



SINGLE PROCESS FEIM CALCULATORS

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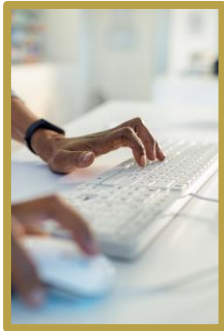
FEIM SINGLE PROCESS CALCULATORS



The Food Enzyme Intake Model (FEIM) is a tool for estimating chronic dietary exposure to food enzymes used in food processes.



FEIM comprises process-specific calculators which allow estimation of dietary exposure to food enzymes used in individual food manufacturing processes.



FEIM can be accessed via the EFSA Knowledge Junction. It is updated annually as further process-specific calculators are generated and adopted by the CEP panel.



Each release uses the most recent consumption data from the Comprehensive Database.



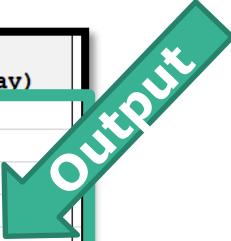
FEIM CALCULATOR

| Age class | Nr surveys mean | Minimum mean (mg TOS/kg bw per day) | Maximum mean (mg TOS/kg bw per day) | Nr surveys P95 | Minimum P95 (mg TOS/kg bw per day) | Maximum P95 (mg TOS/kg bw per day) |
|------------------------------|--------------------------|--|--|----------------|---------------------------------------|---------------------------------------|
| Infants | 12 | 0.000 | 0.008 | 11 | 0.000 | 0.030 |
| Toddlers | 15 | 0.000 | 0.009 | 14 | 0.000 | 0.038 |
| Other children | 19 | 0.000 | 0.010 | 19 | 0.000 | 0.033 |
| Adolescents | 21 | 0.000 | 0.005 | 20 | 0.000 | 0.016 |
| Adults | 22 | 0.000 | 0.006 | 22 | 0.000 | 0.021 |
| Elderly and very elderly | 23 | 0.000 | 0.008 | 22 | 0.000 | 0.018 |
| Use level of the food enzyme | 100 mg TOS/kg dry plants | | | | | |

Input & FE-TOS summary exposure

FE-TOS exposure per survey

%_contribution to exposure



How does it work?

- Enter the use level of a food enzyme, e.g., the maximum recommended for a specific food manufacturing process.
- All values should be entered as mg TOS (Total Organic Solids)/kg of raw materials
- Exposure results are reported as range (min, max) for the MEAN and P95 intake (mg TOS/kg body weight per day) per age class.



FEIM CALCULATOR

| Age class | Country | Survey | Number of subject | Mean exposure (mg TOS / kg bw per day) | P95 exposure (mg TOS / kg bw per day) |
|-----------|----------|-------------------------|-------------------|---|--|
| Infants | Bulgaria | NUTRICHILD | 659 | 0.004 | 0.015 |
| Infants | Cyprus | CY 2014-2017-LOT1 | 206 | 0.001 | 0.003 |
| Infants | Germany | VELS | 159 | 0.008 | 0.030 |
| Infants | Denmark | IAT 2006-07 | 826 | 0.000 | 0.001 |
| Infants | Estonia | DIET-2014-EST-C | 504 | 0.001 | 0.007 |
| Infants | Spain | ENALIA | 285 | 0.000 | 0.000 |
| Infants | Finland | DIPP 2001-2009 | 500 | 0.000 | 0.000 |
| Infants | France | INCA3 | 37 | 0.000 | - |
| Infants | Italy | IV SCAI CHILD 2017-2020 | 150 | 0.000 | 0.000 |
| Infants | Latvia | LATVIA_2014 | 143 | 0.004 | 0.025 |
| Infants | Portugal | IAN-AF 2015-2016 | 234 | 0.000 | 0.000 |
| Infants | Slovenia | SI.MENU-2018 | 294 | 0.005 | 0.023 |

Input & FE-TOS summary exposure | **FE-TOS exposure per survey** | %_contribution to exposure

- Exposure results are reported for each age class, country and survey as the MEAN and P95 intake (mg TOS/kg body weight per day).
- Number of subjects of each survey are also reported



FEIM CALCULATOR

| Age class | Country | Survey | FoodEx Level 2 | FoodEx Level 4 | % contribution to total exposure |
|-----------|---------|--------|-------------------------------|---------------------------------|----------------------------------|
| Adults | France | INCA3 | Confectionery (non-chocolate) | Chewing gum without added sugar | 0.0 |
| Adults | France | INCA3 | Tea (Infusion) | Tea (Infusion) | 8.7 |
| Adults | France | INCA3 | Tea (Infusion) | Black tea, infusion | 32.3 |
| Adults | France | INCA3 | Tea (Infusion) | Green tea, infusion | 28.2 |
| Adults | France | INCA3 | Tea (Infusion) | Fruit tea, infusion | 4.0 |
| Adults | France | INCA3 | Tea (Infusion) | Herbal tea, infusion | 26.8 |
| Adults | France | INCA3 | Tea (Infusion) | Instant tea powder, infusion | 0.0 |

Input & FE-TOS summary exposure
 FE-TOS exposure per survey
 %_contribution to exposure

- Contribution (in %) of each food to the exposure is reported for each age class, country and survey



DIETARY EXPOSURE ASSESSMENT

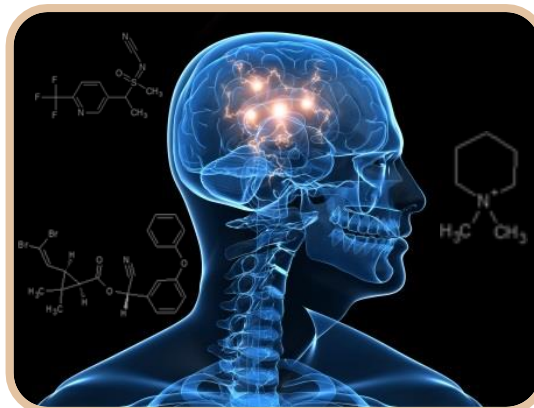
Occurrence



Food classification (FoodEx1 or FoodEx2)



Exposure







Consumption

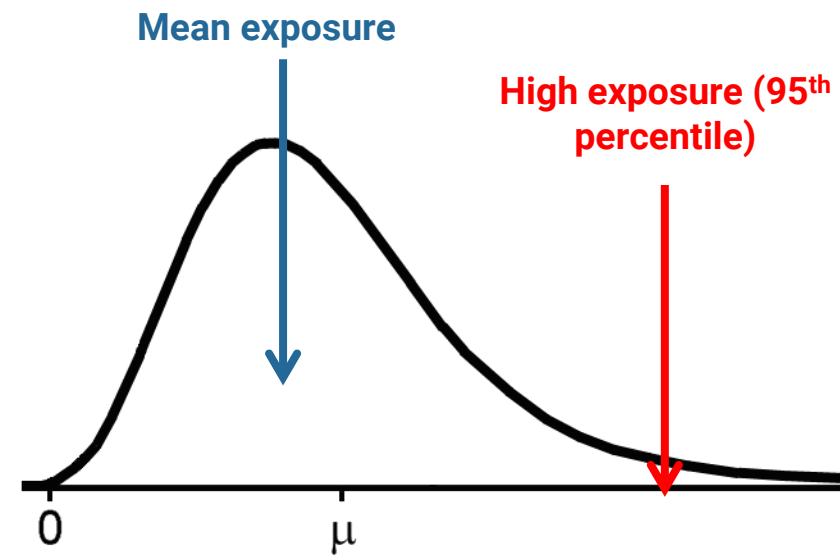
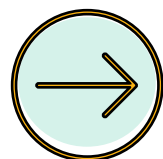


ENZYME EXPOSURE USING INDIVIDUAL DATA



Body weight:
18 kg

| | Average consumption (g/day) | Technical Factors (TF1*TF2*TF3) | Enzyme TOS (mg/kg) | Chronic exposure (mg/day) |
|---|-----------------------------|---------------------------------|--------------------|---------------------------|
|  | 150 | 1.25 * 1 * 1 | 100 | 18.75 |
|  | 25 | 2 * 1 * 1 | 100 | 5 |
|  | 200 | 1.43 * 0.02 * 0.2 | 100 | 0.11 |
|  | 20 | 1 * 0.006 * 0.3 | 100 | 0.004 |



Total chronic exposure in mg per day: 23.9

Total chronic exposure in mg/kg bw per day: 1.33





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- Food consumption data are essential for assessing people dietary exposure to potential risks in the food chain
 - The Comprehensive Food Consumption Database is a source of information on food consumption across the European Union
 - It 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

The EFSA Comprehensive European food consumption database contains:

- 24h recall/dietary record method
- collected at individual level
- most recent within each country
- representative at national level
- different age classes, from infants to elderly
- Special population groups (i.e., pregnant women, lactating women, vegetarians)

| Population group | Number of surveys | Number of countries |
|------------------|-------------------|---------------------|
| Infants | 12 | 12 |
| Toddlers | 18 | 18 |
| Other children | 23 | 22 |
| Adolescents | 24 | 26 |
| Adults | 28 | 27 |
| Elderly | 23 | 23 |
| Very elderly | 16 | 15 |
| Pregnant women | 9 | 9 |
| Lactating women | 2 | 2 |
| Vegetarians | 2 | 2 |

CURRENT VIEW OF THE DATABASE

WHAT'S ON THE MENU IN EUROPE



Towards more harmonised food consumption data at EU level to address methodological differences in the comprehensive food consumption database

GUIDANCE OF EFSA

Guidance on the EU Menu methodology¹

European Food Safety Authority^{2,3}

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The availability of detailed, harmonised and high-quality food consumption data for use in dietary exposure assessments is a long-term objective of EFSA. In 2009, the EFSA guidance on “General principles for the collection of national food consumption data in the view of a pan-European dietary survey” was published, and a pan-European food consumption survey, also known as the “EU Menu”, was launched. Based on the 2009 EFSA guidance, two EU Menu feasibility pilot studies and two methodological projects, EFSA has updated the former guidance document to cover the EU Menu methodology and therefore facilitate the collection of more harmonised food consumption data from all European Union Member States by the year 2020. This guidance has been developed by the EFSA Evidence Management Unit (DATA) and the EU Menu Working Group with Advisory Function, and has been endorsed by the EFSA Network on Food Consumption Data. It provides recommendations for the collection of more harmonised food consumption data among the EU Member States for use in dietary exposure assessments of food-borne hazards and nutrient intake estimations under the remit of EFSA’s scientific panels. Food consumption information should be collected for two non-consecutive days. The 24-hour food diary method, followed by a computer-assisted personal or telephone interview (CAPI/CATI), should be used to collect data from infants and children. For all other age groups, the 24-hour dietary recall CAPI/CATI method should be used. The reported foods should be described in accordance with the EFSA FoodEx2 food classification system. A short food propensity questionnaire should be used to collect information on the consumption of some less frequently eaten foods and the consumption frequencies of food supplements. Information on the weight, height and physical activity levels of participants should also be collected in the survey.

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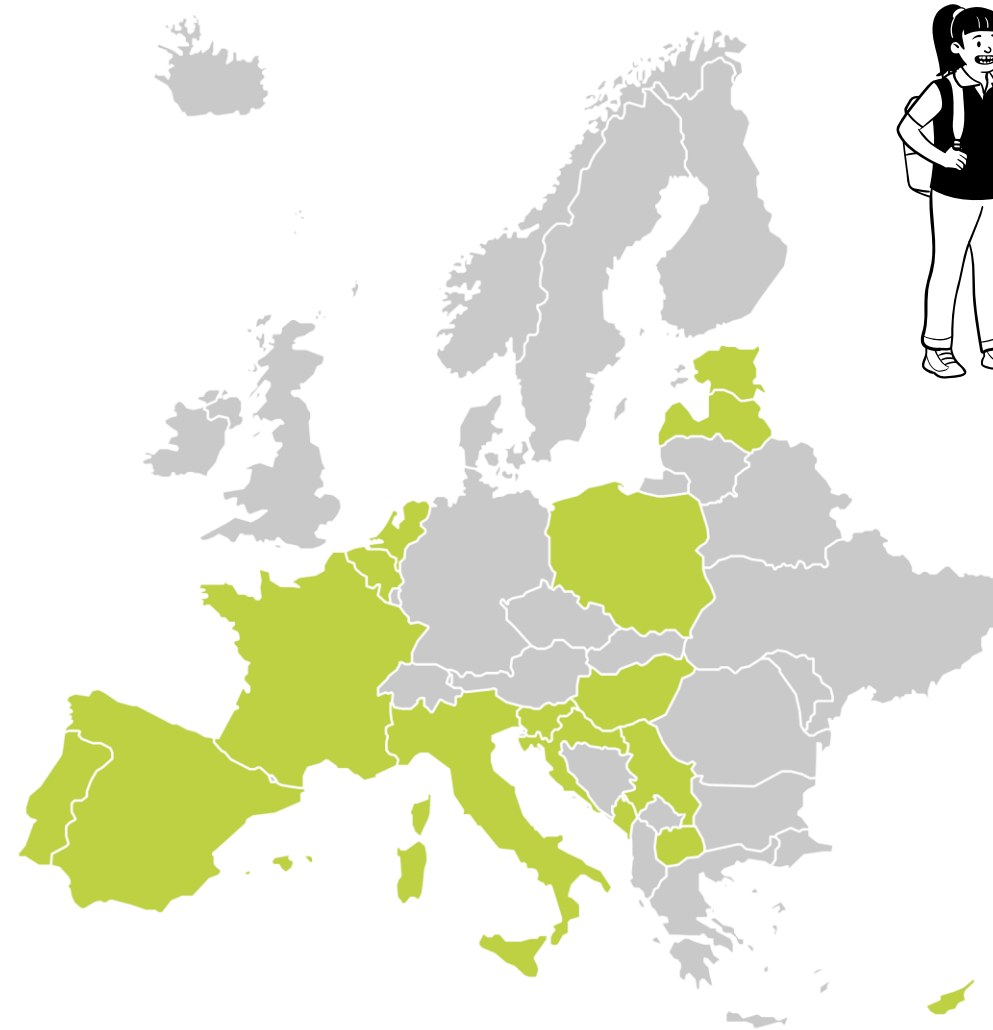
KEY WORDS

<https://www.efsa.europa.eu/en/efsajournal/pub/3944>



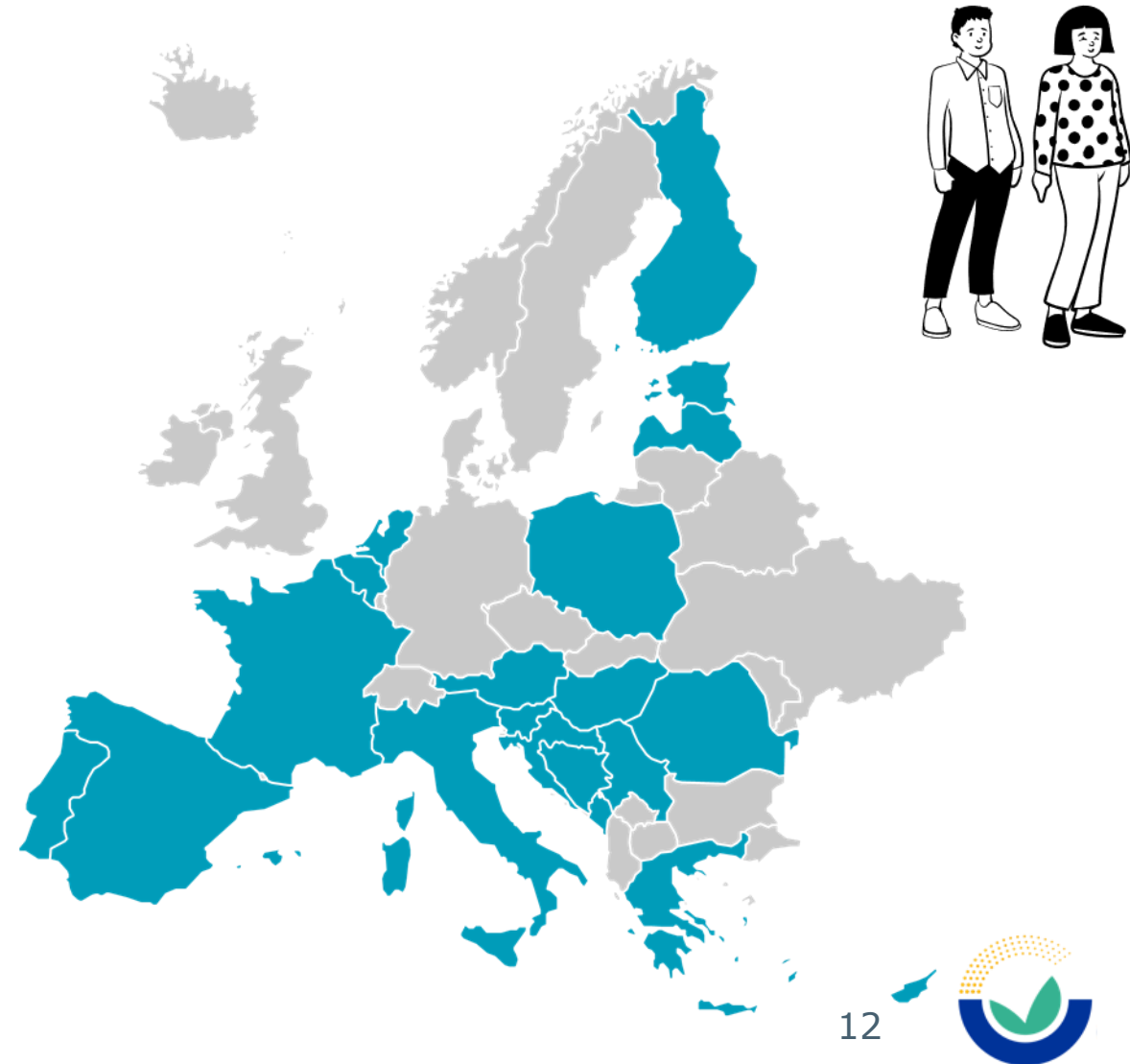
EU MENU SURVEYS - CHILDREN

| Project start | Children (16 surveys) |
|---------------|-------------------------------|
| 2011 | France |
| | Estonia |
| 2012 | Latvia |
| | Netherlands |
| | Portugal |
| | Spain |
| | |
| 2013 | Belgium |
| | Cyprus |
| 2014 | Hungary |
| | Italy |
| | Slovenia |
| 2015 | Poland (expected in 2023) |
| 2016 | Croatia |
| | Serbia |
| | North Macedonia |
| 2017 | Montenegro (expected in 2023) |



EU MENU SURVEYS - ADULTS

| Project start | Adults (20 surveys) |
|---------------|----------------------------|
| 2011 | France |
| 2012 | Latvia |
| | Netherlands |
| | Portugal |
| | Estonia |
| 2013 | Belgium |
| | Cyprus |
| | Greece |
| | Spain |
| 2014 | Hungary |
| | Italy |
| | Slovenia |
| | Austria |
| | Romania |
| 2015 | Finland |
| | Poland (expected in 2023) |
| 2016 | Serbia |
| | Montenegro |
| | Bosnia & Herzegovina |
| 2017 | Croatia (expected in 2023) |



FOOD CLASSIFICATION – FOODEX1

| No | Main food group | Number of subgroups at | | |
|--------------|--|------------------------|-------------|------------|
| | | Level 2 | Level 3 | Level4 |
| 1 | Grains and grain-based products | 7 | 59 | 247 |
| 2 | Vegetables and vegetable products (including fungi) | 16 | 133 | 0 |
| 3 | Starchy roots and tubers | 2 | 16 | 0 |
| 4 | Legumes, nuts and oilseeds | 5 | 52 | 0 |
| 5 | Fruit and fruit products | 9 | 120 | 53 |
| 6 | Meat and meat products (including edible offal) | 12 | 92 | 39 |
| 7 | Fish and other seafood (including amphibians, reptiles, snails and insects) | 6 | 65 | 0 |
| 8 | Milk and dairy products | 9 | 234 | 59 |
| 9 | Eggs and egg products | 2 | 12 | 0 |
| 10 | Sugar and confectionary | 7 | 59 | 12 |
| 11 | Animal and vegetable fats and oils | 6 | 41 | 0 |
| 12 | Fruit and vegetable juices | 8 | 67 | 0 |
| 13 | Non-alcoholic beverages (excepting milk based beverages) | 5 | 22 | 36 |
| 14 | Alcoholic beverages | 7 | 31 | 0 |
| 15 | Drinking water (water without any additives except carbon dioxide; includes water ice for consumption) | 4 | 2 | 0 |
| 16 | Herbs, spices and condiments | 10 | 124 | 0 |
| 17 | Food for infants and small children | 6 | 26 | 0 |
| 18 | Products for special nutritional use | 5 | 35 | 0 |
| 19 | Composite food (including frozen products) | 11 | 54 | 22 |
| 20 | Snacks, desserts, and other foods | 3 | 16 | 0 |
| Total | | 140 | 1260 | 468 |

- Hierarchical system based on 20 main food categories, further divided into subgroups up to a maximum of 4 levels;
- Each food group/subgroup/end-point included in FoodEx was assigned an independent code (matrix code), comprising about 1,700 different end-points;
- Built on different food description and classification systems and legislative requirements were also considered;
- The use of FoodEx for the harmonised classification of the food consumption data included in the Comprehensive database highlighted the importance of having a system including facets, as further descriptors, in order to allow more detailed food descriptions



THE FOODEx2 SYSTEM

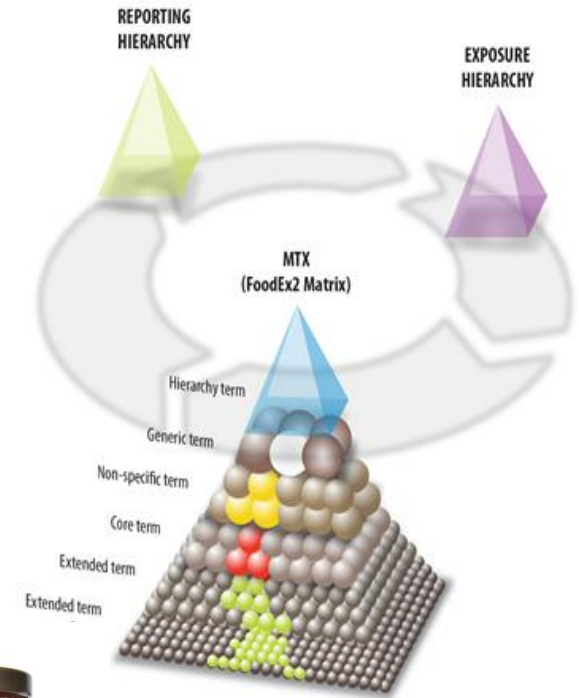
- Food/feed classification and description system developed and maintained by EFSA
- common language between consumption and occurrence data
- Includes 7 levels of food categories in a hierarchical structure (**base terms**)
- includes **facet descriptors**, which are used to add further detail, in relation to different properties and aspects of foods (e.g. packaging material, fortification)

Example:

Base term: Tomato-containing cooked sauces

Facets: Ingredients: basil, garlic; **Processing:** jarring, **Packaging material:** glass

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FoodEx2
efsa

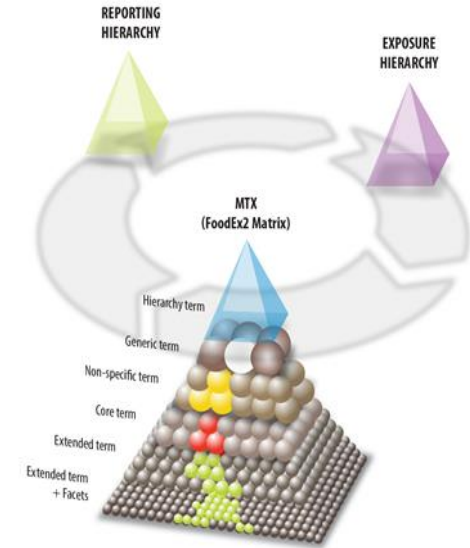


THE FOODEx2 SYSTEM

Base terms:

- > ▲ Grains and grain-based products [A000J]
- > ▲ Vegetables and vegetable products [A00FJ]
- > ▲ Starchy roots or tubers and products thereof, sugar plants [A00ZR]
- > ▲ Legumes, nuts, oilseeds and spices [A011X]
- > ▲ Fruit and fruit products [A01BS]
- > ▲ Meat and meat products [A01QR]
- > ▲ Fish, seafood, amphibians, reptiles and invertebrates [A026T]
- > ▲ Milk and dairy products [A02LR]
- > ▲ Eggs and egg products [A031E]
- > ▲ Sugar and similar, confectionery and water-based sweet desserts [A032F]
- > ▲ Animal and vegetable fats and oils and primary derivatives thereof [A036M]
- > ▲ Fruit and vegetable juices and nectars (including concentrates) [A039K]
- > ▲ Water and water-based beverages [A03DJ]
- > ▲ Alcoholic beverages [A03LZ]
- > ▲ Coffee, cocoa, tea and infusions [A03GG]
- > ▲ Food products for young population [A03PV]
- > ▲ Products for non-standard diets, food imitates and food supplements [A03RQ]
- > ▲ Composite dishes [A03VA]
- > ▲ Seasoning, sauces and condiments [A042N]
- > ▲ Major isolated ingredients, additives, flavours, baking and processing aids [A046L]
- > ▲ Other ingredients [A0F0S]

- ▼ ▲ Milk and dairy products [A02LR]
 - ▼ ▲ Milk, whey and cream [A04NN]
 - ▼ ○ Milk [A02LT]
 - ▼ ● Cattle milk [A04HG]
 - ▼ ● Cow milk [A02LV]
 - Cow milk, natural high fat [A02LX]
 - Cow milk, whole [A02LY]
 - Cow milk, semi skimmed (half fat) [A02LZ]
 - Cow milk, skimmed (low fat) [A02MA]
 - American buffalo milk [A0CXC]
 - Banteng milk [A0CXB]
 - European buffalo milk [A0CXA]
 - Gayal milk [A0CVZ]
 - Yak (domestic) milk [A0CVY]
 - Zebu milk [A0CVX]
 - Water buffalo milk [A02MD]
 - > ● Ovine milk [A02HH]
 - > ● Goat milk [A02MB]
 - > ● Equine milk [A04HK]
 - > ● Other milks [A04HN]
 - > ● Flavoured milks [A02MP]
 - > ○ Cream and cream products [A02MK]
 - > ○ Whey [A0EZB]
 - > ● Buttermilk [A02MV]
 - > ▲ Fermented milk or cream [A02MZ]
 - > ○ Milk and dairy powders and concentrates [A02PD]
- ▼ ○ Cheese [A02QE]
 - ▼ ● Fresh uncured cheese [A02QF]
 - Cottage cheese [A02QG]
 - Mascarpone [A02QH]
 - Mozzarella [A02QJ]
 - Quark [A02QK]
 - Cheese curd [A0CRN]
 - Ricotta [A02QL]
 - Skyr [A02QM]
 - Cream cheese [A02QZ]
 - Cheese, triple creme [A02QX]
 - Cheese, mizithra [A02QV]
 - Cheese, juustoleipa [A02QT]
 - Cheese, crescenza [A02QS]
 - Clotted cream [A02QR]
 - Cheese, chevre frais [A02QQ]
 - Cheese, burrata [A02QP]
 - Cheese, boilie [A02QN]
 - Cheese, urda [A02QY]
 - > ● Brined cheese (feta-type and similar) [A02RA]
 - > ● Ripened cheese [A02RG]
 - > ● Processed cheese and spreads [A031A]



THE FOODEx2 SYSTEM

28 facet groups:

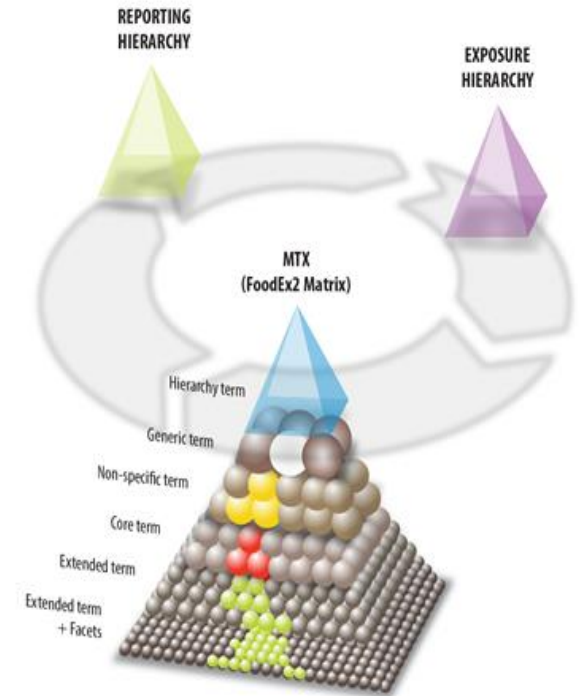
- F01 Source
- F02 Part-nature
- F03 Physical-state
- F04 Ingredient
- F06 Surrounding-medium
- F07 Fat-content
- F08 Sweetening-agent
- F09 Fortification-agent
- F10 Qualitative-info
- F11 Alcohol-content
- F12 Dough-mass
- F17 Extent-of-cooking
- F18 Packaging-format
- F19 Packaging-material
- F20 Part-consumed-analysed
- F21 Production-method
- F22 Preparation-production-plac
- F23 Target-consumer
- F24 *Intended-use*
- F25 *Risky-ingredient*
- F26 Generic-term
- F27 Source-commodities
- F28 Process
- F29 *Purpose-of-raising*
- F30 *Reproductive-level*
- F31 *Animal-age-class*
- F32 *Gender*
- F33 *Legislative-classes*

F28 Process

- Cooking and similar thermal preparation processes [A0BA1]
 - Blanching [A07GF]
 - Cooking in water [A07GG]
 - Poaching [A07GH]
 - Simmering [A07GJ]
 - Scalding [A07GK]
 - Boiling [A07GL]
 - Stewing [A07GM]
 - Bain-marie cooking (in water bath) [A07GN]
 - > Steaming [A07GP]
 - Frying [A07GR]
 - Pan frying / shallow frying [A07GS]
 - Stir frying [A07GT]
 - Deep frying [A07GV]
 - Baking [A07GX]
 - Roasting [A07GY]
 - > Grilling/griddling (high temperature cooking) [A0EJY]
 - Microwave-cooking [A07HB]
 - Infra-red micronisation [A0CRA]
 - Toasting / coffee roasting [A07HC]
 - > Reheating [A07HD]
 - Caramelization / browning [A07HJ]

F08 Sweetening-agent

- Sugars and similar [A0BY6]
 - Sugars (mono- and di-saccharides) [A032G]
 - > Sucrose (common sugar) [A032H]
 - > Mono- di-saccharides other than sucrose [A032S]
 - > Honey [A033J]
 - > Syrups (molasses and other syrups) [A033R]
 - Polyols [A032Z]
 - Maltitol [A033D]
 - Lactitol [A033E]
 - Erythritol [A033F]
 - Other polyols [A033H]
 - Isomalt [A033G]
 - Mannitol [A033B]
 - Xylitol [A033C]
 - Sorbitol [A033A]
- Artificial sweeteners (e.g., aspartam, saccharine) [A046M]
 - Saccharine [A046N]
 - Aspartame [A046P]
 - Acesulfame k [A046Q]
 - Sucralose [A046R]
 - Cyclamate [A046S]
 - Neo-hesperidine [A046T]
 - Thaumatine [A046V]
 - Neotame [A046X]
 - Steviol glucoside [A046Y]
 - Advantame [A046Z]



FoodEx2
efsa



Take home message



FoodEx1



FoodEx2



PLANS MOVING FORWARD

- Based on the PC, EFSA will revise the process specific FEIM-calculators accordingly to the inputs received.
- FEIM-calculators as excel tools will continue to be updated and new versions released in FoodEx1 until the web tool will become available.
- The web tool will be released using FoodEx2 only





SINGLE PROCESS FEIM CALCULATORS

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