Internal report on the quantification of food supplements units to be used in the assessment of dietary exposure

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Abstract

The Comprehensive Food Consumption Database was developed in 2010 and is a source of information on food consumption across the European Union. Information on the consumption of food supplements, reported in units (i.e. tablets, capsules, drops etc.) is also included. The occurrence of different hazards (e.g. chemical contaminants and food additives) in food supplements makes it extremely important to have food supplements quantified in grams, which has been reported as very difficult task by Member States. For this reason, EFSA decided to analyse the information available in the Comprehensive database on the consumption of food supplements and create a database from which standard weights per type of supplements were extracted. Both FoodEx2 classification and unit weight were checked and adjusted for each food supplement record. Food supplements were divided based on their main ingredient and FoodEx2 classification code, and then further divided on the type of unit. The average weight was calculated for each group. The unit weights suggested in this document represent a step-forward into the harmonisation and standardisation of the methodologies used in EFSA. Harmonising the use of the unit weight of the food supplements, instead of a case-by-case approach, is a step to improve the quality and validity of EFSA’s scientific outputs.

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**Key words:** food supplement, Comprehensive food consumption database, FoodEx2, unit weight

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Summary

The Comprehensive Food Consumption Database is a source of information on food consumption across the European Union (EU). It was developed in 2010 and contains detailed data for a number of EU countries. The database plays a key role in the evaluation of the risks related to possible hazards in food in the EU and allows estimates of consumers’ exposure to such hazards, a fundamental step in EFSA’s risk assessment work. It contains the most recent data within each country, collected with 24-hour recall or dietary record method, at individual level with a random sample at national level and covering different age classes, from infants to elderly as well as special population groups.

Information on the consumption of food supplements are also reported by Member States. So far, in the Comprehensive database food supplements were reported in units (i.e. tablets, capsules, drops etc.). However, the occurrence of different hazards (e.g. chemical contaminants and food additives) in food supplements makes it extremely important to have food supplements quantified in grams. Member States reported to have difficulties to perform this quantification due to the large number of food supplements available on the market and the limited information provided on their consumption during the interview by the subjects.

For this reason, EFSA decided to analyse the information available in the Comprehensive on the consumption of food supplements and create a database from which standard weights per type of supplements will be extracted.

EFSA’s European Comprehensive Food Consumption Database includes 1921 records of food supplements. For the quantification in grams of these supplements the following actions were taken: (i) FoodEx2 classification codes were checked and adjusted; (ii) unit weights of food supplements that appeared to have been created by the MS were considered as ‘Dummy codes’ and were excluded; (iii) the unit weight of each recorded food supplement was checked online or in the Mintel’s Global New Products Database (GNPD); (iv) foods supplements were divided based on their main ingredient, FoodEx2 classification code and type of unit (tablet, capsule, powder, etc.); (v) the average weight for each of these was calculated.

Some supplements shown to be homogeneous in terms of unit weight, despite their different compositions. These were food supplements in the form of drops, effervescent tablets and liquid.

More specific average standard weights were obtained for Vitamin only supplements, Mineral only supplements, Combination of Vitamins and Minerals supplements, Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids) supplements, Herbal formulations and plant extracts supplements, Algae based formulations (e.g. Spirulina, chlorella) supplements, Probiotic or prebiotic formulations supplements, Coenzyme q10 formulations supplements, Fibre supplements, Yeast based formulations supplements, Bee-produced formulations supplements, Protein and amino acids supplements, Mixed supplements/formulations and Other common supplements.

It should be acknowledged that some of the suggested unit weights are more uncertain than others. While, for some of the food supplements, reliable and consistent information was available from the data providers, in other cases limited information was identified. Furthermore, any indication related to a food supplement is associated with a high number of factors that increase variability.

Therefore, the use of standard unit weights recommended in this report can represent a source of uncertainty, for example, in the assessment of dietary exposure to chemicals. At the same time, the unit weights suggested in this document represent a step-forward into the harmonisation and standardisation of the methodologies used in EFSA. Harmonising the use of the unit weight of the food supplements, instead of a case-by-case approach, is a step to improve the quality and validity of EFSA’s scientific outputs.

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1. Introduction

The Comprehensive Food Consumption Database is a source of information on food consumption across the European Union (EU). It was developed in 2010 and contains detailed data for a number of EU countries. The database plays a key role in the evaluation of the risks related to possible hazards in food in the EU and allows estimates of consumers’ exposure to such hazards, a fundamental step in EFSA’s risk assessment work. The database is also relevant to other fields of EFSA’s work, such as the assessment of nutrient intakes of the EU population.

The most recent version of the Comprehensive Database covers 94,532 individuals from a total of 51 different dietary surveys that were carried out in 23 different Member States. It contains the most recent data within each country, collected with 24-hour recall or dietary record method, at individual level with a random sample at national level and covering different age classes, from infants to elderly as well as special population groups. Foods and beverages present in the Comprehensive Database are codified according to the FoodEx1 classification system of EFSA (EFSA, 2011). The methodological differences between different dietary surveys in different countries make it difficult to carry out EU-wide analyses or country-to-country comparisons. EFSA’s ongoing EU Menu project aims to provide standardised information on what people eat in all countries and regions across the EU. It will allow more accurate exposure assessment and support risk managers in their decision-making on food safety. Food consumption data collected under the EU-Menu project are codified according to FoodEx2 (EFSA, 2015).

Information on the consumption of food supplements are also reported by Member States. So far, in the Comprehensive database food supplements were reported in units (i.e. tablets, capsules, drops etc.). However, the occurrence of different hazards (e.g. chemical contaminants and food additives) in food supplements makes it extremely important to have food supplements quantified in grams. Therefore, consumption of food supplements is required to be reported in grams under the EU Menu project. However, Member States reported to have difficulties to perform this quantification due to the large number of food supplements available on the market and the limited information provided on their consumption during the interview by the subjects. For this reason, EFSA decided to analyse the information available in the Comprehensive on the consumption of food supplements and create a database from which standard weights per type of supplements will be extracted.

1. Data and Methodologies

EFSA’s European Comprehensive Food Consumption Database includes 1921 records of food supplements. For the quantification in grams of these supplements the following actions were taken:

* The FoodEx2 classification codes were checked and adjusted
* Unit weights of food supplements that appeared to have been created by the MS were considered as ‘Dummy codes’ and were excluded
* The unit weight of each recorded food supplement was checked online or in the Mintel’s Global New Products Database (GNPD) (www.gnpd.com).
  + When a reference online or in the Mintel database was found, the net weight of the packaging was divided by the number of units included in the packaging in order to identify the single unit weight
  + if this information was not available, the reported weight by an equivalent type of food supplement by a different Member State (MS) was used
  + Foods supplements were divided based on their main ingredient and FoodEx2 classification code, and then further divided on the type of unit (tablet, capsule, powder, etc.)
  + The average weight for each of these was calculated
* Some types of supplements were aggregated as they present the same standard mean weight (maximum variation of 0.3 grams considered)
* A supplement was only considered as of mixed type if it was not possible to identify a main ingredient.

Further details on the findings for each food supplement type are found in detail in the following sections.

* 1. Homogeneous unit weights

Some supplements shown to be homogeneous in terms of unit weight, despite their different compositions. These were food supplements in the form of drops, effervescent tablets and liquid. Therefore, for these supplements, a single standard weight is proposed.

* + 1. Drops

There are 22 records of supplements in the form of drops in the EFSA Comprehensive European Food Consumption Database. They include supplements of different nature as seen in Table 1.

1. Food supplements in the form of drops

|  |  |
| --- | --- |
| FoodEx2 code | FoodEx2 code description |
| A03SL | Vitamin only supplements (vitamin A and/or vitamin D) |
| A03SM | Mineral only supplements (iron/manganese/selenium) |
| A03SQ | Bee-produced formulations |
| A03SS | Herbal formulations and plant extracts |
| A03SX | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids) |
| A0F3Y | Probiotic or prebiotic formulations |

The weight of the drop is approximately the same for all supplements mentioned in Table 1; it varies between 0.03 and 0.05 grams. The average weight is **0.04 grams**.

* + 1. Effervescent Tablets

The effervescent tablets are another unit-type which weight does not show high variability. The specific types of food supplements reported in the form of effervescent tablets are found in Table 2. The only exception is the combination of vitamins and minerals supplements, described in detail in later in this report.

1. Food supplements in the form of effervescent tables

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL | Vitamin only supplements (vitamin C) |
| A03SM | Mineral only supplements (calcium and/or magnesium) |
| A03SV | Other common supplements |
| A03TC | Mixed supplements/formulations (herbal, mineral and/or vitamins) |

There are 44 records present in the Comprehensive consumption database. Their weights vary between 2.00 and 4.00 grams. The average weight is **4 grams**.

* + 1. Liquid

There are 60 records of liquid-type supplements in the Comprehensive database that are codified under the FoodEx2 categories seen in Table 3.

1. Food supplements in the form of liquid

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL | Vitamin only supplements (multivitamins) |
| A03SM | Mineral only supplements (calcium or iron) |
| A03SN | Combination of vitamin and mineral only supplements |
| A03SX | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids) |
| A03TC | Mixed supplements/formulations |

The majority of food supplements in liquid form provide as unit of measurement a teaspoon on their labels, as well as the weight a teaspoon corresponds to. For the food supplements that no information on the dosage was found online or they did not indicate the correspondence weight of a teaspoon, the teaspoon unit measure of **5 ml** (assumed as 5 grams) was considered. However, some exceptions were also found; three supplements reported a dose of 1 ml, three supplements (iron) reported a dose of 15 ml and one herbal supplement reported a dose of 20 ml.

* 1. Vitamin only supplements

The group includes all supplements based only on vitamins. Each supplement can contain one vitamin (e.g. vitamin C), a combination of a few vitamins (e.g. vitamin A & D) or a combination of several vitamins (e.g. B-complex).

* + 1. Vitamin supplements containing one vitamin only

These supplements are reported as capsules or tablets and the specific types can be found in Table 4.

1. Vitamin only supplements in the form of capsules or tablets

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL#F04.A0EXY | Vitamin only supplements, INGRED=Vitamin B1 (thiamine) |
| A03SL#F04.A0EXX | Vitamin only supplements, INGRED=Vitamin B2 (riboflavin) |
| A03SL#F04.A0EXV | Vitamin only supplements, INGRED=Vitamin B3 (niacin, niacinamide) |
| A03SL#F04.A0EXT | Vitamin only supplements, INGRED=Vitamin B5 (pantothenic acid) |
| A03SL#F04.A0EXS | Vitamin only supplements, INGRED=Vitamin B6 (pyridoxine, pyridoxamine, pyridoxal) |
| A03SL#F04.A0EXR | Vitamin only supplements, INGRED=Vitamin B7 (biotin) |

For these supplements (n=26) there is a very similar average unit weight (including those which n≤3). The unit weight of the supplements varies between 0.40 and 0.66 grams. The average is **0.4 grams**.

* + 1. Vitamin B9 and/or Vitamin B12 supplements

These supplements (n=34) are reported as capsules or tablets and are usually targeted to pregnant women and have, on average, similar unit weights varying from 0.11 to 0.50 grams. The average weight is **0.3 grams**. The specific FoodEx2 categories are presented in Table 5.

1. Vitamin supplements containing vitamin B9 and/or Vitamin B12 in the form of capsules or tablets

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL#F04.A0EXQ | Vitamin only supplements, INGRED=Vitamin B9 (folic acid, folinic acid) |
| A03SL#F04.A0EXP | Vitamin only supplements, INGRED=Vitamin B12 (cyanocobalamin, hydroxocobalamin, methylcobalamin) |
| A03SL#F04.A0EXQ$F04.A0EXP | Vitamin only supplements, INGRED=Vitamin B9 (folic acid, folinic acid), INGRED=Vitamin B12 (cyanocobalamin, hydroxocobalamin, methylcobalamin) |

* + 1. Supplements containing carotenoids

These supplements are reported as capsule or soft-gel capsule and are mainly of Beta-Carotene, a pro-Vitamin A carotenoid (n=11). The FoodEx2 code assigned to these supplements is ‘A03SL#F04.A0EVN’ with description ‘Vitamin only supplements, INGRED=Carotenoids’. The “Vitamin only supplements” was defined as the more suitable group for this type of compound. The most frequent unit type varies between 0.32 and 0.75 grams and is, on average, **0.7 grams**.

* + 1. Vitamin A, Vitamin D or Vitamin E only supplements

The supplements of vitamin A and E are considered together (n=22). They are reported as capsules or tablets and their average unit weight is **0.6 grams** (range 0.39-1.00 grams).

Vitamin D only supplements present in the Comprehensive Database (n=73) appear to have a slightly lower unit weight compared to the rest of vitamin only supplements. They are also reported as capsule or tablet and their average unit weight is **0.3 grams** (range 0.20-0.80 grams).

The FoodEx2 categories and descriptions of these supplements are presented in Table 6.

1. Vitamin A, Vitamin D or Vitamin E only supplements in the form of capsules

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL#F04.A0EXZ | Vitamin only supplements, INGRED=Vitamin A (retinol, carotenoids) |
| A03SL#F04.A0EXL | Vitamin only supplements, INGRED=Vitamin E (tocopherols, tocotrienols) |
| A03SL#F04.A0EXM | Vitamin only supplements, INGRED=Vitamin D (cholecalciferol) |

* + 1. Combination of Vitamins A and D or Vitamins A and E supplements

These comprise the combination of few vitamins, particular of Vitamin A with Vitamin D or Vitamin E (n=6) reported as capsules. The unit weight for these supplements was uniform and equal to **0.6 grams**. The FoodEx2 categories and descriptions of these supplements are presented in Table 7.

1. Combination of Vitamins A and D or Vitamins A and E supplements in the form of capsules

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SL#F04.A0EXZ$F04.A0EXM | Vitamin only supplements, INGRED=Vitamin A (retinol, carotenoids), INGRED=Vitamin D (cholecalciferol) |
| A03SL#F04.A0EXZ$F04.A0EXL | Vitamin only supplements, INGRED=Vitamin A (retinol, carotenoids), INGRED=Vitamin E (tocopherols, tocotrienols) |

* + 1. Vitamin C only or Multivitamin with Vitamin C supplements

The group includes all supplements containing either vitamin C or in combination with other vitamins. The FoodEx2 code assigned to these supplements is ‘A03SL#F04.A0EXN’ with description ‘Vitamin only supplements, INGRED=Vitamin C (ascorbic acid)’. The majority of the supplements are only composed by vitamin C. It needs to be noted that supplements containing only vitamin C might weigh slightly less than the multivitamin supplements containing vitamin C.

The unit weight of each of these supplements is a little variable *per se*, but the content in vitamin C seems to increase it. For capsules and tablets (n=90), the weight varies between 0.30 and 1.2 grams, and is on average **0.8 grams**. For chewable tablets(n=27), the weight varies between 0.30 and 2.0 grams, and is on average **1.4 grams**.

* + 1. B-complex or Multivitamin supplements

EFSA’s Comprehensive Database includes 82 records of multi-vitamins supplements, B-complex supplements and supplements that aggregate many vitamins and are reported as capsules or tablets. The unit weight of capsule or tablet ranges from 0.14 to 1.0 grams, with an average weight of **0.5 grams**. When they are reported as chewable tablets(n=7, except those with vitamin C, described above) their unit weight varies slightly between 0.50 to 0.80 grams and is on average **0.6 grams**.

* 1. Mineral only supplements

The group includes all supplements based only on minerals (normally salts of different chemical elements). Each supplement can contain one mineral (e.g. calcium), a combination of a few minerals (e.g. zinc & copper) or several minerals. Among those specifying the exact type of mineral, presented in the following sections, there were some (n=3), which were reported as multi mineral unspecified in tablet form. Those were all reported with the same standard weight of **0.8 grams**.

* + 1. Fluorine supplements

All fluorine supplements (n=9) present in the Comprehensive database were reported as tablets with unit weight **0.2 grams**. The FoodEx2 code assigned to these supplements is ‘A03SM#F04.A0F3A’ with description ‘Mineral only supplements, INGRED=Fluorine’.

* + 1. Chromium or Copper only supplements

Food supplements containing chromium or copper only (n=10) are reported as capsules or tablets with average weight **0.6 grams**, ranging from 0.4 to 1.4 grams. The FoodEx2 categories and descriptions of these supplements are presented in Table 8.

1. Mineral supplements containing chromium, zinc or copper only in the form of capsules or tablets

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SM#F04.A0EXB | Mineral only supplements, INGRED=Copper |
| A03SM#F04. A16YP | Mineral only supplements, INGRED=Chromium |

* + 1. Iron, Selenium or Potassium only supplements

The majority of the food supplements containing iron, selenium or potassium only are reported as tablets. All the reported records (n=33) assume a unit weight equal to **0.7 grams** (with the exception of one supplement of potassium only). Additionally, two records for iron chewable tablets are also reported. These have the same unit weight (0.70 grams). The FoodEx2 categories and descriptions of these supplements are presented in Table 9.

1. Mineral supplements containing iron, selenium or potassium only in the form of tablets (simple or chewable)

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SM#F04.A0EXD | Mineral only supplements, INGRED=Iron |
| A03SM#F04.A0EXJ | Mineral only supplements, INGRED=Potassium |
| A03SM#F04.A0EVZ | Mineral only supplements, INGRED=Selenium |

* + 1. Zinc only and Combination of Zinc and Copper or Zinc and Selenium supplements

There are 22 tablet or capsule-type supplements which are either zinc only or a combination of zinc and copper or zinc and selenium reported in the Comprehensive database. The unit weight of these varies between 0.15 and 0.55 grams. The average weight is **0.4 grams**. The FoodEx2 categories and descriptions of these supplements are presented in Table 10.

1. Combination of Zinc and Copper or Zinc and Selenium supplements in the form of tablets

|  |  |  |
| --- | --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** | |
| A03SM#F04.A0EXE | Mineral only supplements, INGRED=Zinc |
| A03SM#F04.A0EXE$F04.A0EXB | Mineral only supplements, INGRED=Zinc, INGRED=Copper | |
| A03SM#F04.A0EXE$F04.A0EVZ | Mineral only supplements, INGRED=Zinc, INGRED=Selenium | |

* + 1. Calcium only, Magnesium only, Combination of Calcium and Magnesium and Combination of Calcium, Magnesium and Zinc supplements

The calcium only supplements (n=16) average unit weight of capsules and tablets is **1.7 grams** (range of 1.4 – 1.8 grams) while the magnesium only supplements (n=32) is **1.3 grams** (range of 0.5 - 1.5 grams). For the combination of calcium and magnesium supplements in the form of capsules or tablets (n=8) the average weight is **1.4 grams** (range of 1.2 - 1.5 grams) and for the combination of calcium, magnesium and zinc supplements is **1.2 grams** (range 0.8 - 1.2 grams).

The calcium only, magnesium only and combination of calcium and magnesium in the form of chewable tablets (n=13) are also reported in the Comprehensive database with an average unit weight of **1.7 grams** (range 1.3 – 2.0 grams).

The FoodEx2 categories and descriptions of the above described supplements are presented in Table 11.

1. Calcium only, magnesium only, combination of calcium and magnesium and combination of calcium, magnesium and zinc supplements

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SM#F04.A0EXH | Mineral only supplements, INGRED=Calcium |
| A03SM#F04.A0EXF | Mineral only supplements, INGRED=Magnesium |
| A03SM#F04.A0EXH$F04.A0EXF | Mineral only supplements, INGRED=Calcium, INGRED=Magnesium |
| A03SM#F04.A0EXH$F04.A0EXF$F04. A0EXE | Mineral only supplements, INGRED=Calcium, INGRED=Magnesium, INGRED=Zinc |

* 1. Combination of Vitamins and Minerals supplements

The group includes all supplements based on formulations including both minerals (normally salts of different chemical elements) and vitamins. Each supplement can contain a combination of few vitamins or minerals, or multi-vitamin/multi-mineral complexes. There are 410 records of at least 40 different types of supplements containing a combination of vitamins and minerals in the Comprehensive database.

All the different combinations of vitamins and minerals in the form of capsules, soft-gel capsules or tablets (330 records) have an average unit weight of **1.0 gram** (range 0.4 – 2.1 grams). Those in the form of chewable tablets (40 records) have an average weight of **1.3 grams** (range 0.9 – 2.5 grams).

However, there are specific types of combinations that vary from this average. This is the case for the food supplements containing a combination of vitamin C and zinc. Such supplements (10 records) are reported in the form of tablets and all present the same unit weight of **0.5 grams**. Another case is the supplements containing a combination of calcium and vitamin D in the form of capsule, chewable capsule or tablet. These (62 records) present an average weight of **1.6 grams** (range 0.9 – 2.1 grams).

Few food supplements in the form of powder (6 records) were also reported. Their unit weights vary from 1.60 to 2.76 grams and one supplement with 5.00 grams unit weight.

The FoodEx2 categories and descriptions of the above described supplements are presented in Table 12.

1. Combination of Vitamins and Minerals supplements

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SN | Combination of vitamin and mineral only supplements |
| A03SN#F04.A0EXN$F04.A0EXE | Combination of vitamin and mineral only supplements, INGREDIENT=Vitamin C (Ascorbic acid), INGREDIENT=Zinc |
| A03SN#F04.A0EXH$F04.A0EXM | Combination of vitamin and mineral only supplements, INGREDIENT=Calcium, INGREDIENT=Vitamin D (Cholecalciferol) |

* 1. Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids) supplements

The group includes any type of supplements/nutraceuticals containing special fatty acids (e.g. omega-3, essential fatty acids, medium-chain triglycerides). There are 256 records of these supplements in the EFSA’s Comprehensive Database. The majority of those correspond to capsules and soft-gel capsules. The majority of these formulations contain omega-3 fatty acids. The supplements of omega-3 and omega-6 fatty acids combination are also frequent. Additionally, some contain minor ingredients (usually lipo-soluble vitamins – A, D or E). There is no relevant difference in the average weight between the different unit types, which is **1.0 gram**. The unit weights vary between 0.30 and 2.10 grams. The FoodEx2 categories and descriptions of the above described supplements are presented in Table 13.

1. Food supplements containing formulations of special fatty acids

|  |  |
| --- | --- |
| **FoodEx2 code** | **FoodEx2 code description** |
| A03SX | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids) |
| A03SX#F04.A0EVV | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids), INGRED=Omega-3 fatty acids |
| A03SX#F04.A0EVV$F04.A0EVG | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids), INGRED=Omega-3 fatty acids, INGRED=Vitamins |
| A03SX#F04.A0EVV$F04.A0EVT | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids), INGRED=Omega-3 fatty acids, INGRED=Omega-6 fatty acids |
| A03SX#F04.A0EVV$F04.A0EVT$F04.A0EVG | Formulations containing special fatty acids (e.g. Omega-3, essential fatty acids), INGRED=Omega-3 fatty acids, INGRED=Omega-6 fatty acids, INGRED=Vitamins |

* 1. Herbal formulations and plant extracts supplements

The group includes any type of supplement based on herbal formulations and/or plant extracts (with exclusion of algae which are treated as separate group). There are 110 records of these supplements in the Comprehensive Database. The majority of those correspond to capsules and tablets, but there are also some chewable tablets. Some of these supplements contain minor ingredients (e.g., vitamin C); others are composed by a single or even a mix of different herbal extracts. The most frequent herbal extracts are from cranberry, Echinacea and garlic.

There is no significant difference in the weights of the different unit types reported, varying between 0.30 and 1.30 grams and having an average of **0.7 grams**.

* 1. Algae based formulations (e.g. Spirulina, chlorella) supplements

The group includes any type of Algae based supplements (e.g. containing Spirulina, Chlorella). The Comprehensive Database includes 18 records for this type of supplements. There is no significant difference between the weights of the different unit types reported, varying between 0.20 and 0.70 grams and having an average of **0.3 grams**.

* 1. Probiotic or prebiotic formulations supplements

The group includes formulations addressed to the probiotic gut flora that could be based on probiotic bacteria and/or on substances favouring the development of probiotic bacteria in the gut (prebiotic substances). There are 40 records for capsules, tablets and chewable tablets in the Comprehensive database. Their unit weights vary between 0.30 and 1.20 grams, having an average weight of **0.6 grams**. There are also two records of probiotics in powder form with unique unit weight of **2.0 grams**.

* 1. Coenzyme q10 formulations supplements

The group includes any type of Coenzyme Q10 supplements. The Comprehensive database includes 16 records of this type of supplement reported as capsules, soft gel capsules and tablets. The supplements can also contain vitamins or/and minerals as minor ingredients. Their unit weights vary between 0.20 and 0.80 grams, having an average of **0.6 grams**.

* 1. Fibre supplements

The group includes any type of fibre supplements. There are 10 records of fibre supplements reported in the Comprehensive Database, seven in the form of powder and three in the form of tablet. For the supplements in powder the unit measure is one teaspoon (**5 grams**) for the majority of them, while for two of them is a sachet of **14 grams**. For the supplements in tablet the unit weight is very similar and has as average **0.7 grams**.

* 1. Yeast based formulations supplements

The group includes any type of yeast (generally Saccharomyces cerevisiae) based supplements. There are 11 records of yeast based supplements reported in the Comprehensive in the form of tablets. Their weight varies slightly between 0.20 and 0.50 grams and is on average **0.4 grams**.

* 1. Bee-produced formulations supplements

The group includes any type of supplements originating from apiculture. There are five records of bee-produced supplements in the Comprehensive. Two of them are in the form of powder with unit measure one teaspoon equal to **5.0 grams**, two in the form of tablet with weight **0.8** **grams,** and one in the form of drops (described under section 2.1.1).

* 1. Protein and amino acids supplements

The group includes any type of Protein and amino acids supplements, including the branched Chain Amino Acids. There only few records of such supplements reported in the Comprehensive database; four in the form of capsule or tablet with an average weight is **0.8 grams** (range 0.75 – 1.0 gram) and two in the form of powder. These last, have as unit measurement one scoop equivalent to **28 grams**.

* 1. Mixed supplements/formulations

The group includes any type of supplements combining different principles without a strong dominance of one. Food supplements’ composition included under this category is very broad. There are 150 records of such supplements recorded in the Comprehensive database, either simple or complex combinations of the formulations cited in the previous sections, making up to more than 20 different types of supplements. Despite the high heterogeneity among their composition, their unit weights do not differ a lot. The weights of the supplements in the form of capsule, soft gel capsules, chewable capsules and tablets vary between 0.20 and 2.10 grams, having an average of **0.95 grams**.

* 1. Other common supplements

The group includes any type of common supplements not treated in any of the sections above. There are 83 records of such supplements reported in the Comprehensive database; 70 of them are containing glucosamine and 13 are containing lecithin or are unspecified. Supplements that contain glucosamine have an average weight of **1.3 grams** (range 0.80 to 1.90 grams). Supplements that contain lecithin or their content is not specified have an average weight of **0.8 grams** (range 0.75 – 1.0 grams).

1. Conclusion

The present document discusses and suggests the quantification of the different units of food supplements reported in the EFSA European Comprehensive database.

It should be acknowledged that some of the suggested unit weights are more uncertain than others. While, for some of the food supplements, reliable and consistent information was available from the data providers, in other cases limited information was identified. Furthermore, any indication related to a food supplement is associated with a high number of factors that increase variability. Different brands or even small differences between nutrient ingredients and their concentration (within the same brand) introduce a certain degree of heterogeneity for the overall assessment.

Therefore, it is important to acknowledge that the unit weights recommended in this report can represent a source of uncertainty when used, for example, in the assessment of dietary exposure to chemicals. It is therefore, recommended that these standard weights suggested here are used only in the absence of more specific information. However, these unit weights are intended to be an approximation and are the result of the critical review of relevant references with the current practices on market by manufacturers.

At the same time, the unit weights suggested in this document represent a step-forward into the harmonisation and standardisation of the methodologies used in EFSA. Harmonising the use of the unit weight of the food supplements, instead of a case-by-case approach, is a step to improve the quality and validity of EFSA’s scientific outputs.

References

EFSA, 2011. Evaluation of the FoodEx, the food classification system applied to the development of the EFSA Comprehensive European Food Consumption Database. EFSA Journal 2011; 9(3):1970. 27 pp. doi:10.2903/j.efsa.2011.1970. Available online: [www.efsa.europa.eu/efsajournal.htm](http://www.efsa.europa.eu/efsajournal.htm)

EFSA, 2015. The food classification and description system FoodEx 2 (revision 2). EFSA Supporting Publications. 2015;12(5):EN - 804. 90 pp

Abbreviations

|  |  |
| --- | --- |
| EFSA | European Food Safety Authority |
| EU | European Union |
| GNPD | Global New Products Database |
| MS | Member State |