

SENSORY EVALUATION OF FISH AND FISH PRODUCTS

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INTRODUCTION

Sensory evaluation or organoleptic assessment of fish and fish products involve the use of the five human senses (namely sight, smell, taste, touch and hearing) to gauge the quality of food. Sensory evaluation is necessary to complement the chemical analysis of food to give an overall quality assessment of the food product.

Sensory tests involve a panel of taste panelists either trained or otherwise. Trained panel members are usually used in difference tests. Untrained panel members are usually made up of a consumer panel for a preference test. The food product is evaluated for its appearance, odour, taste and texture.

There are two types of tests, the difference test and the preference test. The difference tests come in many forms, the two more commonly used ones are the triangle test and the duo-trio test. The difference test is used for experiments where it is required to see if a treatment results in a difference in the food product as compared to a control. The preference test is used for market surveys of consumer preference for a new food product, etc.

FACILITIES

The basic sensory testing facilities include a sample preparation area, a panel booth area and a panel discussion area.

1. Sample preparation area

It should include the following facilities :

- a) Cooking facilities (stoves, microwave oven, steamer, warmer or ovens, fryer, kettle)
- b) Exhaust hood over cooking area
- c) Storage facilities
- d) Cutlery, crockery, trays, casseroles, etc.
- e) Refrigerator
- f) Stainless steel table for food preparation
- g) Serving bench connected to the panel booths
- h) Sinks with hot and cold water if necessary.

2. Panel booth area

The panel booth area should include the following :

- a) Booths with neutral grey (Munsel value N/7) walls which reflect 40-45% light, to separate panel members
- b) A sink in each booth
- c) Water for rinsing (a tap in each booth)
- d) Space for samples and questionnaires
- e) Provision of drinking water
- f) Communication system between panel members and test organiser
- g) Comfortable chairs which can be adjusted in height to suit panel members.
- h) Each booth to be fitted with daylight light. Coloured light may be necessary in masking the colour of food product.

3. Panel discussion area

This area can be in the same room as the panel booths. The area is provided for round table discussions tests and discussion of results among test organizer and panel members. The area should have the following :

- a) Round neutral grey table to comfortably sit 8 to 10 panel members
- b) Whiteboard
- c) Notice board
- d) Comfortable chairs with adjustable height to suit the panel members
- e) Daylight light fittings (adequate and uniform, with comfortable level of illumination)

The panel booth and panel discussion areas should be air-conditioned (constant at 20°C, with controlled temperature and humidity) with a slightly positive pressure to reduce inflow of air from the sample preparation area. The air-conditioning should be installed with activated carbon filters to remove all odours. Use odourless materials, paints and equipment in these two areas.

PANELIST

1. Difference tests

A discrimination panel is used for difference tests. The panel members should undergo prior screening. For triangle tests the panel members should be selected on the basis that their correct responses should not exceed 80%. Each member should have two trials at the same session, and selection should be based on no fewer than 20 judgements per member made on 10 different tests in 10 different sessions.

- a) Number of panel members = usually 10
- b) Minimum number for a given test = 5
- c) Maintain a pool of qualified persons if possible.

2. Preference tests

Panel members must be representative of some consumer population and randomly selected. Persons who have expert knowledge of the product type and all who have specific knowledge of the samples and variables being tested should not be included in the panel. No prior training is required.

- a) For small laboratories = usually 30
- b) 16 to 20 panelists are sometimes employed
- c) about 50 to 100 people are usually considered adequate

Panel members should be kept highly motivated by giving them due recognition in terms of small tokens after each test. Test organizer must create interest in the test activity, maintain a high degree of status for the programme and the panelists, and make panelists aware of the importance of their contribution.

3. Physiological sensitivity of panelists

To eliminate physiological effects in panelists,

- a) conduct tests 1 hour after meals
- b) wait at least 20 minutes after smoking, chewing gum, or eating or drinking between meals
- c) encourage panelists to avoid eating highly spiced foods for lunch on days tests are to be run in the afternoon
- d) when running odour tests, panelists must not use perfumes, lipsticks or perfumed face lotions

- e) in taste testing, have subjects rinse their mouths with room temperature water just prior to starting tests and between samples
- f) with odour stimuli, normal breathing would usually suffice if one waits 20 to 30 seconds between samples.

4. Physiological control

- a) Maintain a pleasant and relaxed environment
- b) Use coding (2 or 3 digit) for samples, refer to Table of random numbers
- c) Use random presentation of samples e.g. for a 3 sample test :

Sample code	840	257	503
Order of presentation	A	B	C
	B	C	A
	C	A	B
	A	C	B
	B	A	C
	C	B	A

SAMPLES

1. Random selection of samples.
2. Uniformity in sample preparation, using standard procedures and preparation methods. Usually a panel member is presented with a tray containing a fork and a knife, serviettes, a glass of warm drinking water, a tumbler for waste disposal, samples, questionnaire, pencil and eraser.
3. Presentation of samples should be uniform. The sizes of samples should be sufficient for at least 3 tastes (normal sips or bites). About 1/2 oz of liquid or 1 oz of solid should suffice.
4. Temperature of samples should not be above 77°C for hot food or drinks, or at normal temperature in which product is usually consumed.

TEST DESIGN AND METHODS

1. Triangle test

Samples are presented either simultaneously or successively. In this test two samples are the same and one is not. The panelist must select the odd one out. A sample of the questionnaire for triangle test is in Appendix F. When frequency of correct solutions is above the chance level, a difference is inferred (obtained by consulting the Statistical table for triangle test, Appendix I).

If the products are A and B, the samples should be presented as follows:

Sample set	Sample code		
	486	927	184
1	A	B	A
2	B	A	B
3	A	A	B
4	B	B	A
5	B	A	A
6	A	B	B

2. Duo-trio test

In this test two samples are the same and one is different. One of the similar pair is identified as R and the panelist must select that one from the two unknown that is similar to the identified sample, R. A sample questionnaire for the duo-trio test is in Appendix G. The criteria for statistic analysis is based on the number of responses correctly identified as the similar sample. The statistical table for duo-trio test is in Appendix J.

If the two samples are A and B, the presentation of sets of samples are as follows:

Sample set	Reference sample(R)	Sample code		
		498	276	956
1	Product A	R	A	B
2	Product B	R	B	A
3	Product A	A	R	B
4	Product B	B	R	A
5	Product A	A	B	R
6	Product B	B	A	R

3. Hedonic preference test

The term "Hedonic" implies psychological expression to "pleasure" and "displeasure". The test is carried out using terms "like" and "dislike" to indicate psychological responses when testing food products. Numerical scores are assigned to the hedonic scale which can be 5-point or 9-point, and the data can be statistically analysed using One-way Analysis of Variance. If the calculated F-value is greater than that from the F-value statistical table, a significant difference is detected in the sample. A sample of the 9-point hedonic scale questionnaire is shown in Appendix H. The samples should be randomly presented to the panelist and an example for a 3-sample (A, B, C) test and a 10 member panel is shown below.

Panel member	Sample code		
	579	286	408
1	A	B	C
2	B	C	A
3	C	A	B
4	A	C	B
5	B	A	C
6	C	B	A
7	A	B	C
8	B	C	A
9	C	A	B
10	A	C	B

REFERENCES

Manual on Sensory Testing Methods. Sponsored by ASTM Committee E-18 on Sensory Evaluation of Materials and Products. ASTM Special Technical Publication 434. Published by American Society for Testing and Materials. (1968).

Piggott, J.R. (1984). Sensory Analysis of Foods. Elsevier Applied Science Publishers, London and New York.