

TECHNICAL NOTE NO. 15--CONDUCTING ORGANOLEPTIC TESTS IN THE LABORATORY

Organoleptic tests are frequently employed in fishery technological research, particularly where the quality of two or more lots of fish are compared. In most cases, no reliable chemical or objective test is available; also, existing chemical tests may not be applicable to the particular problem. Quite often only small differences in quality of the fish may exist. Therefore, unless the reproducibility of the results of organoleptic tests is high, small differences in quality between lots of fish may not be detected.

Observations made by an organoleptic testing panel are apt to be highly erratic. For example, if two identical lots of fish are examined, some members of the testing panel are almost certain to report a difference even though none exists. It is the objective of every well-planned organoleptic test to eliminate the guesses so that the data represent actual values of the samples examined. Otherwise, the good data are so "diluted" with irrelevant opinions that it is impossible to detect fine differences, if any, between samples.

At the Seattle Fishery Technological Laboratory many different methods of conducting organoleptic tests have been tried. No method has proved universally applicable or has given entirely satisfactory results for any particular problem. Attempts are continually being made to improve our technics. Nevertheless, considerable experience in conducting organoleptic tests has been acquired over a period of about 15 years even though no final procedure can be recommended.

Where greatest accuracy is required in detecting small differences in quality, a preliminary test is conducted to determine whether each member of the proposed panel can distinguish between the two samples. This preliminary test is carried out as follows:

The individual is blindfolded or placed in such a position where he cannot see the samples. He is then given a portion of the first test sample which is identified to him as sample A. The same is done with the second sample, which is identified to the tester as sample B. He is then allowed to taste or examine each sample until he feels reasonably certain he can distinguish between the two. He is then given samples of A and B in some mixed order such as A - B - B - B - A - A, etc., without identification. The tester must identify at least 5 out of 6 or 7 out of 9 samples to be qualified--all other testers are disqualified. Only the qualified testers are instructed to complete the rating or score sheets for the products.

The following are some important precautions which we have found necessary or desirable in carrying out organoleptic tests. These are followed carefully and the factors involved are controlled as far as possible in order to obtain greatest accuracy of organoleptic examinations.

1. Elimination of bias: Observers must not be allowed to comment on their ratings or discuss identity of samples in the presence of other observers who have not finished their test.

2. Irrelevant distinguishing characteristics of samples: In some cases, two samples can be differentiated by means of some characteristic other than those being tested for. For example, we have sometimes used as controls samples of fish frozen in round tin cans and sometimes such samples are deformed by the shape of

the can so that observers know which is the control. In other cases, a chemical dip may have discolored one sample. In still other cases where judgment of flavor only is desired, the texture of the samples being compared may be so different that results are really correlated with texture not flavor.

3. Homogeneity of samples: Most pieces of fish differ in appearance, flavor, odor, and texture from one part of the piece to another. In many instances there is greater difference between parts of the same piece than between samples. This is a very difficult problem to deal with. When flavor only is of interest, we have sometimes "homogenized" each sample in a Waring Blendor. In other cases it may be necessary to take great care to compare pieces from comparable portions of the fish. This is particularly a problem with fish which have oil deposits beneath the skin or with fish which have pronounced streaks of dark flesh just beneath the skin along the lateral line.

4. Temperature differences of samples: Samples to be compared should be at the same temperature. Odor and flavor of fish are markedly a function of temperature. If we try to compare a fish which has just finished thawing, or has just been removed from ice, with one at room temperature, erroneous results will be obtained because of the lowered volatility of odors from the fish at the lower temperature.

5. Method of cooking: When cooked samples are to be compared, there is always the danger that differences in cooking or seasoning between the samples will obscure the differences being looked for. We always add salt by dipping the samples in a salt solution (1 tablespoon per cup of water) for periods of time up to 5 minutes, depending on thickness of samples, and then draining. The samples are cooked in either of two ways: (1) they are wrapped in parchment paper and placed in simmering water or (2) baked in an oven. The former gives probably the most uniform cooking but often results in a bland product, quite different from what one would eat under normal conditions. Hence, we often use the baking method.

6. Number of samples to be compared: It is best to compare directly only two samples. Organoleptic tests are so uncertain that even when only two samples are compared, it is hard to get good results. If three or more samples are compared the observer is apt to become confused unless there are considerable differences among the samples.

7. Number of tests per day: As a general rule, we find it best to limit the testing by one person to one pair of samples in the morning and another pair in the afternoon. A few persons can successfully compare a larger number of samples. It is not possible to spend a complete day in comparing flavor of fish. After a relatively short period of time, the sense of taste becomes blunted and the sense of discrimination of the tester declines to the point where it is not feasible to continue.

8. Removing flavors from mouth: It is desirable to provide some means of removal of the flavor of the first sample before testing the next one, especially in instances where one or both of the samples being compared have a rancid or other strong flavor. We have found, after trying various things, that sipping a small amount of apple juice between samplings is helpful.

9. Use of score sheets: Use of score sheets or rating forms indicate clearly the information desired and facilitates recording of data. In order to carry out organoleptic tests, it is usually necessary to solicit assistance from persons on other projects and to ask them to give up time from their regular work. The score sheets should be set up for convenient use and, if possible, require merely

checking of appropriate items. The forms should be as complete as possible before being submitted to the panel members and may have already the member's name, date, and other pertinent information filled in.

10. Advance arrangement of time for tests: It is desirable to make advance "appointments" with members of the panel. This allows the members to arrange their own work in advance so that they can participate in and allow more time for the organoleptic tests. It may even make it possible to obtain additional prospective testers. One important cause of inaccurate observations is that panel members are in a hurry to return to their own work and hence do not devote enough careful attention to the organoleptic testing.

11. Education of organoleptic-panel members: Panel members should understand the meaning of terms used in the score sheets. Do they know what is meant by such terms as "stale," "rancid," etc.? Do all members indicate the same evaluation by the grades assigned to samples? Furthermore, in order to keep up interest in the work, we have found it necessary to hold occasional meetings of persons participating in such tests. These meetings are held at various stages of the work. A preliminary meeting might be held early in the work explaining the purpose of the project and defining terms. Subsequent meetings would discuss results obtained and might identify samples which in the actual tests were designated by code numbers. Such meetings serve to educate and train panel members for the project in question and tend to create an active interest in the work.

12. Time after smoking: Use of tobacco probably blunts the sense of taste. We suggest that panel members refrain from smoking for at least one hour prior to the organoleptic tests. Of course, no smoking is allowed in the judging room.

13. Restriction of information requested of the panel to that urgently needed: The data requested of the panel should be limited to only those factors pertinent to the test. If information on texture is all that is required, the panel should not be requested to give flavor, odor, and appearance ratings. Furthermore, the score sheet should list only those factors to be considered. We make up new score sheets for almost every new project and often use several different sheets for different phases of a given project.

Even with all these precautions, results are never as good as we would desire. We are continually trying new technics in an effort to improve on the reproducibility of our results.

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