SENSORY TESTING FOR FLAVORINGS WITH MODIFYING PROPERTIES

BY
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FEMA Science Committee develops Guidance for the Sensory Testing of Flavorings with Modifying Properties within the FEMA GRAS™ Program.

Flavorings with modifying properties (FMPs) are widely used by the flavor industry to modify or enhance the flavor profile of a flavoring and the food to which it is added. In the last few years, the development of new FMPs has increased to help address consumer desire for healthy food alternatives, including reductions in sugar and salt, without compromising flavor. FMPs may not necessarily have or impart a specific characteristic flavor of their own but can modify the flavor profile by altering flavor attributes such as intensifying specific flavor characteristics (e.g., perceived fruitiness), reducing specific flavor characteristics, masking of off-notes or bitterness, or changing the time onset and duration of the perception of specific aspects of the flavor profile.

In the United States, the Expert Panel of the Flavor and Extract Manufacturers Association of the United States (FEMA) evaluates new flavor ingredients, including FMPs, to determine if they can be considered "generally recognized as safe" (GRAS) for their intended use as flavor ingredients under authority provided by the 1958 Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act (Hallagan and Hall, 1995, 2009). The Expert Panel evaluates substances only for their use as flavor ingredients in human food; it does not evaluate substances for other uses in food (e.g., sweetening) or for uses in products other than human food (e.g., tobacco). Therefore, as part of their evaluation, to assure that the flavor ingredient is an appropriate candidate for consideration as FEMA GRAS™, the Expert Panel a) considers if the new flavor ingredient is functioning to impart, enhance, or modify flavor in the finished food product[1] under conditions of intended use and b) assesses the effect of the flavor ingredient in the finished food product under conditions of intended use.

To complete their evaluation, the FEMA Expert Panel requires sensory data to be submitted as part of the FEMA GRAS application process for FMPs. In a recent publication in *Food Technology* (Marnett et al., 2013) the FEMA Expert Panel requested that the flavor industry outline best practices for conducting sensory testing for FMPs to provide data for both items a) and b) above.

FEMA's Science Committee Sensory Data Task Force, composed of sensory scientists and regulatory experts from FEMA member companies, was formed to respond to the request and developed the document, "Guidance for the Sensory Testing of Flavorings with Modifying Properties within the FEMA GRAS™ Program," which is available with the online version of this article at ift.org.

To provide guidance on whether the FMP functions to impart, enhance, or modify in the

finished food product under conditions of intended use [item (a above], the FEMA Sensory Data Task Force developed "Test 1." Test 1 is used to demonstrate that the FMP does not have inherent sweetness or saltiness under conditions of intended use as an FMP in the finished food product. This test is focused on sweetness and saltiness as the Codex definition[1] of flavoring precludes exclusively sweet or salty taste in the finished food product from the definition of flavor[2]. Additionally, in the United States, if the FMP candidate were exclusively sweet under conditions of its intended use in the finished food, it would not be performing the technical effect of flavor and would require separate regulatory authority to use for that technical effect[3].

Test 1 recommends a two-alternative forced choice test (ASTM Designation E2164-08: Standard Test Method for Directional Difference Test) to show that the sweetness or saltiness of the FMP alone and at the maximum use level is less than that of the recognition threshold concentration of sucrose or sodium chloride in the sample matrix evaluated. The guidance provides a recognition threshold concentration of 1.5% for sucrose in a water base, and 0.25% for sodium chloride in a water base[4]. As these thresholds are only applicable in a water base, the option is provided for the FEMA GRAS applicant to develop a threshold in another food matrix (i.e., meat products) following a three-alternative forced choice standard methodology.

To provide guidance on the assessment of the effect of the FMP on the relevant attributes in the finished food product under conditions of intended use [item b) above], the task force developed "Test 2." Test 2 recommends a Two-Alternative Forced Choice (2-AFC, also known as Directional Difference Test, Paired Comparison

FEMA Science Committee Sensory Data Task Force

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Test), one test conducted for each attribute of interest; scaling methods, such as Descriptive Analysis (e.g., Quantitative Descriptive Analysis, Sensory Spectrum Method); or Time-Intensity Profiling (using standard methodology such as ASTM Designation E2164-08: Standard Test Method for Directional Difference Test; Manual on Descriptive Analysis Testing, R.C. Hootman, Ed., 1992; or ASTM Designation E1909-11: Standard Guide for Time-Intensity Evaluation of Sensory Attributes).

The Sensory Data Task Force is currently evaluating standard food matrices that may be applicable to multiple food categories listed within the FEMA GRAS publications and in the U.S. Code of Federal Regulations (21 CFR 170.3(n)). This work is ongoing and will be available from FEMA when it is completed.

It is anticipated that the "Guidance for the Sensory Testing of Flavorings with Modifying Properties within the FEMA GRAS™ Program" will be a valuable tool for flavor and food companies while providing critical information to the FEMA Expert Panel and others. **FT**

"The Guidance for the Sensory Testing of Flavorings with Modifying Properties," which contains the specific details of Test 1 and Test 2, is available in full with the online version of this article at ift.org.

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NOTES

[1] The Codex Alimentarius Guidelines for the Use of Flavourings (CAC/GL 66-2008) defines flavorings as "products that are added to food to impart, modify, or enhance the flavour of food with the exception of flavour enhancers considered as food additives under the Codex Class Names and the International Numbering System for Food Additives - CAC/GL 36-1989. Flavourings do not include substances that have an exclusively sweet, sour, or salty taste (e.g., sugar, vinegar, and table salt). Flavourings may consist of flavouring substances, natural flavouring complexes, thermal process flavourings, or smoke flavourings and mixtures of them and may contain non-flavouring food ingredients within defined conditions such as carriers, solvents, etc. Flavourings are not intended to be consumed as such."

[2] Sour taste is also included but was not included in this guidance.

[3] Technical effect refers to the function of a food ingredient in food. Technical effect F05, flavors and flavor modifiers, refers to substances that impart, supplement, intensify, or modify the taste and/or aroma of a food. This category excludes [technical effect] of sweeteners (National Academy of Sciences, 1989).

[4] These recognition thresholds were derived from a literature search of articles citing thresholds for taste sensations related to sweetness and saltiness. The FEMA Sensory Data Task Force filtered the literature by: 1) requiring articles citing "recognition thresholds," not "detection thresholds," with the reasoning that the sensation needs to be recognized as sweet or salty and 2) sample size of greater than or equal to 20 subjects/observations.

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