in the Food Composition Tables 2015 pertaining to the foods listed in the current Composition Tables are outlined in **Table 7**.

Table 7 Measurement methods for water and protein

Component	Measurement method
Water	Air drying method, vacuum drying, or Karl-Fischer method
Protein	Calculated by multiplying the amount of nitrogen quantified by the improved Kjeldahl method or the combustion method (improved Dumas method) by the "nitrogen – protein conversion factors" (**Table 8**). For Coffee, caffeine is quantified separately and nitrogen originating from caffeine is subtracted prior to calculating. For Cocoa and Chocolates, caffeine and theobromine are quantified separately and nitrogen originating from them is subtracted prior to calculating. For Vegetables, the total nitrogen including nitrate nitrogen is quantified using the salicylic acid added improved Kjeldahl method, and nitrate nitrogen quantified separately is subtracted prior to calculating. For Teas, the amount of nitrogen originating from caffeine and nitrate nitrogen are subtracted prior to calculating.

Table 8 Nitrogen – protein conversion factors

Food group	Food name	Conversion factor
1 Cereals	Amaranth	5.30
	Common oats	
	oatmeal, raw[3)]	5.83
	Barley[3)]	5.83
	Common wheat	
	whole flour[3)]	5.83
	wheat flour[3)], French bread, "Udon" (thick wheat noodles), "Somen" (thin wheat noodles), yellow alkaline noodles, macaroni and spaghetti[3)], "Fu" (wheat gluten cake), wheat gluten,	5.70
	outer steamed wheat "Jiaozi" (Chinese meat dumpling) dough, outer steamed wheat "Shumai" (Chinese meat dumpling) dough	5.80
	wheat germ[4)]	
	Rice[3)], Rice products (excluding "Sekihan" (steamed rice with adzuki beans or cowpeas))	5.95
	Rye[3)]	5.83
4 Pulses	Soybeans[3)], Soy products	5.71
5 Nuts and seeds	Almonds[3)]	5.18
	Brazil nuts[3)], Peanuts	5.46
	Other nuts[3)]	5.30
	Flax seeds, Pumpkin seeds, Poppy seeds, Sesame seeds[3)], Watermelon seeds, Lotus seeds, Sunflower seeds	5.30
6 Vegetables	Soybeans, immature, Soybean sprouts	5.71
	Peanuts (immature beans)	5.46
11 Meat	Gelatin[5)], Cartilage (Pork)	5.55
13 Milk and milk products	Liquid milk[3)], Dairy products including cheese, other	6.38
14 Fats and oils	Butter[3)], Margarine[3)]	6.38
17 Seasonings and spices	Soy sauce, Miso	5.71
Foods other than the above		6.25

(4) Protein, calculated as the sum of amino acid residues

Protein calculated as the sum of amino acid residues are the amount of dehydrated condensates of amino acids based on the amino acid composition.

Protein, calculated as the sum of amino acid residues per 100 g of edible portion (g)
=∑ {amount of amino acid per 100 g of edible portion (g) × (molecular weight of the amino acid – 18.02)/molecular weight of the amino acid}

(5) Conversion factor for protein calculated as the sum of amino acid residues from reference nitrogen

The conversion factor for protein calculated as the sum of amino acid residues is values derived as the total amount of each amino acid residue from reference nitrogen per 1 g of reference nitrogen.

When deriving the amount of protein for food, multiplying the conversion factor by the amount of reference nitrogen of the food provides a more accurate amount of protein than the amount of protein calculated by the conventional method where the conventional nitrogen-protein conversion factor (**Table 8**) is multiplied by the amount of reference nitrogen.

(6) Ammonia

It is considered that a large majority of ammonia is generated during the hydrolysis process of protein, mainly from amide groups in glutamine and asparagine, except those contained as ammonia in food in small amounts. The amount of ammonia is listed in the Composition Tables as information useful for estimating the amount of amino acids in an amide state.

Consideration was given to including the amount of ammonia into the amount of protein as amide nitrogen from these amino acids. However, currently, there is not sufficient information on the ratio of ammonia originating from amide groups and the calculated values of protein is almost the same even if regarded in an amide state. Therefore, it was decided to provide the amount of ammonia in a separate column as a reference.

Assuming all the amino acids quantifiable as glutamic acid or aspartic acid are in an amide state, if subtracting ammonia for these amino acids leaves any remaining ammonia, the remaining amount was shown in the Remarks as “Surplus ammonia”.

This “Surplus ammonia” is considered to be originating from non-protein nitrogen-containing compounds. Especially for Vegetables, it was identified that part of nitrate nitrogen was converted to ammonia during the process of quantifying amino acids, and it is considered that a relatively large amount of “Surplus ammonia” originates from nitrate nitrogen.

(7) Remarks

In addition to the above-mentioned matters, names of raw materials of prepared food, blending ratio of main raw materials, etc. were shown in the Remarks.

3) Procedure of presenting values

The method of presenting values conforms to the rules below (see **Table 9**).

The unit of water, protein and protein by amino acid composition (protein, calculated as the sum of amino acid residues) is g, and the values are shown to the first decimal place.

The unit of amino acids, total amino acids and ammonia is mg, and the values are shown as integers (values less than 10 are shown to the first decimal place).

Values shown with decimal places are rounded off to the last decimal place presented. Values shown as integers are rounded off at the third digit from the left to have two significant digits.

For each component, "0" indicates the value being less than 1/10 of the minimum listing value or not detected, and "Tr (trace)" indicates the value contained is 1/10 or greater of the minimum value listed yet less than 5/10.

Estimated values are shown in parentheses [see "2 1) (2) Outline of listed foods" for estimated values].

Table 9 Procedure of presenting values

Item	Unit	Decimal places in presentation	Rounding method
Water	g	1	Round off the second decimal place.
Protein			
Protein, calculated as the sum of amino acid residues			
Amino acids	mg	0 (1 for values less than 10)	Values shown as integers are rounded off at the third digit to have two significant digits. Values shown to the first decimal place are rounded off at the second decimal place.
Amino acids, total			
Ammonia			

4) Cooking and preparation conditions

The cooking conditions used in the current Tables are essentially the same as those used in the Food Composition Tables 2015. Basic cooking conditions are predetermined assuming general home cooking (small-scale cooking). Cooking methods used in the current Tables are boiled, steamed, baked, sautéed, and deep-fried, and the following foods are newly added in this revision: breaded and fried, and floured and deep fried fish, mollusks and crustaceans, breaded and fried pork ("Tonkatsu"), floured and deep-fried meat, tempura (fried with batter<= a mixture of flour, egg and water>) of sweet potato, eggplant and fish, mollusks and crustaceans, microwaved sweet corn and glazed carrot. Boiling is done as preparation of cooking, and the resultant broth is discarded. It includes post-boiling handling such as draining in a colander or hand-squeezing after cooling.

Unheated preparation methods include bleached in water, soaked in water, and salted. Usually, preparation of food accompanies the addition of condiments, yet condiments are not added in the current Composition Tables, except for boiled macaroni and spaghetti, glazed carrot, and salted pickles, because it is difficult to generalize the kind and amount of condiments to be used. See the Food Composition Tables 2015 for the outline of cooking conditions for each food.

References

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