



JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES

Fifty-Third Session

DISCUSSION PAPER ON MAPPING FOOD CATEGORIES OF THE GSFA TO THE FOODEx2 DATABASE

Background

1. The Joint FAO/WHO Expert Committee on Food Additives (JECFA), in its conclusions to its 89th meeting¹, requested additional information in order to complete the exposure assessment for sucrose esters of fatty acids (INS 473) and sucrose oligoesters, type I and type II (INS 473a). Specifically, JECFA noted that it did not use Chronic Individual Food Consumption database - Summary statistics (CIFOcOss)² and Global Individual Food consumption data Tool (GIFT)³ databases to assess dietary exposure, partly because calculations of exposure would have been laborious in view of the number of food categories. Therefore, JECFA requested that the foods be classified according to the FoodEx2 classification system, and that the data be presented in tabular format by mapping the foods recorded in both the FoodEx2 to the GSFA food categories. The JECFA finally noted that this exercise can improve mapping consistency for all future meetings.
2. While the FoodEx2 was initially developed as a European food classification and description system, FoodEx2 has been utilized by the Food and Agricultural Organisation (FAO) and the World Health Organisation (WHO) in an attempt to harmonize dietary food consumption databases within the FAO/WHO global repository for harmonized food consumption surveys^{4,5,6}. It is therefore an appropriate food classification system to map to, to code for non-European food lists, such as the foods within the GSFA.
3. As part of the discussions during the in-session working group on the JECFA Priority List⁷, Japan, as the proponent of the original request for the evaluation of INS 473 and 473a, had agreed to conduct a mapping exercise for these additives, but also understood that the mapping exercise would be more broadly applicable to all food additives. To ensure that a complete mapping between the GSFA and the FoodEx2 could be produced that would be suitable for future exposure assessments conducted by JECFA, the working group Chair suggested that the development of such a mapping should undergo greater scrutiny by the Committee.

¹ FAO/WHO. 2020. Joint FAO/WHO Expert Committee on Food Additives: Eighty-ninth meeting (Safety evaluation of certain food additives), Virtual meeting, 1-12 June 2020, Summary and Conclusions.

https://cdn.who.int/media/docs/default-source/food-safety/jecfa/summary-and-conclusions/jecfa89_1-12-june-2020_summary-and-conclusion.pdf?sfvrsn=742500c8_5&download=true, accessed January 2023.

² CIFOcOss accessed on WHO Food Safety Collaborative Platform (FOCOLLAB):

<https://apps.who.int/focolab/Download/DownloadConso>, accessed January 2023.

³ FAO/WHO Global Individual Food consumption data Tool (GIFT): methodological document:

<https://www.fao.org/3/cb8809en/cb8809en.pdf>

⁴ Karageorgou, D., et al., 2019. Harmonizing Dietary Datasets Around the World for Global Diet Monitoring: Methods from the Global Dietary Database and the Global Individual Food Consumption Data Tool (OR06-06-19). Current Developments. Nutrition 3.

⁵ Leclercq, C., et al., 2019. FAO/WHO GIFT (Global Individual Food consumption data Tool): a global repository for harmonised individual quantitative food consumption studies. Proc. Nutr. Soc. 78, 484–495.

⁶ Ioannidou, S., Cascio, C. and Gilsenan, M.B., 2021. European Food Safety Authority open access tools to estimate dietary exposure to food chemicals. Environment International, 149, p.106357.

⁷ FAO/WHO. 2021. Proposals for additions and changes to the Priority List of Substances proposed for evaluation by JECFA: Report of in session WG chair on the JECFA Priority List (CRD 6). https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?Ink=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-711-52%252FCRDs%252Ffa52_CRD06.pdf (accessed January 2023).

4. Based on the recommendations of the working group, the CCFA52 agreed⁸ to consider a discussion paper on mapping food categories (FCs) of the GSFA to the FoodEx2 database, and the paper would be co-authored by Canada, Australia and Japan and be presented at the CCFA meeting held prior to the end of 2023.

Approach for this discussion paper

5. There are two principal objectives of this discussion paper that Members and Observers are welcome to comment on, including any of the recommendations herein, which are expected to be considered by the Committee during CCFA53.

- i. The first objective is to develop recommendations on any aspect of the mapping development, responsible parties for using the mapping, format, location, accessibility (Recommendations 1 – 5).
- ii. Following the endorsement of recommendations 1-5, the Committee is asked to consider next steps in terms of creating and updating the complete mapping, and whether or not further work by the Committee is thought to be necessary (Recommendations 6 – 8).

Mapping development

Description of the food category systems

6. The following briefly describes the GSFA and FoodEx2⁹ food category systems. A visual representation of part of the FoodEx2 interface (Grain and grain-based products) is shown in the [Excel document](#) which can be accessed through the link below:

https://www.fao.org/fileadmin/user_upload/codexalimentarius/doc/CCFA/GSFA_FoodEx2_Mapping-Grains.xlsx

7. The GSFA is a food classification system arranged in a hierarchy that is comprised of 16 “parent” food categories, further divided into subcategories, to a maximum of three further subdivisions (up to a total of four levels). For each food category, a description is provided which explains the scope of the category, but which does not describe in detail each type of commodity in the category.¹⁰

8. The FoodEx2 database also known as the MTX (FoodEx2 Matrix, current version 13.2) is EFSA’s food classification and description system, including a hierarchical arrangement of distinct food items, which are organized into food groups sharing similar characteristics and a collection of descriptive facets for further differentiating individual food items based on specific properties such as treatments or food packaging. There are also multiple hierarchies used to represent different food lists (and other non-food items such as animal feed) for different regulatory purposes (e.g., pesticides, veterinary drugs). The current version has nine hierarchies: one master (MTX or Matrix), for the administrative management of food terminologies; one general-purpose (Reporting hierarchy); and seven domain-specific.

Hierarchies of the FoodEx2

9. A basic understanding of the nine hierarchies is important in deciding the first critical factor as to which to use to for mapping the purpose of eventually estimating food additive exposure.

- The **Matrix** (MTX) is the master hierarchy and is the collection of the full terminology included in the FoodEx2. The MTX contains food and non-food items in it, and is a technical list maintained by the system administrators. EFSA has indicated that this hierarchy should never be used for exposure coding purposes.
- The **Reporting** hierarchy is a general-purpose hierarchy and is described as a data-input-oriented (i.e., for submitting concentration or residue data on individual foods) with a structured organization of facets that facilitates the choice of appropriate code. It comprises food groups as well as certain non-food groups such as feed, food stimulants, food contact materials, etc. This hierarchy is sufficiently robust as to be suitable to report chemical substances in food for most needs, and would be a viable hierarchy to use to map to the GSFA.

⁸ FAO/WHO. 2021. Report of the 52nd Session of the Codex Committee on Food Additives (REP21/FA), paragraph 227. https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-711-52%252FFinal%2Breport%252FREP21_FAe_revised%2Bon%2B14%2BOctober.pdf (accessed January 2023).

⁹ For detailed information on the FoodEx2 system: EFSA, 2015. The food classification and description system FoodEx2 (revision 2). EFSA supporting publication 2015:EN-804. 90 pp. doi :10.2903/sp.efsa.2015.EN-804

¹⁰ See PART II: Food Category Descriptors of Annex B of CXS 192-1995: https://www.fao.org/gsaonline/docs/CXS_192e.pdf

- The **Exposure** hierarchy is domain-specific and designed to facilitate grouping of food items for exposure calculations, and EFSA reports it as the preferred hierarchy for food consumption data. The reportable terms in this hierarchy are the same as in the Reporting hierarchy—thus allowing a direct use of codes generated by either—but the Exposure hierarchy is limited to foods. There are currently over 4400 reported food terms, organized in up to seven levels of specificity, with twenty-one groups at the top level.
- The six remaining domain-specific hierarchies—Zoonoses (microbiological criteria), Feed, Veterinary drug residues, Botanicals, FeedAddExpo, PRIMo (Pesticide Residue Intake Model)—need not be described, as they are not pertinent to overall human food consumption calculations.

10. One major advantage in considering using the Exposure hierarchy to the GSFA stems from a previous exercise conducted by EFSA on the mapping of the Exposure hierarchy to food categories of Annex II (Part D) of Regulation (EC) No 1333/2008¹¹, the primary food additive regulation of the European Parliament and of the Council. The food categories in the Regulation (see the [Excel document](#)), though not identical to the GSFA, are very similar at the top levels. This reference could serve as a powerful tool to corroborate the proposed associations between the GSFA and FoodEx2.

Recommendation 1:

The mapping of the FoodEx2 to the GSFA should use the Exposure hierarchy, given its focus on organizing foods specifically for exposure calculations, that food consumption data bases are already mapped to this hierarchy and that a reference is available that may serve as a verification tool.

Food category level matching

11. As described above, the FoodEx2 database maps commodities with very specific characteristics (facets) and grouped down to seven levels of specificity.

- At the top level are **Hierarchy terms** (graphically indicated by blue pyramids in the online version of the FoodEx2) representing highly aggregated groups to navigate through the system, and should not be used for data collection.
- **Generic terms** (graphically indicated by white circles) relate only to a food nature (e.g., source, or characterizing ingredient), and should be limited in use for coding when more information is not available.
- **Non-specific terms** (graphically indicated by yellow spheres) are intermediate aggregated groups (e.g., “citrus fruit”), also used to navigate the food list. Though they do provide more specificity than generic terms, their use in coding should be limited to cases where more specific terms cannot be found.
- **Core terms** (graphically indicated by red spheres) provide yet a greater degree of specificity (e.g., “lemons and similar”), and are the minimum recommended level of specificity for coding. There are approximately 1300 core terms in the FoodEx2.
- **Extended terms** (graphically indicated by green spheres) provide the most specific information to the level of the general commodity (e.g., “lemon” or “citron”). There are approximately 2600 extended terms in the FoodEx2.

12. It should be noted that, while the Hierarchy, Generic or Non-specific terms of the FoodEx2 generally provide a comparable degree of specificity as the food categories of the GSFA, there is not a direct correlation in the organization of foods. For instance, some foods in the GSFA would only be able to be described in the FoodEx2 through the use of facets (e.g., FC 10.3 Preserved eggs, including alkaline, salted, and canned eggs). Furthermore, the use of Non-specific terms is noted as not being specific enough for coding purposes when estimating exposure. This is important to remember in considering Recommendation 2, below.

¹¹ Marina Nikolic, Sofia Ioannidou, Alexandra Tard, & Davide Arcella. (2021). Mapping of FoodEx2 Exposure Hierarchy with the food categories of Annex II (part D) of Regulation (EC) No 1333/2008 on food additives (Version 1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.4461577>.

13. Another consideration relates to the identification of relevant commodities under the GSFA that form part of the requests for evaluation put forward to JECFA. A petitioner may indicate that an additive is intended to be used only in specific commodities within a food category; or similarly, there may be pre-existing Notes in some food categories that describe when the additive is only used in limited commodities. These may require customized mapping to extended terms, where the core terms may be too broad.

Recommendation 2:

It is recommended that the GSFA be mapped to the level of the Core terms in the FoodEx2, where such terms are available; and where not available, to be mapped to the nearest higher-level term (usually a Non-specific term). This degree of coding provides the minimum level recommended for the JECFA exposure assessors, but also provides some specificity that may be able to accommodate cases where limited foods within a food category of the GSFA are intended to be coded. Limiting the mapping to the Core terms instead of the Extended terms also has the advantage that fewer terms from the FoodEx2 need to be mapped to the GSFA. To illustrate what this level of mapping would yield, the [Excel document](#) includes examples of the Grains and grain-based products food category of the FoodEx2.

Although there may be some cases where the use of the FoodEx2 core term may not be appropriate to account for specific food additive use-cases described in the GSFA, it is suggested that mapping to the most specific extended terms is too comprehensive for this exercise. Instead, the exposure evaluator may need to make case-by-case refinements based on the descriptions provided by the petitioner of the request to JECFA.

Who should be responsible for conducting the routine FoodEx2 food list coding for requests made to JECFA?

14. In submitting a request to the circular letter *Request for information and comments on the priority list of substances proposed for evaluation by JECFA*¹², petitioners are asked to specify in which food categories within the GSFA the food additive is to be used. While this assists the CCFA in establishing provisions in the GSFA, it may not provide information for JECFA by which to assess exposure.

15. Petitioners should also submit information on levels of use for foods in which the additives are used. For a general assessment under the GSFA system, levels of use may initially reflect maximum levels as set out in each of the food categories, or as anticipated for future use. Different levels for different foods within the categories may be specified, including foods within a category that are not permitted to contain the additive. It is reasonable that the petitioner of the request to JECFA should have the responsibility of providing JECFA with complete information on food additive use when making the request to JECFA.

16. It is, however, less clear whether the petitioner should be responsible for refining the FoodEx2 food lists to address specific additive use-cases in the GSFA. As this level of detail is not likely to be incorporated into the current mapping exercise, such refinements conducted by different petitioners may be prone to inconsistencies in coding. Petitioners may provide suggestions in terms of coding, but this would be at the discretion of the JECFA evaluators, who would develop their own assumptions, regardless.

17. That said, the JECFA's capacities, in light of the large number of requests to the organization, should also be considered. If, in JECFA's opinion, its evaluators are not positioned to develop refined food code lists based on the extensive information provided that clarifies exceptions to applicable foods within a category of the GSFA, then it may be unavoidable that the responsibility falls to the petitioners to provide the FoodEx2 food code list.

18. This question will influence some issues, below. Notably, recommendations 4 and 5 assume that the JECFA evaluators will use the mapping to create the FoodEx2 food code lists. Alternatives to recommendations 4 and 5 may be needed if Recommendation 3 is not endorsed.

¹² Sample letter, CL 2021/81-FA, for reference (https://www.fao.org/fao-who-codexalimentarius/sh-proxy/fr/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FCircular%252520Letters%252FCL%2525202021-81%252Fcl21_81e.pdf)

Recommendation 3:

Subject to JECFA's opinion, it is proposed that JECFA use the GSFA-FoodEx2 mapping and extensive clarifying information on relevant foods within the GSFA in order to develop FoodEx2 food code lists for their exposure assessments. JECFA evaluators are likely to have greater expertise and develop more consistent outputs.

Under this recommendation, the petitioner of a request to JECFA should provide as much clear information as is available regarding the uses of additives in foods within applicable food categories of the GSFA, and maximum levels of use of the additive in question.

Format, location and accessibility of the mapping

19. Pursuant to the outcome of Recommendation 3, different options need to be considered with regard to the location, accessibility, and usability of the GSFA-FoodEx2 mapping. These options are not exhaustive nor mutually exclusive, and the views of the Committee are welcome.

Option 1 – Do not publicly host the GSFA-FoodEx2 mapping

20. This option assumes that JECFA will prepare the FoodEx2 food code lists based on the GSFA-FoodEx2 mapping and the additional information provided by the petitioners as a routine part of their exposure assessments. In this case, there is no need for the petitioners to reference the mapping and it can be maintained as an internal reference within JECFA.

21. The initial mapping could be prepared and presented as a tabular document (e.g., a Microsoft Excel file), which JECFA could use or modify as its evaluator see fit.

Option 2 – Develop an interactive tabular document on a third-party hosted website

22. This option is primarily proposed in the event that the Committee and JECFA agree that it is the petitioner's responsibility to provide JECFA with a FoodEx2 code list. The advantage of an interactive document or database would include greater functionality, including the ability to parse inputs (e.g., food categories of the GSFA) and provide automatic outputs (e.g., food categories in the FoodEx2 database) in a clear and consistent fashion.

23. This option could also be viable in conjunction with Option 1, as JECFA may wish to use and/or have access to a tool in the public domain even if JECFA evaluators conduct the FoodEx2 coding themselves.

24. Regardless, having an open-access, shareable document could also facilitate coordination between JECFA evaluators and petitioners, which may prove useful in setting up food code lists.

25. Finally, it should be noted that there is precedent in housing an information database on a third-party hosted site, such as the *Inventory of Substances Used as Processing Aids*.

26. A distinct disadvantage of this option may be in determining which site to host, and who would be responsible for maintaining it.

Option 3 – Present a Miscellaneous Information document¹³ hosted on the Codex alimentarius website

27. The intent of this option relates to providing a comprehensive tabular mapping (for instance, in a Microsoft Excel document) as reference tool, and without necessarily any report-generating functionality, as suggested under Option 2. That is not to say, however, that if an interactive tool could be developed and hosted on the Codex alimentarius website, it should not be considered.

28. This information document could potentially complement Option 1. For example, while JECFA evaluators may be responsible for developing the food code list, the petitioner can cross-reference the information document and provide input to JECFA as needed.

29. A considerable advantage of this option is that it would be managed by the Codex Secretariat and FAO information technologists, albeit with input from CCFA. This presents an opportunity to maintain long-standing oversight and management, in response to updates, such as a revision of the GSFA food categories. Furthermore, as a highly trusted host, the document would likely remain open to access by a wide audience, allowing for its use in preparing consistent food additive exposure assessments, as well as being open to ongoing public scrutiny on the appropriateness of the mapping.

¹³ <https://www.fao.org/fao-who-codexalimentarius/codex-texts/miscellaneous/de/>

30. There are a number of additional advantages to hosting a publicly facing document on a trusted site, including that: individual countries could use the information for their own domestic food or food additive exposure assessments; it provides a food coding tool for use by other parties outside of CCFA who may wish to engage JECFA, but may not otherwise have comparable food data sets to draw upon; and, having a common reference could bring about more consistent international assessments, where previously each jurisdiction may use their own approaches and food category mapping systems.

31. This option may only be viable if the Codex Secretariat and/or FAO information technologists are able to host tabular documents. Currently, most publicly available documents are currently in pdf format, and there would be significant hindrance to the value of the mapping if restricted to a read-only pdf format. Not only would the legibility of the mapping be difficult, its usability would be extremely laborious as food codes would be manually prepared.

Recommendation 4:

It is recommended that the initial iteration of the mapping be a simple **tabular document** that shows the food associations.

The creation of quality-of-life refinements such as automated report generation is not critical to the current task and can be left to future developments, perhaps by the users of the mapping.

Recommendation 5:

Pursuant to Recommendation 3, that the Committee agrees that the initial mapping could remain as an internal reference document for use by JECFA. Further elaboration of the functionality or public hosting of the mapping could be left to the discretion of JECFA.

Alternatively, if the Committee decides that the food coding should be conducted by petitioners who submit requests to JECFA, then the mapping should be a publicly available document. In this case, the Committee should also agree on which group or organization should develop options to host the mapping and any accompanying documentation (e.g., assumptions made; decisions taken).

Creating the initial mapping

32. Once the Committee endorses the recommendations above, the Committee should seek Member nominations to create the initial mapping. The mapping should be available by December of 2023, so as to be responsive to JECFA's requests.

Recommendation 6:

The Committee should endorse a Member or Members to prepare the initial mapping, to be available by the end of 2023.

Recommendation 7:

In order to meet the timeline proposed in Recommendation 6, it is recommended that the initial mapping not be further scrutinized by the Committee during CCFA54. Such scrutiny should not be needed as the mapping should be relatively straightforward, and documentation (notes) will be available that accompany the development of the mapping and all assumptions made. Furthermore, should an interested party identify weaknesses in the mapping, the mapping can be updated as needed.

Process for updating the mapping

33. After the development of the initial mapping, updates may be required in light of:

- Periodic maintenance of the food codes prepared by EFSA¹⁴; or,
- Changes to the organization of the food categories of the GSFA .

34. Other triggers for updates could include quality-of-life updates (e.g., by JECFA evaluators) or suggested amendments by JECFA or Members to the assumptions used to develop the mapping, based on international datasets.

¹⁴ Refer to maintenance reports: EFSA. Food classification standardisation – The FoodEx2 system. <https://www.efsa.europa.eu/en/data/data-standardisation> (accessed January 2023).

Responsible parties

35. Appropriate options on the maintenance of the mapping may be derived from the recommendations on the “Format, location and accessibility of the mapping”; especially Recommendation 4. Combinations of options may be appropriate, and feedback from the Committee on alternative options is welcome. Options 1 and 2, below, are oriented around JECFA conducting the food list coding, and thus being primarily responsible for using the GSFA-FoodEx2 mapping.

Option 1 – JECFA to internally update the mapping in response to EFSA maintenance

36. Subject to input by JECFA: if JECFA already has mechanisms in place to update food consumption databases in response to changes in other areas (e.g., changes to European legislation; harmonization of the FoodEx2 to the GIFT database), then JECFA may already have the capacity to apply similar updates in line with EFSA maintenance to the GSFA-FoodEx2 mapping.

Option 2 – JECFA to request of CCFA to update the mapping in response to any updates to the GSFA food category system

37. As the administrators of the GSFA, CCFA would be responsible for determining what foods fall under each food category of the GSFA, and thus is best suited to update the mapping, accordingly.

38. As the GSFA food categories are not routinely re-organized, this option would only require consequential action by the Committee and would not need to be integrated as part of routine work of the Committee. Further, if Recommendation 7 is endorsed, the updates would not need to be reviewed by the Committee and would not create additional work at any meeting.

Option 3 – CCFA to conduct all updates to the GSFA-FoodEx2 mapping

39. Subject to input by JECFA, and the discussion around Recommendations 4 and 5, the Committee may be required to conduct all updates.

40. A considerable disadvantage of this option is that due to the routine nature of the updates to the FoodEx2 by EFSA, this task may become routine work of the Committee. In this case, it should be considered whether this would constitute new, regular work of the Committee, which may add on to the Committee’s already extensive workload. This option may be appropriate with additional work-management schemes in place.

Option 4 – A Member(s) of CCFA to independently conduct all updates to the GSFA-FoodEx2 mapping

41. This option is similar to Option 3, except that it would be conducted independently by a Member, Members, and/or Member Organization, preferably those with extensive familiarity with the FoodEx2 system. It may be advantageous to have a working group whose participants have diverse expertise in terms of food data sets and regional consumer diets. An advantage of this option over Option 3 is that it would not add to the routine work of the Committee, while still providing considerable integration into the activities of the Committee.

Recommendation 8:

The Committee should determine who should be responsible for updating the GSFA-FoodEx2 mapping when either system is updated. If CCFA will be primarily responsible for all updates, additional discussion on the procedures and level of work may be needed in a subsequent discussion.