CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 8a	NFSDU/43 CRD 16

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON NUTRITION AND FOODS FOR SPECIAL DIETARY USES

Forty-third Session, Düsseldorf, Germany
7 – 10 March with report adoption by virtual mode on 15 March 2023

Review of the Standard for Follow-up Formula (CXS 156-1987)

Methods of analysis - "Drink/product for young children with added nutrients or drink/product for young children" (section B) – sweetness methodology to be considered by CCMAS to assess compliance with footnote 5

(Comments by the European Union, Switzerland, AOAC INTERNATIONAL, IDF and ISO)

EUROPEAN UNION AND SWITZERLAND

The EUMS and CH note that the question raised by CCNFSDU to CCMAS in 2019 with regard to footnote 5 has not been sufficiently clear. The reply of CCMAS that there were no known validated methods to measure sweetness of carbohydrate sources and therefore no way to determine compliance for such a provision seems to be limited to the measurement of absolute sweetness. However, the Observer from International Organization for Standardization (ISO) noted in CCNFSDU42 (Para 91 REP22/NFSDU) that there were some ISO methods to do a comparison. The Observer further clarified that it was possible to compare the sweetness of lactose with the sweetness of another carbohydrate source, but only if this carbohydrate source is alone, diluted in water. The paired-comparison sensory test, ISO 5495, could be applied and would allow manufacturers to exclude carbohydrate sources (ingredients) that are sweeter than lactose.

The EUMS and CH propose that CCNFSDU re-submits to CCMAS the request to endorse ISO 5495 Sensory analysis – Methodology – Paired comparison test to measure sweetness of carbohydrate sources relative to lactose for drink/product for young children with added nutrients or drink/product for young children. The EUMS and CH are aware that ISO 5495 has not been specifically validated for the assessment of relative sweetness of a carbohydrate ingredient against lactose as a reference; however, this kind of sensory testing is widely applied in the food industry and has found general acceptance as a sensory test to choose the sample that is perceived higher in the specified sensory attribute.

The EUMS and CH propose to use

> DIN EN ISO 5495:2016 – Sensory analysis – Methodology – Paired-comparison for the comparative assessment

In order to progress, the EUMS and CH furthermore propose a preparation protocol to prepare the carbohydrate sources for the comparative assessment, as follows:

1. An aqueous solution of the carbohydrate source is prepared at a concentration of 8.75 g/100 ml water[1].

2. The relative sweetness of this solution is compared with the sweetness of a solution of 8.75 g lactose /100 ml water[1] by sensory testing. When the carbohydrate solution is sweeter than the lactose solution, the carbohydrate source does not comply with the provision. Rationale: The concentration of the lactose reference solution (8.75 g/100 ml) is the maximum permissible content of available carbohydrates in drink/product for young children with added nutrients or drink/product for young children.

The EUMS and CH propose that CCNFSDU invites CCMAS to consider the inclusion of this preparation protocol as a footnote to the entry in CXS-234

If CCNFSDU agrees, the following text is proposed for inclusion in the report of CCNFSDU requesting CCMAS to include a method in CXS 234-1999: CCNFSDU requests CCMAS to endorse ISO 5495 Sensory analysis – Methodology – Paired-comparison as a Type IV method for Follow-up formula, Part B: drink/product for young children with added nutrients or drink/product for young children, Carbohydrates (based on non-milk protein) to assess the sweetness of carbohydrate sources used as an ingredient against lactose as a reference 27/02/2023 material. The relative sweetness of the carbohydrate ingredient shall be measured by comparing a sample solution prepared with 8.75 g carbohydrate in 100 ml[1] with a reference solution of 8.75 g lactose in

---

[1] neutral, tasteless, still, odorless and preferably with low mineral content

100 ml[1] at 20 to 22 °C. When the carbohydrate ingredient solution is rated sweeter than the lactose solution by a trained sensory panel, the carbohydrate source does not comply with the provision.

Inclusion of the methodology to CODEX texts:

Recommended Methods of Analysis and Sampling (CXS 234-1999):

Insert a line under the heading of "Foods for special dietary uses", for example on page 20 of CXS 234-1999 under the heading "Foods for special dietary uses":

Commodity	Provision	Method	Principle	Type
Foods for special dietary uses				
Follow-up formula, B: drink for young children	Carbohydrates (based on non-milk protein)	ISO 5495 The relative sweetness of a carbohydrate ingredient shall be measured by comparing a sample solution prepared with 8.75 g carbohydrate in 100 ml water[1] with a reference solution of 8.75 g lactose in 100 ml water[1] at 20 to 22°C. When the carbohydrate ingredient solution is rated sweeter than the lactose solution by a trained sensory panel[2], the carbohydrate source does not comply with the provision.	Sensory test	IV

AOC INTERNATIONAL, IDF, ISO

Methods of analysis to measure sweetness

CCNFSDU42 agreed to retain the provision in the proposed draft revised Standard for Follow-up Formula for Older Infants and Drink/Product for Young Children with Added Nutrients or Drink for Young Children, in particular Section B: Footnote 5 (Available Carbohydrates): "for products based on non-milk protein, carbohydrate sources that have no contribution to sweet taste should be preferred and in no case be sweeter than lactose", and to consider appropriate methods for assessing conformity to the provision and possible endorsement by CCMAS at its next session.

CCNFSDU41 agreed to ask CCMAS41 whether there are internationally validated methods to measure sweetness of carbohydrate sources for FUF. CCMAS41 agreed to inform CCNFSDU that there are no known validated methods to measure sweetness of carbohydrate sources for these products and therefore no way to determine compliance for such a provision. This discussion addressed both analytical and sensory methods. An Ad Hoc Expert Panel on Sweetness convened by AOAC INTERNATIONAL has published their findings[3].

Indeed, there is an abundance of analytical methods for quantitating carbohydrates in foods, although no Official Methods of analysis for the determination of carbohydrates in FUF could be identified.

CCNFSDU42 raised the availability of validated sensory methods for comparing sweetness of two ingredients. Although the question to CCMAS was not raised like that, it was discussed that CCMAS could be asked again on a validated method to assess relative sweetness of carbohydrate sources as compared to lactose in order to enforce the provision. ISO 5495 was mentioned as an example which could be applied and would allow manufacturers to exclude carbohydrate sources (ingredients) that are sweeter than lactose.

ISO 5495 is a paired comparison test; participants of a sensory panel must select which sample is the most intense for a given attribute such as sweetness. It is important to know that magnitude of the difference cannot be estimated. A carbohydrate source could be perceived sweeter than lactose based on paired comparison evaluation, but such difference may not be perceptible anymore in a complex matrix. Manufacturing processes (e.g. thermal processing) and other ingredients in the finished product can modulate the sweetness of carbohydrates. Examples include sourness of organic acid, bitterness of peptides, flavouring odour, and recipe texture through physicochemical, physiological and/or perceptual interactions.

---

[2] For selecting, training and qualifying sensory assessors ISO 8586 – Sensory analysis – General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors; and ISO 3972 + Cor. 1 – Sensory analysis – Methodology – Method of investigating sensitivity of taste shall be used.

[3] The Challenge of Measuring Sweet Taste in Food Ingredients and Products for Regulatory Compliance: A Scientific Opinion, Starkey et al.: Journal of AOAC INTERNATIONAL Vol. 105, No. 2, 2022

The CODEX Procedural Manual includes the requirement for Codex Standards to include a reference to a suitable method of analysis for checking the compliance with the standard. However, the CCNFSDU Chair noted that this is not a requirement. The Codex secretariat added that although methods recommended by Codex normally refer to the finished product, they could also refer to ingredients.

Existing sensory methodologies, such as ISO 5495, can be used to identify the most intense sweetness when comparing two ingredients with a local sensory panel. However, no sensory intensity reference value for sweetness of carbohydrate sources can be defined as an indicator for sweetness of FUF because:

1. Inherent psychological and physiological differences between trained panellists prohibit the development of an accurate sweetness reference value that can be globally harmonized across food companies and is stable over time.
2. The selective measurement of perceived sweetness of carbohydrate sources as an indicator for sweetness of FUF is impossible because matrix and processing effects modulate perceived sweetness in the finished product.

Recommendations to CCNFSDU

The draft Codex Standard for FUF foresees requirements related to sweetness in Point 3.1 (footnote 5) and in Point 3.2.4 (Optional Ingredients) of Section B. However, as indicated by CCMAS and our findings there are no internationally validated methods to enforce these proposed specifications.

AOAC IDF ISO recommend for the information provided by CCMAS - **there are no known validated methods to measure sweetness of carbohydrate sources, and therefore no way to determine compliance for such a provision** - to be captured in the Standard as such, part B, section 9. Methods of Analysis and Sampling, for clarification purpose.

To further contextualise the advice, AOAC IDF ISO would suggest the following addition - **there are no known validated methods to measure sweetness of carbohydrate sources [as an estimation of sweetness in a complex matrix,] and therefore no way to determine compliance for such a provision**.