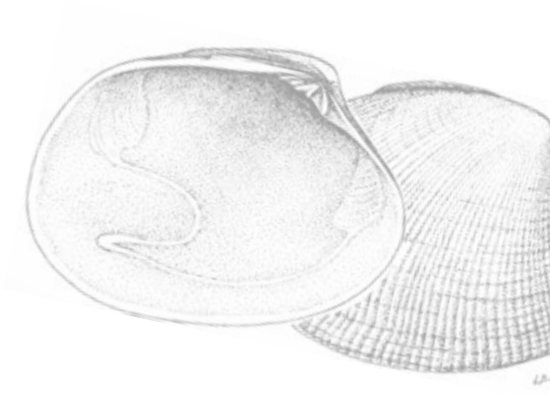
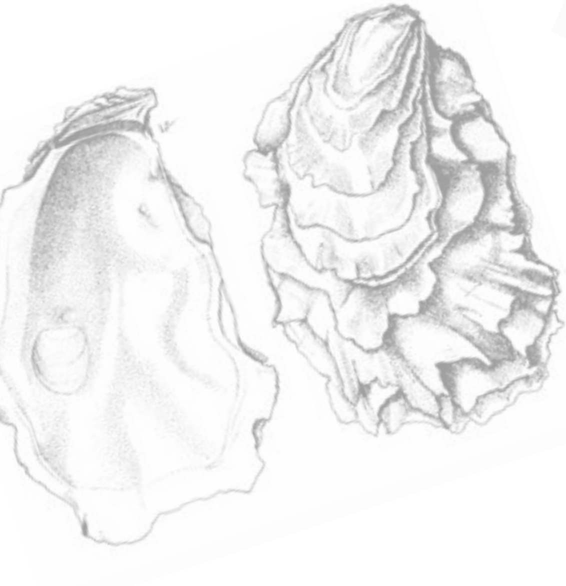
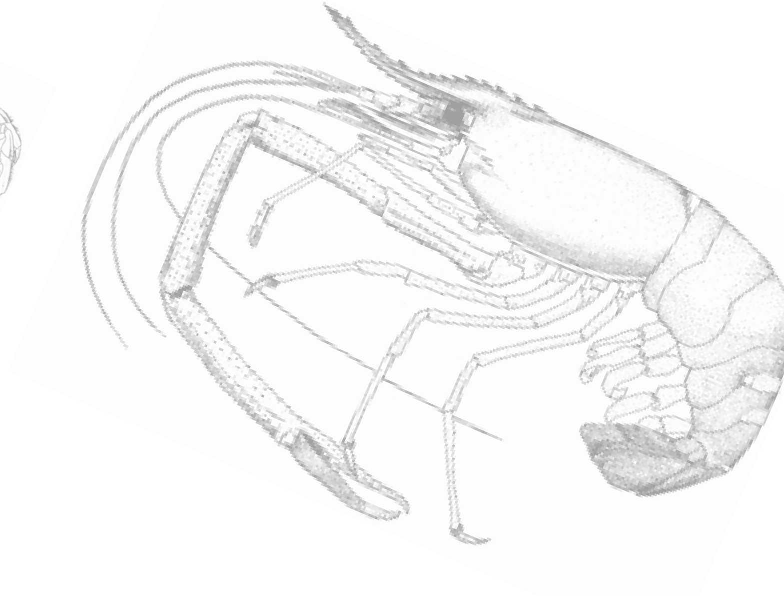
Food and Agriculture Organization of the United Nations



FAO/INFOODS Databases

FAO/INFOODS global food composition database for fish and shellfish, version 1.0 - uFiSh1.0





FAO/INFOODS global food composition database for fish and shellfish version 1.0- uFiSh1.0

User Guide

Food and Agriculture Organization of the United Nations

Rome, 2016

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Abbreviations

Abbreviation	Description
AA	amino acid
av.	average
calc.	calculated
COFI	Committee on Fisheries
DP	decimal place
EP	edible portion
est.	estimated
FA	fatty acid
FAO	Food and Agriculture Organization of the United Nations
FCDB	food composition database
FCT	food composition table
g	gram
INFOODS	International Network of Food Data Systems
mg	milligram
N	nitrogen
n.s.	not specific
RF	nutrient retention factor
sig.	significant
tr	trace
U	unit
uFiSh	FAO/INFOODS Global Food Composition Database for Fish and Shellfish
µg	microgram
YF	weight yield factor
w/	with
w/o	without
XFA	fatty acid conversion factor
z	estimated zero

Foreword

Fish and other animal products from aquaculture and capture fisheries are gaining more attention amongst consumers due to their nutritional value and health benefits. In the last 50 years, the world's fish food supply in terms of availability of caught fish for human consumption has grown remarkably. Seafood (including fish, crustaceans and molluscs) contributes to food security and reduces the risk of non-communicable diseases. Fish and shellfish, besides being a good source of protein, also provide a variety of other nutrients, including micronutrients such as vitamin D and B-vitamins, selenium, iodine and potassium. In particular, the long chain omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in fatty fish are suggested to have beneficial effects on human health. In 2014, the Sub-committee on Fish Trade of the Committee on Fisheries (COFI) "highlighted the need for more knowledge on the nutritional composition of locally available seafood from the aquatic environment, including aquatic plants and by-products from processing of fish and other seafood" (COFI/2014/6). Similar needs were expressed in 2015 by the Sub-committee on Aquaculture (COFI:AQ/VIII/2015/2)

Food composition data for seafood are needed to estimate its contribution to the nutrient intakes of individuals and populations, but also for the development of food-based dietary guidelines and for labelling purposes. Accurate information on the nutrient content of locally available food, including seafood, is the basis for all programmes and policies in nutrition, and increasingly also for agriculture and fisheries. For example, these data can render the design and implementation of programmes and policies more nutrition-sensitive and cost-efficient, and enable the development of meaningful guidelines for improving dietary adequacy and malnutrition through foods, including fish and shellfish, where appropriate.

These nutrient data are normally available in national or regional food composition tables or databases (FCT/FCDB). However, in many countries, reliable compositional data for fish and shellfish are lacking, especially for vitamins but also for minerals and for minor seafood species. Only few FCT/FCDB include a significant number of seafood species and normally do not distinguish between wild and farmed fish, different seasons, or whether fillets are with or without skin, which all impact the nutritional composition.

This first edition of the FAO/INFOODS User Database for Fish and Shellfish (uFiSh) tries to overcome some of these limitations. This database is the result of a thorough evaluation of available compositional data from the international literature and laboratory reports, starting with major species of fish, crustaceans and molluscs. It aims to provide a global overview of the variation in the nutrient composition of fish and shellfish, and to indicate limitations in data quality and availability.

The publication of this database is the result of a fruitful collaboration among the Nutrition and Food Systems Division, the Fisheries Department and international experts. I am sure that it will enable countries and researchers to incorporate more of these data in national and regional FCT/FCDB, to better calculate the nutrient intakes from seafood, and to better integrate fish and shellfish into their programmes and policies. Last but not least, the database will help to provide the much needed information on the nutritional composition of seafood, and also hopefully motivate donors and countries to invest more in the chemical analysis of the nutritional content of fish and shellfish, especially their micronutrient content.

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1. INTRODUCTION

Background

Fish and shellfish (including crustaceans and molluscs), are important contributors to the intake of many nutrients worldwide, especially in coastal areas. The nutritional importance of fish was also recognized in 2013 by the COFI sub-committees on aquaculture and trade (FAO, 2014, 2015). It was acknowledged that more data on the composition of fish and shellfish should be collected, collated and disseminated.

In many countries national food composition tables and databases (FCT/FCDB) cover fish and shellfish to various extents, ranging from a just a few entries to close to 100 (FAO, 2016e). These data derive from various sources and are of different quality; related documentation, especially in old FCT/FCDB, is often insufficient and thus evaluation of data quality is often not possible.

In 2011, the Nutrition Division of the Food and Agriculture Organization of the United Nations (FAO) carried out an extensive systematic literature review for nutrient composition data for fish and shellfish for FAO's Fisheries Statistics & Information Division. The starting point was an abridged version of the ASFIS List of Species for Fishery Statistic Purposes holding nearly 2000 species important for global catch and aquaculture production (FAO, 2016a). This exercise resulted in an important pool of analytical data (i.e. data derived from chemical analysis), and revealed that the food description of fish and shellfish reported by the sources is often insufficient. Moreover, reliable data for vitamins and minerals were lacking, and that most compositional data were published for highly consumed species, while data on minor consumed and underutilized species were scarce – even though the latter ones may contribute considerably to the nutrient intake of certain population groups.

The factors described above contribute to limitations of the data use as well as reducing the accuracy of nutrient intake estimations through seafood consumption. Therefore, FAO and the International Network of Food Data Systems (INFOODS) decided to take this collection of compositional data as the basis to develop the *FAO/INFOODS Global Food Composition Database for Fish and Shellfish* (uFiSh). The aim was to report a complete set of nutrients for fish and shellfish with major consumed species to be published in the first edition, while future editions should cover an increasing number of species and products.

Objectives and principles

The objectives of the FAO/INFOODS Global Food Composition Database for Fish and Shellfish are:

- To provide, at a global level, nutrient data (energy, macronutrients, main minerals and vitamins, amino acids and fatty acids) for various fish and shellfish species, covering different catch regions and/or origins of aquaculture production;
- To report compositional data with comprehensive documentation following international standards and guidelines;
- To allow compilers to include relevant nutritional values for fish and shellfish into their national or regional FCT/FCDB;
- To increase the quality and precision of nutrient intake estimations taking variations in the composition fish and shellfish into account; and
- To identify where compositional data are still missing.

In order to achieve these objectives, the following principles were applied:

- Compile complete nutrient sets of fish and shellfish and report as few missing data as possible;
- Represent the mean composition of fish and shellfish based on available analytical data; only if no or very few analytical data are found are non-analytical data from published FCT/FCDB used;
- As much as available data allow, portray intra-species variation of nutrient values due to:
  - production type (wild vs. farmed);
  - origin (country of aquaculture production or fishing zone);
  - season (winter, summer); or
  - edible part (e.g. skin-on, skinless fillet, tail meat or leg meat).
- Describe foods as precisely as the original data permit. The scientific name and the related ASFIS codes are taken as the reference points to correctly identify the different species;
- Be as close as possible to the exact species when estimating data. Borrowing data from other species or from a higher taxonomic rank should be done with care;
- Evaluate, standardize, compile and document data according to international standards. For uFiSh, the following FAO/INFOODS tools were used:
  - Guidelines for Checking Food Composition Data prior to Publication of a User Table/Database - Version 1.0 (FAO/INFOODS, 2012a)
  - Guidelines for Converting Units, Denominators and Expressions - Version 1.0 (FAO/INFOODS, 2012b)
  - Guidelines for Food Matching - Version 1.2 (FAO/INFOODS, 2012c)
  - INFOODS food component identifiers, called tagnames (FAO/INFOODS, 2014)
  - INFOODS Compilation Tool - Version 1.2.1 (FAO/INFOODS, 2011)

Additional information on the different aspects of this work has been published in several articles: Rittenschober et al. (2013) describes the data collection of analytical data on fish and shellfish, while methodological aspects and the development[1] of uFiSh are described by Nowak et al. (2014) and Rittenschober et al. (2016).

The pool of analytical data that was initially collected was published in two FAO/INFOODS databases: the FAO/INFOODS Food Composition Database for Biodiversity (FAO, 2016d) and the FAO/INFOODS Analytical Food Composition Database (FAO, 2016c). Both databases include solely analytical data found in the published and unpublished literature. For the development of uFiSh, these analytical data were, whenever necessary, complemented with further analytical datasets obtained through the INFOODS listserv as well as with national FCT/FCDB (in this document also referred to as reference data sets). These steps, as well as the calculation or estimation of missing values, were necessary to compile complete nutrient sets for uFiSh, as data on minerals and vitamins from the scientific literature were limited.

The objectives of uFiSh suggest the development of a database with representative compositional data on a global, regional, or national level. It needs, however, to be recognized that uFish can only represent available data of a certain quality, rather than “truly representative” compositional states of the foods presented – especially when considering that data availability per species varied significantly for the different factors affecting the nutrient composition (see *8. Quality considerations* for more details).

[1] After the publication of Rittenschober et al. (2016) some aspects of the compilation methodology changed, and there may be differences between Rittenschober et al. (2016) and the User Guide. In case of discrepancy the User Guide is the authoritative source.

Outputs

This User Guide provides information on the foods, data compilation methodology and component definitions included in uFiSh. The datasheets holding the compositional data are available at the INFOODS website
http://www.fao.org/infoods/infoods/tables-and-databases/faoinfoods-databases/en/.

In order to provide also an overview of published data in reference datasets, nutrient data of selected national FCT/FCDB (ASEAN, China, Denmark, New Zealand, United Kingdom, and USA) were added to uFiSh (see *9. Reference datasets*).

2. SELECTION AND CLASSIFICATION OF SPECIES

Selection of species In this first version of uFiSh selected commercially important species are presented, for which sufficient data of sufficient quality were available.

Species classification The ASFIS list (FAO, 2016a), which reports selected species according to their interest or relation to fisheries and aquaculture, is used to identify all fish and shellfish according to their scientific name. Two codes provided by the ASFIS list are assigned to the food entries: the *ISSCAAP Code* (a double figure code dividing commercial species into groups according to their taxonomical, ecological and economical features) and the *Inter-Agency 3-Alpha Code* (a three letter code which identifies each species in a unique way to be used for exchange of data with national correspondents and among fishery agencies). Foods with the same code refer to the same species.

Table 9 (ANNEX 1) lists foods categorized into five major animal groups (freshwater fish, diadromous[2] fish, marine fish, crustaceans, and molluscs) with their English name and scientific name by following the ASFIS coding system.

3. FOOD

The uFiSh database contains a total of 78 fish and shellfish species, for which at least one food entry is presented. In total, uFiSh holds 515 food entries: 134 raw foods, 5 processed foods and 376 cooked foods (*Table 1*).

Table 1: Number of foods included in uFiSh

	Raw	Processed	Cooked	Total
1 Fish	61	5	183	249
2 Crustaceans	38		114	152
3 Molluscs	35		79	114
Total	134	5	376	515

[2] The life cycle of diadromous species takes place partly in fresh water and partly in sea water.

Food Item ID This is a unique six digit code for each food, e.g. 091001.

- The two digit prefix *09* refers to the code used for the FAO/INFOODS BioFoodComp relating to the specific food group *09* Fish and Shellfish.
- The third digit relates to the specific subgroup, i.e. *1* for finfish, *2* for crustacean, *3* for molluscs.
- The latter three digits give a serial number within a subgroup.

Food names The most recognizable and descriptive food name was chosen for the referenced food, with the seafood's English name taken from the ASFIS list, a detailed description of its edible portion, and its state (raw/processed/cooked). Wherever possible, the name includes further information on origin, production type, and/or possible treatment.

- **Description of the edible portion** No distinction is made in nutrient content between fresh, frozen, and thawed-from-frozen forms of raw fish and shellfish unless significant differences in nutrient content were observed (see below 'Partial treatment/freezing').

  Data for fish derived from samples variously described as fillet, flesh, meat or edible portion. It is seldom entirely clear from the literature quoted whether the term 'fillet' indicates fillet with or without skin, or whether total muscle[3] was used for analysis. In general, fillets with skin should have a higher fat content than those without skin because of fat deposits under the skin; however, no further specification was added when the original description was not clear. In uFiSh, the edible portion is described as precisely as possible. 'Fillet' is used for boneless flesh which *may* include skin; otherwise the edible portion is strictly referred to as 'fillet without skin', 'fillet with skin', or 'fillet with bones'. Additional information regarding different fish cuts is given in *Figure 1* below.

  Abbreviations used in food names are *w/* for with, and *w/o* means without.

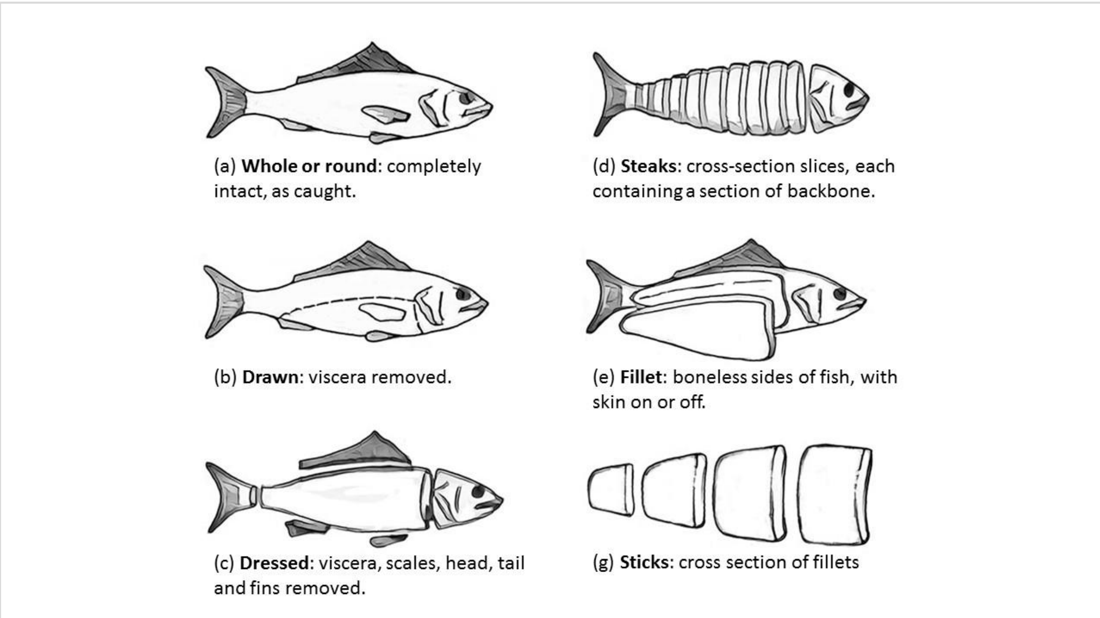

Figure 1*:* Different market forms of fish

[3] Fish muscle consists of light and dark muscle, the first one by consumers generally considered as the flesh or fillet. Dark muscle is present as a small strip under the skin in white fish like cod, and in much larger proportion in fatty fish such as mackerel. Compared to light muscle, it contains higher concentrations of fat and certain vitamins (Murray & Burt, 1983).

The edible portion of crustaceans can be obtained from different parts of the animal (body, claw, leg, or tail). If not specified, data are for a combination of the different parts. Note that the edible portion for crabs may differ considerably – depending on the species either claw meat, claw and leg meat, or meat from claws and bodies can be eaten.

For molluscs, generally the entire non-shell portion is considered edible. More precisely, the edible portion of scallops is the adductor muscle; while cephalopods (cuttlefish, octopus and squid) are considered all edible after removing viscera, eyes, beak, and inedible skin.

See more information on the edible portion coefficient in *4. Components*.

- **Partial treatment/freezing** Before fish is processed to fillets, whole fish can be held in brine solutions or refrigerated sea water. Fresh fillets may also be dipped in chemical solutions containing various sodium, (poly)phosphate or sulphite compounds prior to freezing in order to retain moisture on thawing. These storage and preserving procedures for fish and shellfish after catch may increase levels of sodium and/or phosphates in flesh significantly.

  For Pacific cod, Atlantic cod, channel catfish and striped catfish freezing and/or treatment was indicated for some food records and thus were reported separately in uFiSh.

- **Origin** The indication may either refer to the FAO Fishing area (FAO, 2016b) or the country of aquaculture production. In cases where reference data sets (regional or national) were included in the aggregation, the respective country/region of the FCT/FCDB was considered as the sample origin (e.g. *UK7-16-356 Atlantic salmon, farmed* is considered representative for a farmed Atlantic salmon in the UK).

- **Production type** Caught fish and shellfish are clearly indicated as *wild* and those produced in aquaculture systems as *farmed*. No indication is given for mixed or unknown production types.

- **State of food** The food name provided clearly describes whether the food is *raw*, processed (e.g. *smoked*), or cooked by a specific moist/dry heat method (e.g. *boiled*, *roasted*).
  In cases where the cooking method refers to a mix of methods, the following descriptions are used: *boiled*♦ for a mix of moist heat cooking methods, and *grilled*♦ for a mix of dry heat cooking methods.
  The expression *boiled in recipe* refers to a food that is part of a dish, in which all minerals and fat are retained in the dish during cooking. For more information on cooked foods see *6. Cooked foods*.

Specific comments for selected species

Atlantic horse mackerel In order to represent seasonal variations between autumn and spring, two distinct food entries were compiled. As for other pelagic fish species, the fat content of Atlantic horse mackerel varies with the 'annual cycle of fat' (Eaton, 1983), with variations from 0.4 g to a maximum of 14.5 g/100 g EP (see *05 NV_stat per 100 g EP*. Data description was insufficient to strictly separate between the seasons, therefore the median value of fat was used as cut-off point (5.4 g fat/100 g EP).

Atlantic cod

- Only one food record used in the aggregations refers explicitly to 'analyzed after treatment/processing' (Reykdal et al., 2011)[4], while other records indicate significant high values for sodium/phosphorus too, but don't provide any clarification on the high values. All these foods – the one specifically stated and those assumed to have undergone possible treatment during freezing – are included in the aggregations without applying a weighting factor. In addition, one separate food (food item ID 091049) is compiled which refers to 'previously frozen' based on Reykdal et al. (2011) only. Comments are given accordingly in the datasheets.

- In 2012, total production of Atlantic cod was 1 125 308 t of live weight, of which was 0.97% aquaculture, and 99.03% capture production – this proportion is also reflected in the data collected. Two food entries for wild Atlantic cod caught in the Northeast Atlantic were compiled based on original food descriptions, one for 'fillet' (i.e. skin unknown, food item ID 091047) and one for 'fillet w/o skin' (food item ID 091048). The two foods don't differ significantly in their composition – it seems likely that foods originally described only as 'fillet' refer actually to 'skinless fillet' too.

Pacific cod The reference dataset SR27 (U.S. Department of Agriculture, 2014) presents two food records revealing differences in nutrient composition between samples not previously frozen, and those which may have been frozen and thus assumed to have undergone treatment previous to analytical determinations. Other food records used for aggregation do not give any indication on possible treatment/freezing. For uFiSh, the two foods records by SR27 are presented separately (food item IDs 091054 & 091055), while its food referring to 'may have been frozen previously' is included for mean value calculations without applying weighting factors. Comments are given in the datasheets.

Molluscs Species in uFiSh belonging to the families *Mytilidae*, *Veneridae*, *Ostreidae*, *Haliotidae* and *Pectenidae* are filter feeders. Thus, their muscle composition also reflects their living environment which may explain the high variation in mineral composition found.

Crustaceans Vitamin contents can vary significantly in crustaceans, depending on the edible portion. Especially in crab and lobster species, higher contents of vitamin C, vitamin B_{12}, as well as retinol and ß-carotene are generally found in the body part, while low contents of those vitamins are found in the meat of legs and claws. However, in most of the data sources no clear indication was provided on the edible portion.

[4] In the datasheet Reykdal et al. (2011) is referenced as fi243.

4. COMPONENTS

Definition and expression of nutrients

In the main datasheets, all component values are given per 100 g edible portion on fresh weight basis (EP). Two additional datasheets include data in table format expressed on different denominators: amino acids expressed per g nitrogen, and fatty acids per 100 g total fatty acids.

The values reported are mean values derived from several food records with same/similar food descriptions that have been entered in the archival datasheet (unpublished). Nutrient values are presented in the following datasheets (see also *10. Structure of uFiSh*):

Main datasheets	
04 NV_sum per 100 g EP	Compositional data for proximates, minerals, vitamins, amino acids and fatty acids expressed per 100 g EP, **without** statistics nor value documentation per component.
05 NV_stat per 100 g EP	Compositional data for proximates, minerals, vitamins, amino acids and fatty acids expressed per 100 g EP, **including** statistics and value documentation per component.
Additional datasheets	
06 tbl_AA (per g N)	Compositional data for amino acids expressed per g nitrogen, with statistics and value documentation per component.
07 tbl_FA (per 100 g FA)	Compositional data for fatty acids expressed per 100 g total fatty acids, with statistics and value documentation per component.

Note that values per component are presented with significant digits and decimal places as suggested by Greenfield & Southgate (2003).

Table 2 gives abbreviations used in the value fields of the datasheets. For more specific explanation on calculated values as well as on trace and presumed-zero values (which are expressed as such per default) see the specific information on components below. ANNEX 2 (*Table 10*, *Table 11* & *Table 12*) lists the components with their INFOODS component identifiers, units, denominators, and number of significant digits.

Table 2: Symbols and abbreviations used in the value fields

Abbreviation	Description
tr	Trace - Vitamin C and ß-carotene are assigned *tr* if no published values are available. - See definition of *tr* for individual fatty acids below.
Blank	Wherever possible, missing values have been estimated from a similar food or calculated based on various analytical data. However there remain blanks where no validated data was found, data could not be borrowed and the value could not be assumed to be zero. A zero value cannot automatically be assigned.
[ ]	Data are considered of lower quality.

Edible, proximates and related compounds/ factors

Edible portion coefficient Many foods are purchased or served with the inedible part. Therefore an edible coefficient is given to show the proportion of the edible matter in the food. The edible portion is defined as the part remaining after the inedible waste has been trimmed away, e.g. skin, shell, bones, or viscera.

The edible portion coefficients are expressed in numbers between 0 and 1, where 1 means 100% is edible and 0 means 0% is edible.

Values for edible portions are variable and those presented in the datasheets should be considered as typical and may not correspond to the edible portion known by consumers in practice: some material may be discarded as inedible by some consumers compared to others, while also country- and culture-specific traditions and habits need to be considered.

For most foods, two edible coefficients are provided in the datasheets, one refers to 'from whole fish/shellfish to fillet/flesh', the second refers to 'from purchased portion to edible'.
For most foods a clear description on the edible coefficient is provided where possible (e.g. whether the factor refers to 'from whole fish to fillet', or 'from drawn/gutted fish to fillet'), but some references do not provide sufficient detail to give a fully accurate description.

Energy The metabolizable energy values of all foods are presented in both kilojoules (kJ) and kilocalories (kcal). They are calculated based on protein, fat, available carbohydrates, fiber and alcohol applying the energy conversion factors as given in
Table 3.

Table 3: Metabolizable energy conversion factors. General Atwater factors (FAO, 2003)

Component	kJ/g	Kcal/g
Protein	17	4
Fat	37	9
Available carbohydrates	17	4
Fiber	8	2
Alcohol[1]	29	7

[1] The alcohol content for all foods in the datasheets is assumed zero, but is shown in the equations below for completeness.

Equation 1: Energy (kJ/100 g EP) = total protein (g/100 g EP) x 17 + total fat (g/100 g EP) x 37 + available carbohydrates (g/100 g EP) x 17 + dietary fiber (g/100 g EP) x 8 + alcohol (g/100 g EP) x 29

Equation 2: Energy (kcal/100 g EP) = total protein (g/100 g EP) x 4 + total fat (g/100 g EP) x 9 + available carbohydrates (g/100 g EP) x 4 + dietary fiber (g/100 g EP) x 2 + alcohol (g/100 g EP) x 7

Water Water is measured as the loss of weight after drying the food sample to constant weight. Values may derive from different drying methods.

Nitrogen, total and protein, total The main analytical method used to determine total nitrogen is the Kjeldahl method. The protein content is then estimated from the total amount of nitrogen in the food sample. For most foods including fish and shellfish the nitrogen content of protein by weight is 16 %, thus the following equation is applied:

Equation 3: Total protein (g/100 g EP) = total nitrogen (g/100 g EP) x 6.25

In uFiSh, total protein values originally published were reconverted applying 6.25 to nitrogen values[5]. Thus statistical information is given on the nitrogen values, while total protein is calculated within the datasheet.

The content of non-protein nitrogen in foods may be high in selected fish and shellfish. However, no further investigations on the proportion of non-protein nitrogen in the various species presented was carried out and could therefore not be taken into account. This may lead to an overestimation of the total protein value.

Fat, total The fat values refer to total lipid including triglycerides, phospholipids, sterols and related compounds; they were mainly derived by gravimetric methods including acid hydrolysis and extraction methods using mixed solvents (chloroform/methanol). The Soxhlet method (determination by continuous extraction using single or mixed solvents e.g. ether or petroleum ether) may result in different, mostly lower, values; this applies especially to lean fish where fat values are low (Reykdal et al., 2011). To indicate its potential distortion when values derived by Soxhlet are used to represent total fat, an * is added in the value documentation.

Carbohydrates, available In uFiSh, the content of available carbohydrates is estimated by:

> *Equation 4: Available carbohydrates by difference (g/100 g EP) = 100 – water (g/100 g EP) – total fat (g/100 g EP) – total protein (g/100 g EP) – total dietary fiber (g/100 g EP) - ash (g/100 g EP).*

In raw fish and shellfish, the content of carbohydrates may be negligible. For raw fish a zero value is estimated, while the available carbohydrate content is reported for crustaceans and molluscs, derived by calculation (*Equation 4*); any negative value is reported as zero.

It is assumed that the calculated value for available carbohydrates may be underestimation because of the possible overestimation of the total protein (considering that crustaceans and molluscs may contain a high amount of non-protein nitrogen).

For all three animal groups information on values for carbohydrates of any kind (i.e. also of glycogen, and carbohydrates mixed or unknown methods) that were found in the literature are provided in the comment fields, to indicate the positive carbohydrate content and its variability.

Fiber, total dietary Fiber may be present in trace amounts in raw fish and shellfish. However, if no values were reported for a food, the content of dietary fiber is assumed to be zero.

Ash The ash content of foods is determined by gravimeteric methods.

Minerals

The following minerals are included in the datasheets: calcium, copper, iron, iodine, magnesium, phosphorus, potassium, sodium, selenium, and zinc. Several determination methods were reported

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[5] Values assigned the tagname <PROT-, total protein with method of determination unknown or variable> are included to calculate values for total nitrogen, assuming that Kjeldahl or similar methods were originally applied to determine total nitrogen. However, this assumption was not made when also amino acids were analyzed for the food, as the protein content may be calculated based on individual amino acid contents.

by the sources, including atomic absorption spectrometry (AAS), inductively coupled plasma (ICP), ICP-mass spectrometry, and colorimetric methods.

Fat-soluble vitamins

Vitamin A Vitamin A is comprised of multiple vitamin A active compounds, each of them with different biological activity. Retinol is the most bioactive form and normally only present in animal source foods. In the datasheets, vitamin A is presented as *all-trans*-retinol only. In addition, contents of β-carotene are presented, which may be very low in fish and shellfish depending on the edible portion. If no analytical data were available, β-carotene is presented as trace amounts, while β-carotene equivalents[6] are indicated by an * in the value documentation.

Vitamin D Vitamin D in the datasheets refers to vitamin D_3 (cholecalciferol) only; it is contained naturally in all animal source foods. Values derive by HPLC method.

Vitamin E Vitamin E occurs in several active forms such α-tocopherol, β-tocopherol, γ-tocopherol, and δ-tocopherol, and tocotrienols. α-Tocopherol is the most active form and values are given in the datasheets while the less active forms were not taken into consideration because few data for fish and shellfish were reported. Values referring to unknown method or expression are indicated by an * in the value documentation.

Water-soluble vitamins

Thiamin Values are expressed as thiamin only. Thiaminase, a heat-labile enzyme that degrades the vitamin, is present in some finfish (carp, mackerel, and sardines) and in shellfish. The amount of available thiamin will be less than the actual value present in the datasheets, especially when seafood are consumed raw (Nutrition Reviews, 1976, in: U.S. Department of Agriculture, 1987).

Riboflavin Sources reported microbiological, fluorimetry and HPLC methods for the determination of riboflavin.

Niacin The values for niacin are for preformed niacin only (NIA).

Niacin equivalents Niacin equivalents include the niacin contributed by tryptophan (a niacin precursor) and refer to the potential niacin value; that is the sum of preformed niacin and the amount which could be derived from tryptophan (the mean value of 60 mg tryptophan is considered equivalent to 1 mg niacin (U.S. Department of Agriculture, 2014)), i.e.:

> *Equation 5: Niacin equivalents (mg/100 g EP) = niacin (mg/100 g EP) + tryptophan (mg/100 g EP) / 60.*

Pantothenic acid Sources reported microbiological methods to determine pantothenic acid in food.

Vitamin B_6 Vitamin B_6 consists of pyridoxine, pyridoxal and pyridoxamine and their phosphates. Values given in the datasheets were determined by HPLC, while values derived by other methods such as the microbiological assay are indicated by an * in the value documentation.

[6] Beta-carotene equivalents = 1 µg ß-carotene + 0.5 µg α-carotene + 0.5 µg ß-cryptoxanthin.

Folate, total The values refer to total folate determined by microbiological assay in which bound folate is released by enzymatic treatment. Values referring to other analytical methods (e.g. HPLC) or expressions are indicated by an * in the value documentation.

Vitamin B_{12} Vitamin B_{12} is found intrinsically in foods of animal origin. Values are determined by microbiological methods.

Vitamin C Values for vitamin C include both L-ascorbic acid and L-dehydroascorbic acid. Where values were available, these are presented in the datasheets, otherwise they are reported as trace because the content is considered to be very low in seafood.

Fat-related compounds

Cholesterol The content of cholesterol is determined by enzymatic or chromatographic methods. Values referring to unknown or mixed methods are indicated by an * in the value documentation.

Total fatty acids Total lipid consists of triglycerides, phospholipids and unsaponifiable matter. In order to estimate the amount of total fatty acids in the lipid, a fatty acid conversion factor (XFA) is applied:

Equation 6: Total fatty acids (g/100 g EP) = total fat (g/100 g EP) x XFA (g/g)

XFA for fish and shellfish are derived using formulas by Weihrauch et al. (1977):

Equation 7: Finfish: XFA= 0.933-0.143 / total fat (g/100 g EP)
Equation 8: Crustaceans: XFA= 0.956-0.237 / total fat (g/100 g EP)
Equation 9: Molluscs: XFA=0.956-0.296 / total fat (g/100 g EP)

In case the total lipid content is lower than 0.55 g/100 g EP, the following XFA are applied (Nowak et al., 2014):
Finfish: XFA= 0.673
Crustacean: XFA= 0.459
Molluscs: XFA= 0.417

Fatty acids, fatty acid classes An individual set of fatty acids (FA) is given per food, presented both per 100 g EP and per 100 g total fatty acids (%). *Table 12* (ANNEX 2) lists the fatty acids with their corresponding INFOODS component identifier (tagname), unit (U), and denominators and number of significant digits.

For uFiSh, all collected fatty acid data reported differently than as *g/100 g total fatty acids* (in this document also referred to as fatty acid profile) were converted to this expression. All fatty acid profiles were evaluated and aggregated, resulting in a mean fatty acid profile per food entry. Generally, values of individual fatty acids were available from fewer sources than total lipid values.

Considerations:
- In uFiSh the sets of fatty acids differ from food to food due to data availability. Values for undifferentiated fatty acids are provided for all occurring fatty acids in the respective food, while

data for more precisely described fatty acids (differentiated/isomers) are indicated where thought to be of reasonable quality and representativeness.

- Any undifferentiated fatty acid is the result of either direct data aggregation, or of estimation from one or more precisely described fatty acid(s), e.g. the undifferentiated fatty acid C20:4 is the sum of C20:4 n-3 + C20:4 n-6.
- For all foods, the fatty acid classes saturated, monounsaturated and polyunsaturated are calculated within the present datasheet, i.e. their value is based on the sum of the corresponding individual fatty acids contained in the respective food (respective fatty acids are highlighted in the datasheets).
- Where the specification of fatty acids allowed, values for n-3 and n-6 polyunsaturated FA are calculated within the present datasheet.
- Mean values of individual fatty acids < 0.005 g/100 g total fatty acids are reported as *tr* in the respective datasheet, while their underlying values are included in the calculations of the fatty acid classes.
- The datasheets on fatty acids (datasheets 04, 05, 07) report them with the precision given by the sources used, e.g. one source states C20:5 n-3 cis, while another is less specific giving values for C20:5 n-3 (both are eicosapentaenoic acid); values for each food entry were compiled exactly as reported without any assumptions made, even though it is highly likely that even in the latter case the cis-isomer is meant. This circumstance might apply also for other fatty acids in the datasheets.

As a result of aggregation, in cases where the sum of individual fatty acids exceeds the amount of estimated total fatty acids in the food, it was necessary to normalize the individual fatty acids, i.e. the sum of the individual fatty acids will equal the amount of the calculated total fatty acid content of the food. No statistics of variability are reported for normalized fatty acids. In other cases, where the sum of individual fatty acids was lower than the estimated content of total fatty acids, the difference was reported as unidentified fatty acids in the datasheets.

The mean fatty acid profile (g/100 g total fatty acids) and the total fat content were then used to express the levels of individual fatty acids per 100 g EP, applying the following formula:

Equation 10: Fatty acid (g/100 g EP) = fatty acid (g/100 g total fatty acid) x total fatty acids (g/100 g EP) / 100

Per 100 g EP, calculated values of individual fatty acids <0.005 g were reported as *tr* in the respective datasheet, while their underlying values were included in the calculations of the fatty acid classes.

As described above, calculation of mean fatty acid data was carried out with data expressed as g/100 g total FA; this method allowed a better evaluation of data on a common basis and explains why value documentation per component and summary statistics are provided for the profiles, while fatty acid data expressed per 100 g EP are indicated as *calculated (c)* in the documentation.

Amino acids

The amino acid (AA) content is given for 18 amino acids for each food, presented both per 100 g EP and per g nitrogen. *Table 11* (ANNEX 2) lists the amino acids with their INFOODS component identifier, units and denominators.

Usually amino acids are extracted in three groups—tryptophan, sulfur-containing amino acids (methionine and cystine), and all others. Tryptophan is determined by alkaline hydrolysis/HPLC, methionine and cystine by performic oxidation/HPLC and all others by acid hydrolysis/HPLC.
For uFiSh, all collected amino acid data were converted to mg/g nitrogen (also referred to as amino acid profile in this document) as a common expression; the data were evaluated and aggregated, resulting in mean amino acid profiles for each food. The amino acid profiles and the total nitrogen content were then used to express the levels of individual amino acids per 100 g EP, applying the following formula:

Equation 11: Amino acid (mg/100 g EP) = amino acid (mg/g total nitrogen) x total nitrogen (g/100 g EP)

This method of compilation allowed a better comparison of the amino acid data on a common basis and explains the reason that value documentation per component and summary statistics are provided for the amino acids profiles per g nitrogen, while those expressed per 100 g EP are indicated as *calculated (c)* in the documentation.

In the case of missing amino acid data, a default profile per mg/g nitrogen is used as a pattern for various foods to complete these data gaps. The default profile was then adjusted to the nitrogen content of the respective food. Thus data were selected as shown below, and a set of amino acids calculated for each animal groups (fish, crustaceans, molluscs).

Selection criteria for calculating a default amino acid profile:

Selection of data according to

- **data origin**: only analytical data from articles of the scientific literature, analytical reports and reference datasets were used;
- **data check**: Sum of amino acid residues (anhydrous form) as mg/g nitrogen < 6.25;
- **edible portion**: food refers to raw flesh, meat, fillet or similar (excluding e.g. roe, gonads);
- **validation of amino acid profile**: values are included if in alignment with other data, also if they were part of an incomplete amino acid set (i.e. less than 18 amino acids).

In the uFish datasheets *06 AA (per g N)* the default amino acid profile is referenced as dAA; its full statistical information is given in the datasheet *08 DefaultProfile AA*.

5. FOOD AGGREGATION AND PRINCIPLE OF IMPUTATIONS

Generally, foods records with the same description were aggregated, following a ‘top-down’ approach. This means that in the first instance a generic food is compiled (abbreviated as ‘n.s.’ for non-specific), while further distinct foods were created if data availability was sufficient, considering the following characteristics:

- Production type (wild or farmed)
- Origin (country of aquaculture production or fishing zone)
- Edible portion (e.g. skinless fillet, tail part)

Example of ‘top-down’ aggregation, *Salmo salar* (Atlantic salmon):

Level 1 *Salmo salar*, fillet, n.s.
Level 2 *Salmo salar*, wild, fillet

Level 2 *Salmo salar*, farmed, fillet (n.s.)
Level 3 *Salmo salar*, farmed, fillet (country X)
Level 3 *Salmo salar*, farmed, fillet (country Y)

For crustacean and molluscs, in general, less analytical data were available. Thus, in most cases a food at the taxonomic *family* or *genus* level was aggregated first, from which missing data for a specific species were estimated.

Example, Mytilidae (sea mussels):

Level 1 Mytilidae
Level 2 *Mytilus spp*
Level 3 *Mytilus edulis*
Level 3 *Mytilus galloprovincialis*
Level 2 *Perna spp*
Level 3 *Perna perna*

Considerations:

- Where appropriate, missing values in the nutrient set of a specific food were estimated from a higher level of aggregation.
- Aggregation of distinct food records is principally based on all compositional data; however, data for vitamins and amino acids were often estimated from the generic food (n.s.) due to limited data availability. Furthermore, distinct food records may have a very similar/the same content of nutrient values due to underlying data used for the aggregation.
- Wherever possible, it was aimed to mainly include analytical data from scientific articles and reports in the aggregation.
- No weighting factors considering global production or market share data were applied when compiling nutrient values for a food.
- No weighting factors were applied considering the inclusion of reference datasets compared to articles from scientific literature or analytical reports. This was mainly done because information on number of samples was often lacking.

6. COOKED FOODS

Nutrient values of foods cooked with moist and dry heat were calculated using yield factors and nutrient retention factors as indicated by FAO/INFOODS (2013).

Weight yields factors (YF) These factors describe the weight change in foods or mixed dishes due to cooking. They adjust for losses and gains of water and/or fat during preparation. Whenever possible, species-specific yield factors were used in uFiSh, while in many cases factors referring to less specific foods needed to be applied (ANNEX 3).

Note that YF that were given for mussels and clams *cooked in pan* and *sautéed* were considered as cooked by moist heat (boiled) due to the high amount of liquor released by mussels and clams themselves.

Especially for fatty foods it is assumed that weight change can also be attributed to loss of fat, thus, fat loss factors were taken into consideration where necessary (*Table 4*).

Table 4: Factors for loss of water/fat in foods

	Fat < 5% of EP	Fat 5-15% of EP	Fat > 15% of EP
Loss of fat	0%	7%	13-15%
Loss of water	100%	93%	85-87%

Nutrient retention factors (RF) These factors express the nutrient content retained in the food during preparation or processing. It is defined as the coefficient expressing the preservation of nutrients, especially of vitamins and minerals in a food or dish after storage, preparation, processing, warm holding or reheating.

Table 5 below gives average values for moist heat (boiled, steamed, or stewed) and dry heat (fried in pan or oven) cooking methods, deriving from Bognár (2002) and Vásquez-Caicedo (2008).

Table 5: Nutrient retention factors applied in uFiSh

	Moist heat[1]			Dry heat[2]	
Component	Low fat fish[3] or shellfish	Fat fish[4]	Fish or shellfish, cooked in recipe[5]	Low fat fish[3] or shellfish	Fat fish[4]
Protein[6]	1	1	1	1	1
Fat[4]	1	1	1	1	1
Carbohydrates[6]	1	1	1	1	1
Fiber[6]	1	1	1	1	1
Protein[6]	1	1	1	1	1
Calcium	1	1	1	1	1
Iron	0.8	0.8	1	0.85	0.85
Magnesium	0.85	0.85	1	0.9	0.9
Phosphorus	0.85	0.85	1	0.9	0.9
Potassium	0.75	0.75	1	0.85	0.85
Iodine[7]	0.9	0.9	1	1	1
Sodium	0.85	0.85	1	0.85	0.85
Zinc	1	1	1	1	1
Copper	0.9	0.9	1	0.95	0.95
Selenium[7]	0.9	0.9	1	1	1
Retinol	0.9	0.7	0.9	0.9	0.8
ß-carotene	0.9	0.7	0.9	0.9	0.8
Cholecalciferol	0.9	0.7	0.9	0.9	0.8
α-tocopherol	1	0.7	1	1	0.8
Thiamin	0.75	0.75	0.85	0.8	0.85
Riboflavin	0.7	0.7	1	0.85	0.9
Niacin	0.7	0.7	0.95	0.85	0.9
Vitamin B6	0.7	0.7	0.85	0.9	0.9
Folate	0.7	0.7	0.85	0.8	0.85
Pantothenic acid	0.7	0.7	0.85	0.88	0.88
Vitamin B12	0.8	0.8	0.9	0.9	0.9
Vitamin C	0.8	0.8	0.85	0.8	0.8
Amino acids[8]	1	1	1	1	1
Fatty acids[8]	1	1	1	1	1
Cholesterol[9]	1	1	1	1	1

[1] Average values for moist heat cooking methods (boiling, steaming and stewing), w/o addition of salt; [2] Average values for dry heat cooking methods (fry in pan, fry in oven), w/o addition of fat; [3] Total fat content < 5 %; [4] Total fat content > 5 %; [5] No separation between low fat and fat fish as reported NRF are identical; [6] Adapted RF applied; [7] RF given for 'Other minerals'; [8] RF given for 'Other food constituents'; [9] RF given for 'Sterols'.

7. VALUE DOCUMENTATION

Statistics The foods represent average values of the collected compositional data. If at least two data points were available, the minimum (min) and maximum (max) values are listed. In addition, the median and the standard deviation (SD) are calculated, i.e. when the number of data points was 3 or above. For each value, the number of data points is indicated (n).[7]

Documentation at food level For all information given per food, the data sources are indicated with the respective reference ID in the source column, while the bibliographic information on each is given in the sheet *12 Bibliography*.

Documentation at component level For each value the type of source acquisition or value type is given to indicate whether a value is 'truly' analytical or refers to a compiled, calculated or estimated value, as outlined in *Table 6*.

Table 6: Abbreviations used for component level documentation

Type of source acquisition/ value type	Abbreviation used	Comment
Article from scientific literature Analytical report	*a*	Analytical value
Reference dataset	*r*	Value taken from data compilation, i.e. food composition datasets/databases.
Mix of data sources	*ar*	Value represents a mix of data from the scientific literature or reports (i.e. analytical data) or from reference data sets
Calculated	*c*	Value derived by calculation in present datasheets, e.g. PROTCNT, ENERGY (ANNEX 2).
Estimated	*e*	Value borrowed from similar/same food (values may be adjusted/unadjusted), or estimated from calculations.
	z	Value is assumed zero.
	*	Tag for values for which INFOODS tagnames referring to a less preferred/improper analytical method were also included in the aggregation, or were the only option available. In the latter case the respective tagname is added in the documentation field (ANNEX 2).

Considerations:

- It was aimed to include predominantly analytical data from reference datasets, so users may want to verify the origin of a value labelled with *r* or *ar* by referring to the original material in detail.
- If data availability was low for certain values, also values assigned to non-preferred/improper tagnames were used if in alignment with the preferred tagname. Thus, values including non-preferred/improper tagnames were indicated with * in the documentation; this label does not indicate lower quality of values, but allows a precise documentation.

[7] The number of *n* gives the number of data points used for calculation and should not be misinterpreted as the number of analyses or composite samples; further, a higher number of data points compared to another food does not automatically suggest a higher validity of the content value.

8. QUALITY CONSIDERATIONS

The values in uFiSh are the result of a comprehensive literature search, additional analytical data and other reference datasets. Because the underlying analytical data used to compile uFiSh are mainly results of specific research questions but have not been sampled to represent a global, regional or national average, the presented data have to be taken with caution. To the author's knowledge, however, the data represent the bulk of publicly available data on these fish and shellfish species with the set standard for data quality.

It is recognized that the limited number of data points per species meant it was not possible to present nutrient compositional data that are globally representative. Even though great efforts were undertaken to collect and compile data accounting for various catch areas and seasons or farming origins, data coverage was limited. For example, globally published data only cover some regions, few species and most probably represent only a small fraction of the variability in the composition of fish and shellfish.

In some cases, the data availability was poor, which resulted in a significant amount of imputed or borrowed data, especially for vitamins in fish. Also, the very few analytical data available for the entire spectrum of nutrients of both crustaceans and molluscs led to a high degree of estimations. Data were thus mainly borrowed from national FCT/FCDB and marked accordingly in the documentation.

The final selection of values published is dependent on the judgment of the compilers and their interpretation of available data.

Component variability Component values have been scrutinized and selected carefully for publication in uFiSh; however, it is important that users appreciate that the composition of different samples of the same or similar seafood may differ considerably. Values can differ as much within a species as between species. Variability in wild-caught fish is mainly due to natural variation in their feed depending on catch season and area. With respect to farmed fish, the composition of feed and the feeding regime are the main factors influencing fat content and other components, while other major factors such as water temperature, sex, age and size may be controlled.

The content of fat and fatty acids are particular variable. Fat and water normally sum up to about 80 % of the flesh, with the two components showing an inverse relationship, i.e. when fat rises, water levels tend to fall. For example, this balance between components can be observed particularly in pelagic fish species: fat levels reach peak values in autumn and very low values in spring, following an annual cycle of fat.

The uFiSh database has been designed to reflect various factors influencing the composition of seafoods by having as many food entries as possible. However, data availability did not always allow for separation.

Data remarks Calculated mean values should not be considered as 'absolute and exhaustive': they derive from various sources and are subject to differences caused by sampling procedures and analytical performance, they also reflect data availability, data quality and estimations made.

Even though uFiSh does not mention the number of individual analyses per source, it is an important and simple quality parameter, i.e. a high number of individual analytical samples increases the validity of the content value. However, for most of the data included for compilation no number of composite samples was provided in the original source. It was therefore also impossible to apply weighting factors according to their data quality or representativeness when aggregating food records.

Sum of proximates The sum of water, protein, lipid, and ash does not necessarily equal 100 g for those foods for which a zero value for available carbohydrates and fiber is shown because each of these four proximate constituents were determined independently. The acceptable range of the sum of proximates lies within 97-103 g, while the range from 95-105 is accepted for some foods.

Data checks Selected criteria as outlined by FAO/INFOODS (2012) were used to evaluate the validity of data for publication.

9. REFERENCE DATASETS

Selected reference datasets, i.e. national or regional compiled FCT/FCDB, were included in the uFiSh to provide nutrient values of a wider range of aquatic animals in a standardized way (*Table 7*). ASFIS codes were assigned to the foods whenever possible, while component names were assigned to INFOODS tagnames and relevant unit conversions were carried out. Components originally presented solely per g nitrogen or per 100 g FA were additionally expressed per 100 g EP for easier data use.

Table 7: List of reference datasets included in uFish

RefID	Bibliography
AF1	Puwastien, P., Burlingame, B., Raroengwichit, M., & Sungpuag, P. (2000). ASEAN Food composition tables 2000. Thailand: Institute of Nutrition, Mahidol University.
AF2	Institute of Nutrition, Mahidol University (2014). ASEAN Food Composition Database, Electronic version 1, February 2014, Thailand. Retrieved from http://www.inmu.mahidol.ac.th/aseanfoods/composition_data.html.
CH02	Institute of Nutrition and Food Safety. (2002). China food composition – Book 1 (2nd ed.). Beijing: Peking University Medical Press.
DK7	Saxholt E., Christensen A.T., Møller A. Hartkopp H.B., Hess Ygil K., Hels O.H. (2008) Danish Food Composition Databank, revision 7. Department of Nutrition, National Food Institute, Technical University of Denmark. 2008. Retrieved from http://www.foodcomp.dk/.
NZ13	New Zealand Ministry of Health, & New Zealand Plant & Food Research Limited. (2013). New Zealand FOODfiles 2013 Version 01. Retrieved from www.foodcomposition.co.nz.
SR27	U.S. Department of Agriculture, (2014). USDA National Nutrient Database for Standard Reference, Release 27. U.S. Department for Agriculture, Agricultural Research Service, Nutrient Data Laboratory. Retrieved from http://ndb.nal.usda.gov/.
UK7	Public Health England (2015) McCance and Widdowson's The Composition of Foods Integrated Dataset (CoFID) 2015. Prepared by Finglas P., Roe M., Pinchen H., Berry R., Church S., Dodhia S., Powell N., Farron-Wilson M., McCardle J., & Swan G, Institute of Food Research. Public Health England, London. Retrieved from https://www.gov.uk/government/publications/composition-of-foods-integrated-dataset-cofid. Open Government Licence https://www.nationalarchives.gov.uk/doc/open-government-licence/version/2/.

It is advised to check the documentation or user guide of the reference datasets for the exact component definition (i.e. analytical method, calculation, expression), as well as the FAO/INFOODS webpage for more information on the definition and description of INFOODS tagnames (FAO/INFOODS, 2016).

10. STRUCTURE OF uFiSh

The actual compositional data of uFiSh and additional information on foods and components can be accessed at www.fao.org/fileadmin/templates/food_composition/documents/uFiSh1.0.xlsx. The structure of uFiSh is outlined in *Table 8*; it consists of 12 separate datasheets, where sheets 04 to 07 hold the actual nutrient values.

Table 8: Datasheets in uFiSh

Datasheet title	Description
01 Introduction	Gives an introduction to the tables, incl. information on copyright and disclaimer.
02 Overview Species	Presents an overview of the fish and shellfish species for which compiled nutrient values are given in uFiSh, relating to their respective food item IDs used in the actual datasheets (sheets 04-07).
03 Components uFiSh	Gives an overview of all components that are covered by the uFiSh datasheets (sheets 04-07), listing INFOODS tagnames, descriptions, recommended units, max. decimal places and significant digits used.
04 NV_sum (per 100 g EP)	Presents compiled nutrient values per 100 g EP for raw, processed and cooked foods - without information on statistics and documentation per component.
05 NV_stat (per 100 g Ep)	Presents compiled nutrient values per 100 g EP with information on statistics for raw, processed and cooked foods – includes information on statistics and documentation per component.
06 AA (per g N)	Presents compiled amino acid values per g nitrogen for raw, processed and cooked foods - includes information on statistics and documentation per AA.
07 FA (per 100 g FA)	Presents compiled fatty acid values per 100 g fatty acids for raw, processed and cooked foods, and includes information on statistics and documentation per FA.
08 DefaultProfile AA	Provides information on the default amino acid profiles used to estimate missing amino acid data for fish, crustaceans and molluscs.
09 Yield Factors	Lists yield factors and the corresponding source(s) for each food.
10 RefDatasets	Contains nutrient values of selected reference datasets per 100 g EP, as well as amino acids per g nitrogen, and fatty acids per 100 g fatty acids.
11 Components RefDatasets	Gives an overview of all components that are covered by the reference datasets (sheet 10). It lists INFOODS tagnames, units and descriptions, and indicates which components are available per reference dataset.
12 Bibliography	Presents the entire reference list with the corresponding ID.

11. CONCLUSION AND RECOMMENDATIONS FOR FUTURE WORK

This is the first edition of the uFiSh database and it represents a first review of the available data on those species included in uFiSh. This work is the result of a comprehensive data collection, of thorough and demanding investigations on methodological issues concerning fatty acid conversion factors and data aggregation, as well as of a careful peer-review carried out by world experts in fish composition.

Even though huge amounts of data were collected over time, data availability was a major constraint in the development of uFiSh, especially considering the objectives and principles described earlier (see *1. Introduction*). For example, it was in not possible to separate food entries according to additional factors such as feed or season. It can be concluded that for proximates (i.e. water, fat, protein, and ash) sufficient data but of various quality were available for most species; mineral data were available to a medium extent, although reliable data on iodine were missing; amino acid data do not seem to vary hugely among species which allowed us to construct a default amino acid profile; fatty acid data – especially on major consumed species - are largely covered by scientific articles, but they are often described with different levels of specificity which did not allow for the same fatty acid set for all species to be presented; there were very few analytical vitamin data in the international literature and in most cases they needed to be estimated from reference datasets.

It was decided to report the fish and shellfish data from different national FCT/FCDB to show the variation in the composition of the seafood species included therein. This might be helpful for those looking for species and forms of processing or cooking which are not covered by the uFiSh database.

The quality of the uFiSh database could definitely be enhanced by replacing borrowed and estimated values in the future with analytical data. This will only be possible if additional funds will be identified in order to analyse more fish and shellfish species in raw and processed forms, and also of those considered minor species. Very importantly, more analysis of the vitamin contents have to be carried out in order to fill this huge data gap, except for those which are known to be in trace amounts in seafood. In addition, it is critically important that these new analytical data would be made available to FAO in order to be included in next versions of uFiSh.

This first edition holds mainly seafood in in raw and cooked forms, i.e. cooked without any additional ingredients. It is recommended that future editions shall also include compositional data on different forms consumed (e.g. tail part, head part), more on processed fish and shellfish, fish-by-products (e.g. fish meal), as well as seafood dishes.

12. BIBLIOGRAPHY

The reference sources used for uFiSh, with their codes (RefID) and complete bibliography are given in datasheet 12.

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ANNEX 1: List of species

A complete list of all species for which uFiSh holds compositional data is given in Table 9. The species are listed with their English names together with their ASFIS codes (ISCCAAP and 3-Alpha codes) and scientific name. If necessary, available data of those species belonging to either the same taxonomic family or genus are pooled together to present a food entry on these taxonomic levels ($^{\Delta}$). The Food Item IDs refer to raw, processed, and cooked foods.

Table 9: List of species

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
Freshwater fish					
12 Tilapias and other cichlids					
	TLN	Cichlidae	Nile tilapia	*Oreochromis niloticus* (Linnaeus 1758)	091001-091006, 091067-091072, 091128-091133, 091189-091194
13 Miscellaneous freshwater fishes					
	CTO	Clariidae	Torpedo-shaped catfishes	*Clarias spp*$^{\Delta}$	091007, 091073, 091134, 091195
	CBT	Clariidae	Philippine catfish	*Clarias batrachus* (Linnaeus 1758)	091008, 091074, 091135, 091196
	CLZ	Clariidae	North African catfish	*Clarias gariepinus* (Burchell 1822)	091009-091011, 091075-091077, 091136-091138, 091197-091199
	CMC	Clariidae	Bighhead catfish	*Clarias macrocephalus*, Günther 1864	091012-091013, 091078-091079, 091139-091140, 091200-091201
	FPI	Esocidae	Northern pike	*Esox lucius*, Linnaeus 1758	091014-091016, 091080-091082, 091141-091143, 091202-091204
	ITP	Ictaluridae	Channel catfish	*Ictalurus punctatus* (Rafinesque 1818)	091017-091020, 091083-091086, 091144-091147, 091205-091208
	PGS	Pangasidae	Striped catfish	*Pangasius hypophthalmus* (Sauvage 1878)	091021-091025, 091087-091091, 091148-091152, 091209-091213
Diadromous fish					
23 Salmons, trouts, smelts					
	SAL	Salmonidae	Atlantic salmon	*Salmo salar*, Linnaeus 1758	091026-091034, 091062-091066, 091092-091100, 091153-091161, 091214-091222
	TRR	Salmonidae	Rainbow trout	*Oncorhynchus mykiss* (Walbaum 1792) (syn.	091035-091041, 091101-091107,

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
				Salmo gairdneri, Richardson 1836 - unaccepted)	091162-091168, 091223-091229
Marine fish					
31 Flounders, halibuts, soles					
	SOL	Soleidae	Common sole	*Solea solea* (Linnaeus, 1758) (syn. Solea vulgaris, Quensel 1806 - unaccepted)	091042-091043, 091108-091109, 091169-091170, 091230-091231
32 Cods, hakes, haddocks					
	COD	Gadidae	Atlantic cod	*Gadus morhua*, Linnaeus 1758	091044-091051, 091110-091117, 091171-091178, 091232-091239
	PCO	Gadidae	Pacific cod	*Gadus macrocephalus*, Tilesius 1810	091052-091055, 091118-091121, 091179-091182, 091240-091243
33 Miscellaneous coastal fishes					
	BSS	Moronidae	European sea bass	*Dicentrarchus labrax* (Linnaeus, 1758) (syn. Morone labrax, Linnaeus 1758 - unaccepted)	091056-091058, 091122-091124, 091183-091185, 091244-091246
37 Miscellaneous pelagic fishes					
	HOM	Carangidae	Atlantic horse mackerel	*Trachurus trachurus* (Linnaeus, 1758)	091059-091061, 091125-091127, 091186-091188, 091247-091249
Crustaceans					
41 Freshwater crustaceans					
	EWA/AYS/CJF	Astacidae/ Cambaridae/ Parastacidae$^{\Delta}$	European crayfishes / Euro-American crayfishes / Oceanian crayfishes	Includes a mix of species belonging to the *Astacidae*, *Cambaridae* and *Parastacidae* family	092001-092003, 092039-092041, 092077-092079, 092115-092117
	PPF	Palaemonidae	River prawns	*Macrobrachium spp*$^{\Delta}$	092005, 092043, 092081, 092119
	MBM	Palaemonidae	Monsoon river prawn	*Macrobrachium malcolmsonii* (H. Milne Edwards 1844)	092006, 092044, 092082, 092120
	PRF	Palaemonidae	Giant river prawn	*Macrobrachium rosenbergii* (De Man 1879)	092007, 092045, 092083, 092121
42 Crabs, sea-spiders					
	CAD	Cancridae$^{\Delta}$	Jonah crabs, rock crabs	Includes DUN, CRE, and other species belonging to the *Cancridae* family	092008, 092046, 092084, 092122
	DUN	Cancridae	Dungeness crab	*Cancer magister,* Dana 1852	092009, 092047, 092085, 092123
	CRE	Cancridae	Edible crab	*Cancer pagurus,* Linnaeus 1758	092010, 092048, 092086, 092124

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
	PCR	Majidae	Tanner crabs	*Chionoecetes spp*[Δ]	092011, 092049, 092087, 092125
	SWM	Portunidae[Δ]	Swimming crabs, etc.	Includes CRB, SCD, MUD, and other species belonging to the *Portunidae* family	092012, 092050, 092088, 092126
	CRB	Portunidae	Blue crab	*Callinectes sapidus*, Rathbun 1896	092013, 092051, 092089, 092127
	SCD	Portunidae	Blue swimming crab	*Portunus pelagicus*, Linnaeus 1758	092014, 092052, 092090, 092128
	MUD	Portunidae	Indo-Pacific swamp crab	*Scylla serrata* (Forsskål, 1775)	092015, 092053, 092091, 092129
43 Lobsters, spiny-rock lobsters					
	NEX	Nephropidae[Δ]	True lobsters, lobsterettes	Includes LBA, LBE, NEP, and other species belonging to the *Nephropidae* family.	092016, 092054, 092092, 092130
	LBA	Nephropidae	American lobster (Northern lobster)	*Homarus americanus*, H. Milne Edwards 1837	092017, 092055, 092093, 092131
	LBE	Nephropidae	European lobster	*Homarus gammarus* (Linnaeus 1758) (syn. Homarus vulgaris, H. Milne Edwards 1837 - unaccepted)	092018, 092056, 092094, 092132
	NEP	Nephropidae	Norway lobster (Langoustine)	*Nephrops norvegicus* (Linnaeus 1758)	092019, 092057, 092095, 092133
	VLO	Palinuridae[Δ]	Spiny lobsters	Includes LOR, and other species belonging to the *Palinuridae* family	092020, 092058, 092096, 092134
	LOR	Palinuridae	Red rock lobster	*Jasus edwardsii* (Hutton 1875)	092021, 092059, 092097, 092135
44 King crabs, squat-lobsters					
	KCX	Lithodidae[Δ]	King crabs, stone crabs	Includes KCD, and other species belonging to the *Lithodidae* family.	092022, 092060, 092098, 092136
	KCD	Lithodidae	Red king crab	*Paralithodes camtschaticus* (Tilesius 1815)	092023, 092061, 092099, 092137
45 Shrimps, prawns					
	CSH	Crangonidae	Common shrimp	*Crangon crangon* (Linnaeus 1758)	092024, 092062, 092100, 092138
	PAL	Palaemonidae[Δ]	Palaemonid shrimps	Includes a mix of species belonging to the *Palaemonidae* family	092004, 092042, 092080, 092118
	PAN	Pandalidae	Pandalus shrimps	*Pandalus spp*[Δ]	092025, 092063, 092101, 092139
	PRA	Pandalidae	Northern prawn	*Pandalus borealis*, Krøyer 1838	092026, 092064, 092102, 092140
	PEZ	Penaeidae[Δ]	Penaeid shrimps	Includes ENS, MPM, MPN, PRB, WKP, PBA, GIT,	092027, 092065, 092103, 092141

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
				TIP, PNV, and other species belonging to the *Penaeidae* family	
	ENS	Penaeidae	Endeavour shrimp	*Metapenaeus endeavouri*, Schmitt 1926	092028, 092066, 092104, 092142
	MPM	Penaeidae	Eastern school shrimp	*Metapenaeus macleayi* (Haswell, 1879)	092029, 092067, 092105, 092143
	MPN	Penaeidae	Speckled shrimp	*Metapenaeus monoceros* (Fabricius, 1798)	092030, 092068, 092106, 092144
	PRB	Penaeidae	Brown tiger prawn	*Penaeus esculentus,* Haswell 1879	092031, 092069, 092107, 092145
	WKP	Penaeidae	Western king prawn	*Penaeus latisulcatus,* Kishinouye 1896	092032, 092070, 092108, 092146
	PBA	Penaeidae	Banana prawn	*Penaeus merguiensis,* De Man 1888	092033, 092071, 092109, 092147
	GIT	Penaeidae	Giant tiger prawn	*Penaeus monodon*, Fabricius 1798	092034-092035, 092072-092073, 092110-092111, 092148-092149
	TIP	Penaeidae	Green tiger prawn	*Penaeus semisulcatus,* De Haan 1844	092036, 092074, 092112, 092150
	PNV	Penaeidae	Whiteleg shrimp	*Litopenaeus vannamei* (Boone, 1931) (syn. Penaeus vannamei, Boone 1931 - unaccepted)	092037, 092075, 092113, 092151
	SHS	Sergestidae$^{\Delta}$	Sergestid shrimps	Includes SHS, and other species belonging to the *Sergestidae* family	092038, 092076, 092114, 092152
Molluscs					
52 Abalones, winkles, conchs					
	ABX	Haliotidae	Abalones	*Haliotis spp*$^{\Delta}$	093001, 093036, 093071
	JTX	Strombidae$^{\Delta}$	Conch shells	Includes TBG, TBI, and other species belonging to the *Strombidae* family	093002, 093037, 093072
	TBG	Strombidae	Giant Eastern Pacific conch	*Strombus galeatus*, Swainson 1823	093003, 093038, 093073
	TBI	Strombidae	Eastern Pacific fighting conch	*Strombus gracilior*, Sowerby 1825	093004, 093039, 093074
53 Oysters					
	OYC	Ostreidae	Cupped oysters	*Crassostrea spp*$^{\Delta}$	093005, 093040, 093075
	OYG	Ostreidae	Pacific cupped oyster	*Crassostrea gigas* (Thunberg 1793)	093006-093007, 093041-093042, 093076-093077
	OYM	Ostreidae	Mangrove cupped oyster	*Crassostrea rhizophorae* (Guilding 1828)	093008, 093043, 093078
	OYA	Ostreidae	American cupped oyster	*Crassostrea virginica* (Gmelin 1791)	093009-093011, 093044-093046,

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
					093079-093081
	OYX	Ostreidae	Flat oysters	*Ostrea spp*[Δ]	093012, 093047, 093082
	OYF	Ostreidae	European flat oyster	*Ostrea edulis*, Linnaeus 1758	093013, 093048, 093083
54 Mussels					
	MYV	Mytilidae	Mytilus mussels	*Mytilus spp*[Δ]	093014, 093049, 093084
	MUK	Mytilidae	Korean mussel	*Mytilus coruscus*, Gould 1861	093015, 093050, 093085
	MUS	Mytilidae	Blue mussel	*Mytilus edulis*, Linnaeus 1758	093016, 093051, 093086
	MSM	Mytilidae	Mediterranean mussel	*Mytilus galloprovincialis*, Lamarck 1819	093017-093019, 093052-093054, 093087-093089
	XMS	Mytilidae	Perna mussel	*Perna spp*[Δ]	093020, 093055, 093090
	MUZ	Mytilidae	New Zealand mussel	*Perna canaliculus* (Gmelin 1791)	093021, 093056, 093091
	MSV	Mytilidae	Green mussel	*Perna viridis* (Linnaeus 1758)	093022, 093057, 093092
55 Scallops, pectens					
	SCX	Pectinidae[Δ]	Scallops	Includes SCE, and other species belonging to the *Pectinidae* family	093023, 093058, 093093
	SCE	Pectinidae	Great Atlantic scallop	*Pecten maximus* (Linnaeus, 1758)	093024, 093059, 093094
56 Clams, cockles, arkshells					
	CLV	Veneridae[Δ]	Venus clams	Includes SVE, and other species belonging to the *Veneridae* family	093025, 093060, 093095
	SVE	Veneridae	Striped venus	Chamelea gallina (Linnaeus, 1758)	093026, 093061, 093096
57 Squids, cuttlefishes, octopuses					
	SQZ	Loliginidae	Inshore squids	*Loligo spp*[Δ]	093027, 093062, 093097, 093106
	SQR	Loliginidae	European squid	*Loligo vulgaris,* Lamarck 1798	093028-093029, 093063-093064, 093098-093099, 093107-093108
	OCT	Octopodidae[Δ]	Octopuses, etc.	Includes OCC, and other species belonging to the *Octopodidae* family	093030, 093065, 093100, 093109
	OCC	Octopodidae	Common octopus	*Octopus vulgaris,* Cuvier 1797	093031-093032, 093066-093067, 093101-093102, 093110-093111

ISCCAAP	3-Alpha	Family	English name	Scientific name, author	Food Item ID
	OMZ	Ommastrephidae$^{\Delta}$	Ommastrephidae squids	Includes a mix of species belonging to the *Ommastrephidae* family	093033, 093068, 093103, 093112
	CTL	Sepiidae, Sepiolidae$^{\Delta}$	Cuttlefish, bobtail squids	Includes CTC, and other species belonging to the *Sepiidae* family	093034, 093069, 093104, 093113
	CTC	Sepiidae	Common cuttlefish	*Sepia officinalis*, Linnaeus 1758	093035, 093070, 093105, 093114

ANNEX 2: List of components

The tables below list the components used in uFiSh with their corresponding INFOODS component identifier (tagname), units, denominators and number of significant digits. *Table 10* gives all components other than amino acids and fatty acids; they are presented in *Table 11* and *Table 12*, respectively.

Table 10: List of components with corresponding INFOODS tagnames, units, denominators and number of significant (sig.) digits

Component	INFOODS tagname	Unit	Denominator	Sig. digits	Data-sheet	Comment[1]
Edible portion	EDIBLE			2	04/05	Presented as the edible coefficients of the total food as purchased and as consumed
Energy	ENERC	kJ, kcal	/100 g EP	3	04/05	Calc. from energy-yielding components FAT, CHOAVLDF, PROTCNT, FIBTG (*Equations 1 & 2*)
Water	WATER	g	/100 g EP	3	04/05	
Nitrogen, total	NT	g	/100 g EP	3	04/05	
Protein, total	PROTCNT	g	/100 g EP	3	04/05	Calc. from NT using nitrogen-to-protein factor 6.25 (*Equation 3*)
Fat, total	FAT	g	/100 g EP	3	04/05	Not preferred/improper tagname: FATCE, determination by continuous extraction; FAT-, unknown or mixed method.
Fatty acid conversion factor	XFA			3		Calc. individually using formula per animal group (*Equations 7, 8 & 9*)
Fatty acids, total	FACID	g	/100 g EP	3	04/05	Calc. from FAT using XFA (*Equation 6*)
Carbohydrate available, by difference	CHOAVLDF	g	/100 g EP	3	04/05	Calc. from proximates WATER, FAT, PROTCNT, ASH, FIBTG (*Equation 4*)
Fiber, total dietary	FIBTG	g	/100 g EP	3	04/05	
Ash	ASH	g	/100 g EP	3	04/05	
Calcium	CA	mg	/100 g EP	3	04/05	
Copper	CU	mg	/100 g EP	3	04/05	
Iron	FE	mg	/100 g EP	3	04/05	
Potassium	K	mg	/100 g EP	3	04/05	
Magnesium	MG	mg	/100 g EP	3	04/05	
Sodium	NA	mg	/100 g EP	3	04/05	
Phosphorus	P	mg	/100 g EP	3	04/05	

Component	INFOODS tagname	Unit	Denominator	Sig. digits	Data-sheet	Comment[1]
Zinc	ZN	mg	/100 g EP	3	04/05	
Iodine	ID	µg	/100 g EP	2	04/05	
Selenium	SE	µg	/100 g EP	2	04/05	
Retinol	RETOL	µg	/100 g EP	3	04/05	
ß-carotene	CARTB	µg	/100 g EP	3	04/05	Not preferred/improper tagname: CARTBEQ, ß-carotene equivalents
Cholecalciferol	CHOCAL	µg	/100 g EP	2	04/05	
α-tocopherol	TOCPHA	mg	/100 g EP	2	04/05	Not preferred/improper tagnames: VITE, α-tocopherol equivalents; VITE-, unknown expression or method
Thiamin	THIA	mg	/100 g EP	2	04/05	
Riboflavin	RIBF	mg	/100 g EP	2	04/05	
Niacin	NIA	mg	/100 g EP	2	04/05	
Niacin equivalents	NIAQ	mg	/100 g EP	2	04/05	Calc. from NIA and NIATRP (*Equation 5*). NIATRP, niacin equivalents from tryptophan
Pantothenic acid	PANTAC	mg	/100 g EP	2	04/05	
Vitamin B_6	VITB6C	mg	/100 g EP	2	04/05	Not preferred/improper tagnames: VITB6A, microbiological assay; VITB6-, unknown expression or method
Folate	FOL	µg	/100 g EP	2	04/05	Not preferred/improper tagnames: FOLSUM, sum of vitamers determined by HPLC; FOL-, method unknown or variable
Vitamin B_{12}	VITB12	µg	/100 g EP	2	04/05	
Vitamin C	VITC	mg	/100 g EP	3	04/05	
Cholesterol	CHOLE	mg	/100 g EP	3	04/05	Not preferred/improper tagname: CHOLE-, unknown or mixed method.

[1] Values with non-preferred methods will be marked with *.

Table 11: List of amino acids with corresponding INFOODS component identifier (tagname), unit, denominators and significant digits

Amino acid	INFOODS tagname	Unit	Denominator	Sig. digits	Data sheet	Comment[1]
Isoleucine	ILE	mg	/100 g EP	3	04/05	Calc. from ILE/g N
			/g N	3	06	
Leucine	LEU	mg	/100 g EP	3	04/05	Calc. from LEU/g N
			/g N	3	06	
Lysine	LYS	mg	/100 g EP	3	04/05	Calc. from LYS/g N
			/g N	3	06	
Methionine	MET	mg	/100 g EP	3	04/05	Calc. from MET/g N
			/g N	3	06	
Cystine	CYS	mg	/100 g EP	3	04/05	Calc. from CYS/g N
			/g N	3	06	
Phenylalanine	PHE	mg	/100 g EP	3	04/05	Calc. from PHE/g N
			/g N	3	06	
Tyrosine	TYR	mg	/100 g EP	3	04/05	Calc. from TYR/g N
			/g N	3	06	
Threonine	THR	mg	/100 g EP	3	04/05	Calc. from THR/g N
			/g N	3	06	
Tryptophan	TRP	mg	/100 g EP	3	04/05	Calc. from TRP/g N
			/g N	3	06	
Valine	VAL	mg	/100 g EP	3	04/05	Calc. from VAL/g N
			/g N	3	06	
Arginine	ARG	mg	/100 g EP	3	04/05	Calc. from ARG/g N
			/g N	3	06	
Histidine	HIS	mg	/100 g EP	3	04/05	Calc. from HIS/g N
			/g N	3	06	
Alanine	ALA	mg	/100 g EP	3	04/05	Calc. from ALA/g N
			/g N	3	06	
Aspartic acid	ASP	mg	/100 g EP	3	04/05	Calc. from ASP/g N
			/g N	3	06	
Glutamic acid	GLU	mg	/100 g EP	3	04/05	Calc. from GLU/g N
			/g N	3	06	
Glycine	GLY	mg	/100 g EP	3	04/05	Calc. from GLY/g N
			/g N	3	06	
Proline	PRO	mg	/100 g EP	3	04/05	Calc. from PRO/g N
			/g N	3	06	
Serine	SER	mg	/100 g EP	3	04/05	Calc. from SER/g N
			/g N	3	06	

[1] See *Equation 11* for the calculations.

Table 12: List of fatty acids with corresponding INFOODS component identifiers (tagname), unit (U), denominators and number of significant digits

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
Saturated fatty acids, total	FASAT	g	/100 g EP	3	04/05	Calc. from FASAT/100 g total FA
			/100 g total FA	3	07	
Monounsaturated fatty acids, total	FAMS	g	/100 g EP	3	04/05	Calc. from FAMS/100 g total FA
			/100 g total FA	3	07	
Polyunsaturated fatty acids, total	FAPU	g	/100 g EP	3	04/05	Calc. from FAPU/100 g total FA
			/100 g total FA	3	07	
Fatty acids non-identified	FAUN	g	/100 g EP	3	04/05	Calc. from FAUN/100 g total FA
			/100 g total FA	3	07	
Fatty acids, trans, total	FATRN	g	/100 g EP	3	04/05	Calc. from FATRN/100 g total FA
			/100 g total FA	3	07	
n-3 polyunsaturated fatty acids	FAPUN3	g	/100 g EP	3	04/05	Calc. from FAPUN3/100 g total FA
			/100 g total FA	3	07	
n-6 polyunsaturated fatty acids	FAPUN6	g	/100 g EP	3	04/05	Calc. from FAPUN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 4:0	F4D0	g	/100 g EP	3	04/05	Calc. from F4D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 6:0	F6D0	g	/100 g EP	3	04/05	Calc. from F6D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 8:0	F8D0	g	/100 g EP	3	04/05	Calc. from F8D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 9:0	F9D0	g	/100 g EP	3	04/05	Calc. from F9D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 10:0	F10D0	g	/100 g EP	3	04/05	Calc. from F10D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 12:0	F12D0	g	/100 g EP	3	04/05	Calc. from F12D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 13:0	F13D0	g	/100 g EP	3	04/05	Calc. from F13D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 14:0	F14D0	g	/100 g EP	3	04/05	Calc. from F14D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 15:0	F15D0	g	/100 g EP	3	04/05	Calc. from F15D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:0	F16D0	g	/100 g EP	3	04/05	Calc. from F16D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:0	F17D0	g	/100 g EP	3	04/05	Calc. from F17D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:0	F18D0	g	/100 g EP	3	04/05	Calc. from F18D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 19:0	F19D0	g	/100 g EP	3	04/05	Calc. from F19D0/100 g total FA
			/100 g total FA	3	07	

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
Fatty acid 20:0	F20D0	g	/100 g EP	3	04/05	Calc. from F20D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 21:0	F21D0	g	/100 g EP	3	04/05	Calc. from F21D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:0	F22D0	g	/100 g EP	3	04/05	Calc. from F22D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 23:0	F23D0	g	/100 g EP	3	04/05	Calc. from F23D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 24:0	F24D0	g	/100 g EP	3	04/05	Calc. from F24D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 26:0	F26D0	g	/100 g EP	3	04/05	Calc. from F26D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 30:0	F30D0	g	/100 g EP	3	04/05	Calc. from F30D0/100 g total FA
			/100 g total FA	3	07	
Fatty acid 10:1	F10D1	g	/100 g EP	3	04/05	Calc. from F10D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 12:1	F12D1	g	/100 g EP	3	04/05	Calc. from F12D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 14:1	F14D1	g	/100 g EP	3	04/05	Calc. from F14D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 14:1 n-7	F14D1N7	g	/100 g EP	3	04/05	Calc. from F14D1N7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 15:1	F15D1	g	/100 g EP	3	04/05	Calc. from F15D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1	F16D1	g	/100 g EP	3	04/05	Calc. from F16D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1 n-9	F16D1N9	g	/100 g EP	3	04/05	Calc. from F16D1N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1 n-7	F16D1N7	g	/100 g EP	3	04/05	Calc. from F16D1N7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1 n-5	F16D1N5	g	/100 g EP	3	04/05	Calc. from F16D1N5/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1 cis	F16D1C	g	/100 g EP	3	04/05	Calc. from F16D1C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:1 trans	F16D1T	g	/100 g EP	3	04/05	Calc. from F16D1T/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:1	F17D1	g	/100 g EP	3	04/05	Calc. from F17D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:1 n-7	F17D1N7	g	/100 g EP	3	04/05	Calc. from F17D1N7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:1 n-9	F17D1N9	g	/100 g EP	3	04/05	Calc. from F17D1N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:1 cis	F17D1C	g	/100 g EP	3	04/05	Calc. from F17D1C/100 g total FA

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
			/100 g total FA	3	07	
Fatty acid 18:1	F18D1	g	/100 g EP	3	04/05	Calc. from F18D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 n-11	F18D1N11	g	/100 g EP	3	04/05	Calc. from F18D1N11/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 n-9	F18D1N9	g	/100 g EP	3	04/05	Calc. from F18D1N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 cis n-9	F18D1CN9	g	/100 g EP	3	04/05	Calc. from F18D1CN9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 trans n-9	F18D1TN9	g	/100 g EP	3	04/05	Calc. from F18D1TN9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 n-7	F18D1N7	g	/100 g EP	3	04/05	Calc. from F18D1N7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 cis n-7	F18D1CN7	g	/100 g EP	3	04/05	Calc. from F18D1CN7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 n-5	F18D1N5	g	/100 g EP	3	04/05	Calc. from F18D1N5/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 cis	F18D1C	g	/100 g EP	3	04/05	Calc. from F18D1C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:1 trans	F18D1T	g	/100 g EP	3	04/05	Calc. from F18D1T/100 g total FA
			/100 g total FA	3	07	
Fatty acid 19:1	F19D1	g	/100 g EP	3	04/05	Calc. from F19D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1	F20D1	g	/100 g EP	3	04/05	Calc. from F20D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 n-11	F20D1N11	g	/100 g EP	3	04/05	Calc. from F20D1N11/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 cis n-11	F20D1CN11	g	/100 g EP	3	04/05	Calc. from F20D1CN11/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 n-9	F20D1N9	g	/100 g EP	3	04/05	Calc. from F20D1N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 cis n-9	F20D1CN9	g	/100 g EP	3	04/05	Calc. from F20D1CN9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 n-7	F20D1N7	g	/100 g EP	3	04/05	Calc. from F20D1N7/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:1 cis	F20D1C	g	/100 g EP	3	04/05	Calc. from F20D1C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:1	F22D1	g	/100 g EP	3	04/05	Calc. from F22D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:1 n-11	F22D1N11	g	/100 g EP	3	04/05	Calc. from F22D1N11/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:1	F22D1N9	g	/100 g EP	3	04/05	Calc. from F22D1N9/100 g total FA

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
n-9			/100 g total FA	3	07	
Fatty acid 22:1 cis	F22D1C	g	/100 g EP	3	04/05	Calc. from F22D1C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:1 trans	F22D1T	g	/100 g EP	3	04/05	Calc. from F22D1T/100 g total FA
			/100 g total FA	3	07	
Fatty acid 24:1	F24D1	g	/100 g EP	3	04/05	Calc. from F24D1/100 g total FA
			/100 g total FA	3	07	
Fatty acid 24:1 n-9	F24D1N9	g	/100 g EP	3	04/05	Calc. from F24D1N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 24:1 cis	F24D1C	g	/100 g EP	3	04/05	Calc. from F24D1C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:2	F16D2	g	/100 g EP	3	04/05	Calc. from F16D2/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:2 n-4	F16D2N4	g	/100 g EP	3	04/05	Calc. from F16D2N4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:2 n-6	F16D2N6	g	/100 g EP	3	04/05	Calc. from F16D2N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 17:2	F17D2	g	/100 g EP	3	04/05	Calc. from F17D2/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2	F18D2	g	/100 g EP	3	04/05	Calc. from F18D2/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2 cis n-6	F18D2CN6	g	/100 g EP	3	04/05	Calc. from F18D2CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2 n-6	F18D2N6	g	/100 g EP	3	04/05	Calc. from F18D2N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2 conjugated	F18D2CLA	g	/100 g EP	3	04/05	Calc. from F18D2CLA/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2 trans	F18D2T	g	/100 g EP	3	04/05	Calc. from F18D2T/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:2 cis	F18D2C	g	/100 g EP	3	04/05	Calc. from F18D2C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:2	F20D2	g	/100 g EP	3	04/05	Calc. from F20D2/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:2 n-9	F20D2CN9	g	/100 g EP	3	04/05	Calc. from F20D2CN9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:2 cis n-6	F20D2CN6	g	/100 g EP	3	04/05	Calc. from F20D2CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:2 n-6	F20D2N6	g	/100 g EP	3	04/05	Calc. from F20D2N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:2 cis	F20D2N6	g	/100 g EP	3	04/05	Calc. from F20D2N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:2	F22D2	g	/100 g EP	3	04/05	Calc. from F22D2/100 g total FA
			/100 g total FA	3	07	

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
Fatty acid 22:2 n-6	F22D2N6	g	/100 g EP	3	04/05	Calc. from F22D2N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:3	F16D3	g	/100 g EP	3	04/05	Calc. from F16D3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:3 n-3	F16D3N3	g	/100 g EP	3	04/05	Calc. from F16D3N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3	F18D3	g	/100 g EP	3	04/05	Calc. from F18D3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3 cis n-6	F18D3CN6	g	/100 g EP	3	04/05	Calc. from F18D3CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3 n-6	F18D3N6	g	/100 g EP	3	04/05	Calc. from F18D3N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3 n-4	F18D3N4	g	/100 g EP	3	04/05	Calc. from F18D3N4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3 cis n-3	F18D3CN3	g	/100 g EP	3	04/05	Calc. from F18D3CN3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:3 n-3	F18D3N3	g	/100 g EP	3	04/05	Calc. from F18D3N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:3	F20D3	g	/100 g EP	3	04/05	Calc. from F20D3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:3 n-9	F20D3N9	g	/100 g EP	3	04/05	Calc. from F20D3N9/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:3 cis n-6	F20D3CN6	g	/100 g EP	3	04/05	Calc. from F20D3CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:3 n-6	F20D3N6	g	/100 g EP	3	04/05	Calc. from F20D3N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:3 n-3	F20D3N3	g	/100 g EP	3	04/05	Calc. from F20D3N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:3	F22D3	g	/100 g EP	3	04/05	Calc. from F22D3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:3 n-6	F22D3N6	g	/100 g EP	3	04/05	Calc. from F22D3N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:4	F16D4	g	/100 g EP	3	04/05	Calc. from F16D4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:4 n-3	F16D4N3	g	/100 g EP	3	04/05	Calc. from F16D4N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 16:4 cis	F16D4C	g	/100 g EP	3	04/05	Calc. from F16D4C/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:4	F18D4	g	/100 g EP	3	04/05	Calc. from F18D4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:4 cis n-3	F18D4CN3	g	/100 g EP	3	04/05	Calc. from F18D4CN3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 18:4	F18D4N3	g	/100 g EP	3	04/05	Calc. from F18D4N3/100 g total FA

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
n-3			/100 g total FA	3	07	
Fatty acid 20:4	F20D4	g	/100 g EP	3	04/05	Calc. from F20D4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:4 cis n-6	F20D4CN6	g	/100 g EP	3	04/05	Calc. from F20D4CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:4 n-6	F20D4N6	g	/100 g EP	3	04/05	Calc. from F20D4N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:4 n-3	F20D4N3	g	/100 g EP	3	04/05	Calc. from F20D4N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:4	F22D4	g	/100 g EP	3	04/05	Calc. from F22D4/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:4 cis n-6	F22D4CN6	g	/100 g EP	3	04/05	Calc. from F22D4CN6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:4 n-6	F22D4N6	g	/100 g EP	3	04/05	Calc. from F22D4N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:4 n-3	F22D4N3	g	/100 g EP	3	04/05	Calc. from F22D4N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:5	F20D5	g	/100 g EP	3	04/05	Calc. from F20D5/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:5 cis n-3	F20D5CN3	g	/100 g EP	3	04/05	Calc. from F20D5CN3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 20:5 n-3	F20D5N3	g	/100 g EP	3	04/05	Calc. from F20D5N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 21:5	F21D5	g	/100 g EP	3	04/05	Calc. from F21D5/100 g total FA
			/100 g total FA	3	07	
Fatty acid 21:5 n-3	F21D5N3	g	/100 g EP	3	04/05	Calc. from F21D5N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:5	F22D5	g	/100 g EP	3	04/05	Calc. from F22D5/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:5 n-6	F22D5N6	g	/100 g EP	3	04/05	Calc. from F22D5N6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:5 cis n-3	F22D5CN3	g	/100 g EP	3	04/05	Calc. from F22D5CN3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:5 n-3	F22D5N3	g	/100 g EP	3	04/05	Calc. from F22D5N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:6	F22D6	g	/100 g EP	3	04/05	Calc. from F22D6/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:6 cis n-3	F22D6CN3	g	/100 g EP	3	04/05	Calc. from F22D6CN3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 22:6 n-3	F22D6N3	g	/100 g EP	3	04/05	Calc. from F22D6N3/100 g total FA
			/100 g total FA	3	07	
Fatty acid 24:6	F24D6	g	/100 g EP	3	04/05	Calc. from F24D6/100 g total FA
			/100 g total FA	3	07	

Fatty acid	INFOODS tagname	U	Denominator	Sig. digits	Data-sheet	Comment[1]
Fatty acid 24:6 n-3	F24D6N3	g	/100 g EP	3	04/05	Calc. from F24D6N3/100 g total FA
			/100 g total FA	3	07	

[1] See *Equation 10* for the calculations.

ANNEX 3: List of yield factors

The tables below present weight yield factors (YF) for seafood prepared by moist and dry heat cooking methods, *Table 13* for fish, *Table 14* for crustaceans, and *Table 15* for molluscs.
In cases where the yield factor refers to a mix of methods, the default description *boiled* is used for a mix of moist heat cooking methods, and grilled is used for a mix of dry heat cooking methods. For easier reference, these foods are labelled with ♦ in the datasheets. More specific information can be found in the respective datasheet 09, e.g. ranges of YF and details on cooking methods.

Table 13: List of weight yield factors (YF) for fish

		Cooked by moist heat			Cooked by dry heat		
3-Alpha code	Food name in English	YF	Source	Food Item ID	YF	Source	Food Item ID
TLN	Nile tilapia	0.87	10	091067-091072, 091128-091133	0.79	5	091189-091194
CTO	Torpedo-shaped catfishes	0.83♦	7	091073, 091134	0.75	11	091195
CBT	Philippine catfish	0.83♦	7	091074, 091135	0.75	11	091196
CLZ	North African catfish	0.83♦	7	091075-091077, 091136-091138	0.75	11	091197-091199
CMC	Bighead catfish	0.83♦	7	091078-091079, 091139-091140	0.75	11	091200-091201
FPI	Northern pike	0.83♦	7	091080-091082, 091141-091143	0.86	8	091202-091204
ITP	Catfish, channel	0.83♦	7	091083-091086, 091144-091147	0.75	11	091205-091208
PGS	Striped catfish	0.83♦	7	091087-091091, 091148-091152	0.75	11	091209-091213
SAL	Atlantic salmon	0.83♦	2	091092-091100, 091153-091161	0.86♦	9	091214-091222
TRR	Rainbow trout	0.90♦	2; 4	091101-091107, 091162-091168	0.78♦	2; 9	091223-091229
SOL	Common sole	0.83	2	091108-091109, 091169-091170	0.72♦	2; 9	091230-091231
COD	Atlantic cod	0.82♦	2; 3	091110-091117, 091171-091178	0.75♦	2	091232-091239
PCO	Pacific cod	0.82♦	2; 3	091118-091121, 091179-091182	0.75♦	2	091240-091243
BSS	European sea bass	0.86	2	091122-091124, 091183-091185	0.75	2	091244-091246
HOM	Atlantic horse mackerel	0.70♦	2	091125-091127, 091186-091188	0.80♦	2; 9	091247-091249

♦ Mix of cooking methods; [2] Bergström (1994); [3] Bognár (2002); [4] Choubert & Baccaunaud (2010); [5] Monteiro et al. (2015); [7] Own estimation; [8] Own measurement; [9] Matthews & Garrison (1975); [10] Wangtueai & Vichasilp (2015); [11] Wu & Lillard (1998).

Table 14: List of weight yield factors (YF) for crustaceans

		Cooked by moist heat			Cooked by dry heat		
3-Alpha code	Food name in English	YF	Source	Food Item ID	YF	Source	Food Item ID
EWA	European/Euro-American/Oceanian crayfishes	0.93	3; 9	092039-092041, 092077-092079	0.86	6; 7	092115-092117
PAL	Palaemonid shrimps	0.83	3; 6; 8; 9	092042, 092080	0.86♦	6; 7	092118
PPF	River prawns	0.83	3; 6; 8; 9	092043, 092081	0.86♦	6; 7	092119
MBM	Monsoon river prawn	0.83	3; 6; 8; 9	092044, 092082	0.86♦	6; 7	092120
PRF	Giant river prawn	0.83	3; 6; 8; 9	092045, 092083	0.86♦	6; 7	092121
CAD	Jonah crabs/Rock crabs	0.87	2; 9	092046, 092084	0.86♦	6; 7	092122
DUN	Dungeness crab	0.87	2; 9	092047, 092085	0.86♦	6; 7	092123
CRE	Edible crab	0.87	2; 9	092048, 092086	0.86♦	6; 7	092124
PCR	Tanner crabs	0.87	2; 9	092049, 092087	0.86♦	6; 7	092125
SWM	Swimming crabs	0.87	2; 9	092050, 092088	0.86♦	6; 7	092126
CRB	Blue crab	0.87	2; 9	092051, 092089	0.86♦	6; 7	092127
SCD	Blue swimming crab	0.87	2; 9	092052, 092090	0.86♦	6; 7	092128
MUD	Indo-Pacific swamp crab	0.87	2; 9	092053, 092091	0.86♦	6; 7	092129
NEX	True lobsters/ lobsterettes	0.89	2; 9	092054, 092092	0.86♦	6; 7	092130
LBA	American lobster	0.89	2; 9	092055, 092093	0.86♦	6; 7	092131
LBE	European lobster	0.89	2; 9	092056, 092094	0.86♦	6; 7	092132
NEP	Norway lobster	0.89	2; 9	092057, 092095	0.86♦	6; 7	092133
VLO	Spiny lobsters	0.89	2; 9	092058, 092096	0.86♦	6; 7	092134
LOR	Red rock lobster	0.89	2; 9	092059, 092097	0.86♦	6; 7	092135
KCX	King crabs, stone crabs	0.87	2; 9	092060, 092098	0.86♦	6; 7	092136
KCD	Red king crab	0.87	2; 9	092061, 092099	0.86♦	6; 7	092137
CSH	Common shrimp	0.83	3; 6; 8; 9	092062, 092100	0.86♦	6; 7	092138
PAN	Pandalus shrimps	0.83	3; 6; 8; 9	092063, 092101	0.86♦	6; 7	092139
PRA	Northern prawn	0.83	3; 6; 8; 9	092064, 092102	0.86♦	6; 7	092140
PEZ	Penaeid shrimps	0.83	3; 6; 8; 9	092065, 092103	0.86♦	6; 7	092141
ENS	Endeavour shrimp	0.83	3; 6; 8; 9	092066, 092104	0.86♦	6; 7	092142
MPM	Eastern school shrimp	0.83	3; 6; 8; 9	092067, 092105	0.86♦	6; 7	092143
MPN	Speckled shrimp	0.83	3; 6; 8; 9	092068, 092106	0.86♦	6; 7	092144
PRB	Brown tiger prawn	0.83	3; 6; 8; 9	092069, 092107	0.86♦	6; 7	092145
WKP	Western king prawn	0.83	3; 6; 8; 9	092070, 092108	0.86♦	6; 7	092146
PBA	Banana prawn	0.83	3; 6; 8; 9	092071, 092109	0.86♦	6; 7	092147
GIT	Giant tiger prawn	0.83	3; 6; 8; 9	092072-092073, 092110-092111	0.86♦	6; 7	092148-092149
TIP	Green tiger prawn	0.83	3; 6; 8; 9	092074, 092112	0.86♦	6; 7	092150
PNV	Whiteleg shrimp	0.83	3; 6; 8; 9	092075, 092113	0.86♦	6; 7	092151

		Cooked by moist heat			Cooked by dry heat		
3-Alpha code	Food name in English	YF	Source	Food Item ID	YF	Source	Food Item ID
SHS	Sergestid shrimps	0.83	3; 6; 8; 9	092076, 092114	0.86♦	6; 7	092152

♦ Mix of cooking methods; [2] Bergström (1994); [3] Bognár (2002); [6] Dudek, Behl & Elkins (1981); [7] Own estimation; [8] Own measurement; [9] Matthews & Garrison (1975).

Table 15: List of weight yield factors (YF) for molluscs

		Cooked by moist heat			Cooked by dry heat		
3-Alpha code	Food name in English	YF	Source	Food Item ID	YF	Source	Food Item ID
ABX	Abalones	0.63♦	7	093036, 093071			
JTX	Conch shells	0.51♦	7	093037, 093072			
TBG	Giant Eastern Pacific conch	0.51♦	7	093038, 093073			
TBI	Eastern Pacific fighting conch	0.51♦	7	093039, 093074			
OYC	Cupped oysters	0.78	9	093040, 093075			
OYG	Pacific cupped oyster	0.78	9	093041-093042, 093076-093077			
OYM	Mangrove cupped oyster	0.78	9	093043, 093078			
OYA	American cupped oyster	0.78	9	093044-093046, 093079-093081			
OYX	Flat oysters	0.78	9	093047, 093082			
OYF	European flat oyster	0.78	9	093048, 093083			
MYV	Mytilus mussels	0.62♦	2; 8	093049, 093084			
MUK	Korean mussel	0.62♦	2; 8	093050, 093085			
MUS	Blue mussel	0.62♦	2; 8	093051, 093086			
MSM	Mediterranean mussel	0.62♦	2; 8	093052-093054, 093087-093089			
XMS	Perna mussels	0.62♦	2; 8	093055, 093090			
MUZ	New Zealand mussel	0.62♦	2; 8	093056, 093091			
MSV	Green mussel	0.62♦	2; 8	093057, 093092			
SCX	Scallops	0.5	9	093058, 093093			
SCE	Great Atlantic scallop	0.5	9	093059, 093094			
CLV	Venus clams	0.63♦	1; 8	093060, 093095			
SVE	Striped venus	0.63♦	1; 8	093061, 093096			
SQZ	Inshore squids	0.51	2	093062, 093097	0.61	2; 8	093106
SQR	European squid	0.51	2	093063-093064, 093098-093099	0.61	2; 8	093107-093108
OCT	Octopuses	0.51	2	093065, 093100	0.61	2; 8	093109
OCC	Common octopus	0.51	2	093066-093067, 093101-093102	0.61	2; 8	093110-093111

		Cooked by moist heat			Cooked by dry heat		
3-Alpha code	Food name in English	YF	Source	Food Item ID	YF	Source	Food Item ID
OMZ	Ommastrephidae squids	0.51	[2]	093068, 093103	0.61	[2; 8]	093112
CTL	Cuttlefish, bobtail squids	0.51	[2]	093069, 093104	0.61	[2; 8]	093113
CTC	Common cuttlefish	0.51	[2]	093070, 093105	0.61	[2; 8]	093114

♦ Mix of cooking methods; [1] Badiani et al. (2006); [2] Bergström (1994); [7] Own estimation; [8] Own measurement; [9] Matthews & Garrison (1975).

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