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Standard Guide for Evaluating Odor and Taste of Fish Suspected of Contamination¹

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INTRODUCTION

The flavor quality of fish and shellfish (hereinafter collectively termed “fish”) can be related to their exposure to compounds that might be present in the food chain and the water in which they live. High-quality fresh fish have a low-intensity aroma and flavor impact. Certain compounds might cause deterioration of, or change to, the flavor of the fish’s flesh. Examples of sources of contaminants include wood or other processing effluent, odorants of detergents, microbial genesis, and accidents involving petroleum products, industrial sewage, farm runoff, and feedstuffs. Although many known contaminant compounds can be detected by instrumental means, the presence of many unknown volatile contaminants is first detected through odor and flavor evaluation.

1. Scope

1.1 This guide covers procedures for determination of the effects of water-related contaminants on the odor and taste of live fish or fishery products after alleged exposure where flavor impairment is a suspected issue.

1.2 This guide addresses safety, harvested quality, sample preparation, assessor selection and training, testing procedures with assessor instructions, as well as test environment and parameters.

1.3 This guide is applicable to product categories from aquaculture and wild-caught sectors. The range of contaminated products could be from a small-scale water source, such as an estuary, or a limited river system, to a large-scale source, such as a bay, gulf or portion of an ocean. For details on how these methods compare to field- or laboratory-exposed fishery samples, see Ref (1).²

1.4 Also covered in this guide are fish species, harvest method (wild-caught versus aquaculture/farmed fish), post-harvest handling, processing methods, and storage.

1.5 This guide provides suggested procedures and is not meant to exclude alternate procedures that may be effective. It also does not address all of the nuances of testing throughout

the world. It is the responsibility of the user to be aware of their local guidelines and apply them as needed. Some useful resources are also cited in this guide.

1.6 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. Specific hazards statements are given in Section 7.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*³

D3696 Practice for Evaluating an Effluent for Flavor Impairment to Fish Flesh (Withdrawn 2006)⁴

E253 Terminology Relating to Sensory Evaluation of Materials and Products

¹ This guide is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.06 on Food and Beverage Evaluation.

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² The boldface numbers in parentheses refer to the list of references at the end of this guide.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

2.2 *Federal Documents*:⁵

21 CFR Part 50 Protection of Human Subjects

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this guide, refer to Terminology E253.

4. Summary of Practice

4.1 Fish that are suspected of having been exposed to contamination are to be processed and maintained for sensory analysis in accordance with appropriate manufacturing practices. After cleaning and evisceration, fish are wrapped in protective covering such as aluminum foil (which will not impact flavor), placed in labeled plastic bags, and maintained at 4 °C or below, necessary for preservation of the product. Samples must be frozen if sensory testing cannot be conducted within 24 h. Immediately prior to sensory testing, the fish are thawed under refrigeration, if frozen, and homogeneous composite samples are prepared. Individually foil-wrapped aliquots of 20 g fish (sufficient to provide all panelists with nearly identical samples for testing) are steamed and presented to trained sensory panelists for odor or flavor evaluation, or both.

5. Significance and Use

5.1 This procedure is used to determine the effects of water-related contaminants on the odor and taste of exposed fish. This procedure may be used as evidence in showing compliance with regulatory procedures.

5.2 This guide is designed for use by fish processors or research laboratories for evaluations by a trained and monitored sensory panel under the supervision of a sensory professional.

6. Apparatus

6.1 *Aluminum Foil*, heavy-duty, approximately 0.5 mm thickness, or

6.2 *Polyethylene Bags*, heat-sealable, as an alternative to aluminum foil.

6.3 *Steam Bath*, with rack and lid.

6.4 *Thermometer*, with a range from 20 to 100 °C.

6.5 *Electrical Warming Tray*.

7. Precautions and Safety Hazards

7.1 Fish that are being prepared and eviscerated in the field should be visually evaluated to see if the outer coating on skin or shell has evidence of contamination. Determine if the coating should be disturbed or is significant to results. If the coating can be disposed of, wiping the skin or shell is preferable to washing. Use paper towels to wipe the fish clean. Do not use water containing the effluent or the dilution water (river, lake, and so forth). In the event that no clean water is

available, the fish should be transported to a source of clean water for cleansing, eviscerating, and freezing.

7.2 Do not taste fish that have died or are suspected of having died as a result of exposure to contaminants, or that show any signs of toxic effects, because they might be toxic to the taster or possible tissue deterioration might influence the test results.

7.3 Where possible, if fish are to be frozen, they should have been eviscerated prior to freezing because the contents of the viscera may lead to subsequent flavor effects.

7.4 Minimize personal contact with the effluent or dilutions of the effluent because it is always possible that some hazardous material, bacterial, or viral pathogen might be present. Clean hands, clothing, and equipment after contact thoroughly.

7.5 Follow local water safety laws and practices in field studies. Check with local enforcement agencies because these laws vary from one area to another.

7.6 A current food handler's certificate might be required by local law for the cleaning, handling, and preparation of fish and shellfish samples.

7.7 Reasonable assurance of pertinent chemical and microbiological safety of the test samples should be assessed before sensory tests. If potential contaminants are known to be hazardous, then sensory assessment must be by odor evaluation only.

7.8 Panelists must read a statement that they are aware of the requirements of the test procedure. Prior to testing, all panelists must sign an informed consent form between themselves and the sponsoring organization (see 21 CFR Part 50).

7.9 Every attempt should be made to prevent further contamination of the samples. Panelists and sample preparers and servers must avoid introducing extraneous odors during preparation and testing from the use of products such as scented hand soap, hand creams, hairspray, perfume, odorous writing instruments or inks, etc.

8. Sampling Procedures

8.1 See Practice D3696 for conducting laboratory exposure of fishes.

8.2 See Ref (1).

9. Sample Preparation

9.1 The method of sample preparation should result in uniform samples for panelists. Preparation of homogeneous pooled samples is recommended because there might be flavor variation among fish, as well as within individual fish, such as differences between the anterior and posterior portions of a fish and dark versus light muscle areas of the fish.

9.1.1 For fresh fish, eviscerate and remove the head, tail, and large bones or shell crustaceans and molluscs. Thaw frozen fish in a refrigerator (4 °C) for up to 18 h.

9.1.2 Observe if the outer coating on skin or shell has evidence of contamination. Determine if the coating should be disturbed or is significant to results. If the coating can be disposed of, wiping the skin or shell is preferable to washing.

⁵ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.