

# **SELECTION AND TRAINING OF ASSESSORS FOR SENSORY EVALUATION OF FISH**

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## **PRINCIPLE**

These notes provide guidelines for the selection and training of expert assessors who can act singly or as members of a panel to evaluate the freshness of fish and fish products. It is expected that the assessors will score the freshness of samples on a numeric scale, but the same training be used for assessors who will be required to classify fish into freshness grades.

Loss of freshness and spoilage is a complex phenomenon involving chemical, physical and microbiological changes in the fish. It is a continuous, irreversible process, but a consistent sequence of changes can be observed in the raw and in the cooked fish. Loss of freshness merging into spoilage is a continuum starting when the fish has just died and can be considered perfectly fresh, and ending at some imprecise point when the fish is putrid. The objective of training is to enable the assessor to place a sample on this continuum using the sensory properties of the sample, and to position the sample in a structured scoring or grading system.

## **SELECTION OF CANDIDATES**

Candidates for training should be selected on the basis that they are required to do the job, that they are available, and that they are willing. Clearly staff in a quality assurance department in a company or in a quality studies section in a research laboratory or are official inspectors are possible, if not necessary, candidates, but persons from other departments in an organisation, not necessarily technical, can be considered. Senior managerial staff should not be selected since, apart from considerations of cost, they are likely often to be unavailable due to other commitments. Individuals who are unwilling to serve as assessors will not be conscientious enough to concentrate and will give erratic judgements. Very few people lack the innate ability to be good assessors, but willingness and conscientiousness are necessary attributes.

The number of candidates selected for training will obviously depend on the number of trained assessors required. In a factory QA laboratory perhaps 3 or 4 might be required to cover work load and for absences, though it might be useful to have a few reserves. In a research laboratory routinely using panels of 6-8 assessors a pool of 12 trained persons might be required. Start off with 2-4 more candidates than are required to allow for some not making the grade. Official inspectors might be required to attend a course as part of their duties.

## **TRAINING**

A full training course can be divided into 5 stages and can spread over about 3 months at 2 or 3 training sessions a week. An introductory course involving stages 3 to 5 below can be covered in 2-3 days and will provide basic expertise which can be developed with experience.

Training should use one species right up to stage 5. Preferably a white fleshed species common to the locality and without pronounced odours or flavours should be selected.

### **Stage 1.     Fundamentals of Sensory Assessment**

The trainer should give an introductory talk on what sensory assessment is about - the use of the human senses of sight, smell, taste and touch in the evaluation of properties of a food product. Solutions of salt, sucrose, citric acid and quinine can be given in practical sessions to illustrate the basic tastes of saltiness, sweetness, acidic and bitter. It is important to get the trainees to be precise in their use of terms at this stage, that is not to confuse the acid and bitter tastes and not to refer to either as sour. There need only be one or two practical sessions with chemicals as this stage as it is intended just to make the assessors think about the use of sensory terms, not to test their sensory abilities. It is sometimes possible to spot people who are unlikely to make good assessors at this stage because they are unable to detect or discriminate among the tastes very well, but no one should be rejected at this stage as innate abilities for assessing spoiling fish are not tested by these simple tasting tests.

### **Stage 2.     Practice in Observing and Describing**

In this stage candidates are encouraged to use their senses critically to observe and describe the features of spoiling fish in the raw state. Present the trainees with a few, perhaps 2-4, fish of different freshnesses and ask them to describe them in their own words. They should write down their own observations and should not collude with their colleagues. The group should then discuss their observations under the guidance of the trainer. The trainer at first should not prompt them with terms and let the assessors develop their own vocabulary, though the trainer should help to resolve synonyms and should prompt for features, for example, the feel of the skin or the colour of cut surfaces or the appearance of abdominal cavity which the trainees might have overlooked.

After 2 or 3 sessions like this the trainer should encourage the assessors to be methodical in their examination of raw fish and even produce a standardised approach

for examination and recording. The sequence of observation and recording could be:

- colour and appearance of skin;
- shape and appearance of the eyes;
- feel of the skin - smooth/gritty;
- firmness of the flesh to the touch;
- appearance of the belly cavity;
- appearance of the gills;
- odour of the gills;
- appearance of cut surface of the fillet;
- appearance of the backbone;

The trainer should try to resolve differences among trainees in the use of terms and try to develop a standard thesaurus of terms.

### **Stage 3.     Ranking of Freshness**

By this point the trainees will have recognised that the sensory properties of fish can be assembled into patterns that are indicative of the freshness of the sample, for example that cloudy eyes are associated with grittiness of the skin and both are associated with a sour smell in the gills. The trainees should be introduced to the concept of these patterns forming a systematic sequence from fresh to stale. This sequence will probably have already been remarked on by the assessors during previous stages of training, but discussion of a scale should be discouraged at this stage.

The assessors should be given a set of fish of different qualities and asked to place (rank) them in order of freshness. The samples should be laid out in random order, and trainees should do the ranking individually and should not move the fish around to put them in sequence, (the samples will be identified by random 3-digit numbers). The group should discuss their rankings and the trainer should attempt to reconcile inconsistencies among judgements. Some samples might be so close to each other that their rankings are not obvious and the trainer should just ask for a vote count.

Ability to discriminate among samples should have been developed at stage 2 and here it is only a matter of demonstrating a sequence, the continuum referred to at the start of these notes. It should be fairly obvious at this stage those candidates who will not make successful expert assessors. They will show an inability to consistently discriminate among, and to rank, samples differing in freshness.

### **Stage 4.     Scoring and Grading for Freshness**

Once the trainees accept the principle of ranking freshness, scoring samples on a scale of freshness follows naturally and the instructor can introduce the freshness scale, or

scales, used in the institute, company or department. The concept of freshness scales should be described - the relative distance of ranked samples from a starting point or the position on a continuum of freshness with the continuum equally subdivided and numbered - and the trainees required to put a freshness score to the samples. Trainees should work individually to score the samples then the trainer should evaluate the samples one by one, comparing the trainees' scores with his/her own. The concept of grades can also be introduced - subdivisions of the freshness continuum, but with the intervals not necessarily equally spaced.

The trainer will have to point out and discuss samples which exhibit unusual characteristics. The terms in the freshness scale describe the features of typical fish, but as for any biological entity atypical samples will appear. Also some unusual aspects of handling and stowage on board the catching vessel could result in atypical features, particularly in gill odours.

This stage will last until the trainer considers the trainees are giving scores or grades consistent with each other and with the trainer's. Persons who are erratic in their scoring, that is scoring or grading high and low in an unsystematic manner, should be identified and not be used as expert assessors. Persons who tend to be biased, that is, who consistently score or grade high or low can be trained to conform to the panel average, but erratic scoring demonstrates either an unwillingness to, or lack of ability to, carry out the task. (See notes on statistical analysis of sensory scores).

## **Stage 5**      Scoring of Cooked Fish

The trainees should get their basic training in sensory evaluation of freshness with raw fish then go on to cooked fish. Training in evaluation of cooked samples follows the sequence of stages 2-4 already described but stages 2 and 3 can be completed more quickly because the trainees are already familiar with the concepts and practices of describing sensory properties and scoring for freshness. This stage can overlap with later sessions of stage 2 and stages 3 and 4 of evaluation of raw fish.

## **PREPARATION OF FISH FOR SENSORY EVALUATION**

An official inspector or a buyer for a company will have to evaluate fish at the landing site or quayside and will make their evaluations predominately by the external characteristics of the fish, and for most circumstances for evaluation of fish at the time of landing this will be adequate for grading or for selecting fish. If there is some doubt about the grading by external appearance only the assessor should pick up samples of the batch and inspect and smell the gills; these evaluations will give an accurate assessment of freshness.

In a laboratory situation it is good practice to present the fish in a standard manner for sensory evaluation of freshness of raw fish. Do not pick up the fish by putting finger and thumb in the eye sockets. Cut off the head leaving on some of the belly flap. Remove a

fillet from one side to allow the backbone to be seen. Lay out the head, fillet, and the side remaining after removing the fillet on a tray, labelled as required. Present the tray on a bench under a good light. Very large fish will have to be laid out on a bench or table. A portion, or all, of the excised fillet might be taken for cooked assessment, but assessment of appearance and feel of the skin and appearance and firmness of flesh can be evaluated on the remaining side.

In the case of flat fish, do not remove the head, and remove one fillet, usually that on the underside for cooking. Cut away a quarter fillet from the upper side to expose the backbone.

Fish can be cooked by steaming in a casserole, by a 'boil-in-the-bag' procedure, or by microwave cooking. Cook to an internal temperature of 65°C and serve warm to the assessors in covered containers. It is not necessary to present individual samples to members of an expert panel; it is sufficient to present the cooked samples in the container from which assessors can take samples.