

JUDGING OF DAIRY PRODUCTS



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Module 3. Fundamental rules, score card and sensory taste

Lesson 12

SENSORY TESTS – DIFFERENCE TESTS (PAIRED COMPARISON, DUE – TRIO, TRIANGLE), RANKING, SCORING, HEDONIC SCALE AND DESCRIPTIVE TESTS

12.0 Introduction

The main purposes of Sensory test are:

- Select qualified judges and study human perception of food attributes
- Correlate sensory with chemical and physical measurement
- Study processing effects, maintain quality, evaluate raw material selection, establish storage stability or reduce costs
- Evaluate quality or
- Determine consumer reaction

12.1 Classification of Sensory Tests

Each of these purposes requires appropriate tests. There are a substantial number of test methods and new methods continue to be developed. Sensory tests are classified into following three categories.

Name _____

Date _____

Code No. _____

Time _____

A) Score the sample for different characteristics. Indicate the degree of defects, if any, encircling the applicable one and deduct accordingly from the attribute score.

Characteristic	Maximum	Minimum score for each attribute	Sample Score
(1)	(2)	(3)	(4)
Package appearance	5	3	
Appearance of Dry product	15	9	
Appearance of reconstituted milk	15	9	
Body and Texture of reconstituted milk	20	17	
Flavour of reconstituted milk	45	27	

NOTE: If the sample scores less than the minimum for any characteristic, it is to be rejected.

12.2 Discriminative Testing

This is one of the most useful analytical tools available to the sensory professionals. It is on the basis of a perceived difference between two products that one can justify proceeding to a descriptive test in order to identify the basis for the difference. Within this general class are a variety of specific methods e.g.

- Paired comparison test
- Duo – Trio test
- Triangle test
- Multiple sample test
- Other test methods such as dual and multiple standard test.

The main objective of all these methods is to answer a simple question. “Are the products perceived as different”? Obviously the response to this question can have major consequences. If the conclusions from a discrimination test are to be accepted by management as reliable, valid and believable, then it is important that each test be conducted with proper consideration for all aspects of the test design, product preparation and handling implementation, data analysis and

interpretation.

12.2.1 Paired comparison test

The paired comparison procedure is used in discrimination testing to food and beverage evaluation. It has also been used successfully for determinations of threshold for basic taste solutions. The paired comparison test is a two product test, and the panelist task is to indicate the one that has more of a designated characteristic such as sweetness, tenderness or skinniness. This method is also identified as a directional paired comparison test, the “directional” component altering the panelist to a specific type of paired test. The paired comparison test is relatively easy to organize and to implement. The two coded products (AA, BB, AB, BA) are served simultaneously and the subject has to decide whether “there is difference” or “there is no difference”. Requiring a “difference” response in all cases has been found to give better results.

Another version of the paired test is the A – not – A procedure. The subject is presented with a single sample for evaluation, which is then replaced by a second sample. The subject then makes a decision as to whether the product are the same (or different). This particular test procedure has considerable merit in those situations where non test variables such as a colour difference may influence results.

12.2.2 Due – trio and triangle test

The Due – Trio test is suitable for products that have relatively intense taste, odour and or kinesthetic effects such that the sensitivity is significantly reduce. It lends itself to use for quality control and for selection of judges for superior discrimination. The chance probability associated with the due – trio test is identical with that of the other two product test. Whenever products are being compared with a current franchise (i.e. product now being manufacture), the due– trio, constant – reference test method, is most appropriate.

The chance probability associate with the three product (triangle) test is only $1/3$, which accounts for its claim of greater sensitivity. The triangle test is a more difficult test because the subject must recall the sensory characteristics of two products before evaluating a third and then making a decision. In fact, the test can be viewed as a combination of three paired test (A-B, A-C and B-C). Products that have intense flavours and aromas that are spicy and / or are difficult to remove from palate, or that have physiological effects (distilled beverages) usually preclude the use of the triarigle test.

12.2.3 Multiple sample test

Tests involving more than 3 stimuli are classified as multiple sample tests. They may have equal (symmetrical) or unequal (asymmetrical) numbers of each stimulus. When they are applied as true difference tests, the judge is required to separate the samples into two groups or like samples. When they are applied as directional tests, the judge is asked to identify the groups or higher or lower intensity or a given criterion. Difference test designs involving more than three stimuli have had only limited use. The limitation is based on the increase in psychological complexity and physiological fatigue which accompanies an increase in the number of stimuli. In addition, large quantity of samples are required and more time is needed for the observer to make a decision. These test appear to be most applicable to visual discrimination, where the

judge does not rely on memory and fatigue is almost non – existent.

12.2.4 Dual standard test

The dual standards method was proposed for use in quality control situations. The subject is served four products: two are identified as references A and B and Two are coded. The subject must match the reference product with the coded product. The designation of the two references could reflect quality control limits or current production and product outside the limit.

12.2.5 Multiple standards Test

This test was developed for odour evaluation when a non – uniform standard was to be compared with an unknown. Any number of the questionable standards are presented simultaneously with the unknown and the subject is asked to designate the one which is most different. The chance probability of identifying the unknown correctly is ones over the total numbers of samples involved.

Some sensory professionals suggest that the triangle is more sensitive than the due – trio the paired test, while the others have arrived at contrary conclusions. The various difference tests can be ranked in terms of increasing sensitivity as : paired, dual standard, duo – trio, triangle and multiple standard. Recently All discrimination tests are equally sensitive.

12.3 Descriptive Analysis

Descriptive analysis is a sensory methodology that provides quantitative descriptions of products based on the perceptions of a group of qualified subjects. It is a total sensory description taking into account all sensations that are perceived– visual, auditory, olfactory, kinesthetic, and so on – when the product is evaluated. Descriptive analysis results provide complete sensory descriptions of an array of products and provide a basis for determining those sensory attributes that the important to acceptance. The results enable one to relate specific process variables to specific changes in some of the sensory attributes of a product. From the product development view point, descriptive information is essential in finding out those product variable that are different and from which one can establish cause and effect relationships.

Screening should be product category specific as is the subsequent training effort. Training is primarily focused on development of descriptive language which is used as a basic from scoring the product. A part from this the other important activities that are part of training include, the grouping of attributes by modality (i.e. appearance attributes, aroma attributes and so on), them by occurrence, developing a definition for each attribute, identifying helpful references for use during training and familiarizing the subjects with the scoring procedure. There are numerous applications for descriptive analysis, including monitoring competitions, storage stability / shelf life, product development, quality control, physical / chemical and sensory correlation, etc. Depending upon the test methods used the training can be quite different.

12.3.1 Flavour profile

The flavour profile method is the only formal qualitative descriptive procedure and is probably the most well known of sensory test methods. This method utilizes a panel of four to six

screened and selected subjects who first examine and then discuss the product in an open session. Once agreement is reached on the description of the product the panel leader summarizes the results in report form. The method has considerable appeal because results could be obtained rapidly and would obviate the need for statistics.

12.3.2 Texture profile

This method represents an advancement in descriptive analysis with respect to development of descriptive terminology, the scales for recording intensities and the word /product anchors for each scale category. In developing the method, the objective was to eliminate problems of subject variability, allow direct comparison of results with known materials and provide a relationship with instrument measures. There is considerable appeal to the direct link between specific instrumental measures of these rheological properties of a product and the responses of a panel of specific sensory attributes, for example, texturometer units and hardness sensory rating. However, separation of texture from other sensory properties of a product such as colour, aroma, taste and so forth limits the total perception of the product's sensory properties.

12.3.3 Quantitative descriptive analysis

The quantitative descriptive analysis (QDA) method was developed with an approach that was primarily behavioral in orientation with a consensus approach to language development, use of replication for assessing subject and attribute sensitivity, and for identifying specific product differences and defined statistical analysis. The development of method evolved from a number of considerations to ensure that it would :

- Be responsive to all the sensory properties of a product.
- Rely on a limited number of subjects for each test
- Use subjects qualified before participation
- Be able to evaluate multiple product individual booths
- Use a language development process free from leader influence
- Be quantitative and use a repeated trials design
- Have a useful data analysis system.

In a QDA test, the subjects evaluate all of the products on an attribute by a attribute basis on more than a single occasion.

12.3.4 Other methods

The spectrum descriptive analysis involves extensive training activities, reflecting the basic Flavour and Texture Profile procedures, with particular reliance on training the subjects with specific standards of specified intensities. Free choice profiling is another approach in which no subject screening or training are required and the subject can use any words they want to describe the products being evaluated. The time advantage may, however, actually not be there

since the experimenter requires to spend time explaining the testing procedures to the subject.

12.3.5 Scoring

The most frequently used of all sensory testing systems is scoring because of its diversity, apparent simplicity, and ease of statistical analysis. Scoring methods have most extensively been used by the dairy industry for product development and improvements, shelf life studies and assessing suitability of packaging materials. Score cards base on 100 points are generally used for judging and grading of dairy products. Most recently 25 points score cards have been suggested. It is believed that numerical rating tests give more complete information than either ranking tests or descriptive rating test. But the judges must be trained. Since there is no indication of liking to the test product, palatability norms should be established. The score card must be properly developed giving due weight age to all the sensory attributes.

12.4 Affective Testing

Acceptance testing available and necessary component of every sensory programme is performed at consumer's levels. It refers to measuring liking or preference for a product. Preference can be measured directly by comparison of two or more products with each other, that is, which one of the two or more products is preferred. Indirect measurement of preference is achieved by determining which product is scored significantly higher than another product in a multi product test, or which product is scored higher than another by significantly more people. These two methods most frequently used to directly measure preference and acceptance are the paired comparison test and the nine point hedonic scale. Other methods are either modifications of these two methods or are types of quality scale: for example, excellent to poor and palatable to unpalatable.

12.4.1 Hedonic scale

The nine point hedonic scale has been used extensively since its development with a wide variety of products and with considerable success. The scale is easily understood by naive consumers with minimal instruction and the product differences are reproducible with different groups of subjects. The results from use of this scale are most informative since computations will yield means, variance measures and frequency distributions, all by order of presentation and magnitude of difference between products by subject and by panel and the data can be converted to ranks as well, which yields product preferences. An example of the scale is given below.

Like extremely 9

Like very much 8

Like moderately 7

Like slightly 6

Neither liked nor disliked 5

Dislike slightly 4

Dislike moderately 3

Dislike very much 2

Dislike extremely 1

The subject task is to circle the term that best represents their attitude about the product. The responses are converted to numerical values for computational purposes, e.g. like extremely 9; dislike extremely 1; in a 9-point scheme.

The sensory acceptance test is a very cost – effective resources that has a major role to play in the development of successful product. Properly used, it can have a significant impact on the growth and long term development of sensory evaluation.

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