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GUIDE FOR SENSORY EVALUATION OF FOODS

PART I OPTIMUM REQUIREMENTS

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GUIDE FOR SENSORY EVALUATION OF FOODS

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Indian Standard

GUIDE FOR SENSORY EVALUATION OF FOODS

PART I OPTIMUM REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 September 1971, after the draft finalized by the Sensory Evaluation Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Sensory evaluation of foods is assuming increasing significance, as this provides information which may be utilized for quality control, assessment of process variation, cost reduction, product improvement, new product development and analysis of market.

0.3 This standard provides guidelines for sensory evaluation for all the above objectives in general; in particular, it covers laboratory testing in respect of new product development and for determining consumer reaction. However, it is recognized that for commercial purposes, the existing practices of testing tea, coffee, etc, would continue. In any case, this standard would be applicable to new products developed from tea and coffee as well.

0.4 To derive maximum benefits from sensory evaluation, it is necessary to follow the methodology in its full scientific perspective. It is, therefore, necessary to: (a) use standard terminology (*see* IS : 5126-1969*); (b) select the panel properly; (c) maintain suitable environmental conditions and use standard equipment for the test; (d) obtain representative samples; (e) prepare and present samples suitably and uniformly; and (f) select the methods and statistical techniques carefully. This part of the standard provides guidelines on (b), (c), (d), and (e). Part II of this standard covers all the methods of sensory evaluation and a detailed standard is being prepared on statistical evaluation of results.

*Glossary of general terms for sensory evaluation of foods: Part I Methodology and Part II Quality characteristics.

1. SCOPE

1.1 This standard (Part I) covers optimum requirements of sensory evaluation of food, such as personnel, panel selection, laboratory set-up and equipment, sampling, and preparation and presentation of samples.

1.2 In places, where it is not possible to have all these arrangements, a set up may be evolved, keeping in view all the principles stated in this standard.

2. PERSONNEL

2.1 Panel Organizer — In consultation with the person who submits the product, the panel organizer should formulate questions precisely for which answers are required. He should be responsible for organizing sessions and moderating discussions and should have ability to act as the connecting link between the panel and users of the panel findings. During the phases of panel selection and training, he should be attentive to various aspects of the candidates' test behaviour, such as speed interest level, domination, independence and honesty of individual. He should not try to impose his ideas on the panel.

2.2 Statistician — The statistician should choose suitable sampling procedure, evaluation card, experimental designs and statistical method for evaluation of results.

2.3 Preparation - Room - Incharge — The preparation - room - incharge should have preliminary study of the preparation and presentation of samples along with the panel organizer; he should also prepare and present the samples to the panel as per experimental design formulated.

3. PANELS

3.1 Types of Panel

3.1.1 *Trained Panel (Laboratory Panel)* — The trained panel should be carefully selected and trained; it need not be an expert panel. Trained panels provide answers to two general questions relating to the sensory properties of foods: Is there a difference between or among stimuli ? And what is the direction and the intensity of differences ? Trained panel should be used to establish the intensity of a sensory character or overall quality of a food. The trained panels should be small in number varying from 5 to 10 and may be used in all developmental and processing studies. The panel for flavour profile studies should have a higher degree of training for detailed analysis of the flavour spectrum of complex processed foods.

3.1.2 *Discriminative and Communicative (D and C) Panel (Semi-Trained Panel)* — This type of panel should be constituted from people normally familiar with quality of different classes of foods. This panel is capable of discriminating differences and communicating their reactions. The panelists may not be trained formally but they should be capable of following instructions given at the evaluation session. The panel should consist of about 25 to 30 members and should be used to find the acceptability of preference of final products as a preliminary screening programme to select a few for large scale consumer trials.

3.1.3 *Untrained Panel (Consumer Panel)* — The members of the untrained panel should be selected at random from the total of potential consumers in the market area. The number of panelists should be large enough to ensure due representation to different age, sex, race and income level group in the total potential consumer population in the market area. The findings should be based at least on 100 independent judgements.

3.2 History Card — A card for each member of the trained and D and C panels shall be maintained for cross reference to check bias. It shall contain information, such as, threshold record, preferences, likes and dislikes, and eating habits and habitat.

3.3 Qualifications — The panelists particularly for the trained and D and C panels should have the following qualifications:

a) Sound health without any defects in sensory perception;
b) Average sensitivity;
c) Capability of independent judgement;
d) Ability to concentrate, train and learn;
e) Intellectual curiousity and interest in quality evaluation work;
f) Willingness to spend time in evaluation and submission to periodic tests on acuity; and
g) Freedom from prejudices in respect of a particular food product.

3.4 Trained Panels

3.4.1 *Selection* — The members should be selected from the available personnel and each of them should be tested for:

a) the capacity to distinguish the basic tastes and odours;
b) the threshold of gustatory differentiation;
c) the capacity to distinguish the different degree of concentration; and
d) taste and odour memory.

NOTE — A separate detailed Indian Standard covering all aspects of panel selection is under compilation.

3.4.2 *Screening* — The panel members should be selected using as test materials the products which are similar to those to be tested later. The test should be so designed as to pick out more sensitive member of the group.

3.4.3 *Training* — The panel should undergo a period of training in the type of work it shall be doing later. The members should be educated in the special vocabulary and they shall be taught to be percipient and articulate about their sensory reactions. Testing sessions should be preceded by a few informal orientation sessions in which the type of sample is introduced and discussed and tentative decisions made about testing conditions, temperature, quantity, mode of presentation, etc. Further, the language used to describe the character notes of aroma and taste and overall quality should be developed and tested. Reference standards for expressing amplitudes shall be discussed in these orientation sessions.

3.4.4 *Briefing of Panel* — The panel members should be given clear and precise instructions before they start testing. When a quality attribute is evaluated, the instruction should be given in the score card. In case of rating tests, the panelist should be given clear and precise instruction in respect of scale used to help anchor judgements in respect of degree and direction of quality attributes and grade specification. The instructions should not lead the panel to the identity of particular samples or induce error of anticipation.

4. LABORATORY SET-UP AND EQUIPMENT

4.0 General — Environmental factors and samples should be controlled suitably. Sensory evaluation should be conducted in quiet and well lit rooms free from any odours. The dominant motif of constructional details should be to have comfort for concentrated prolonged testing and ease of cleaning. Pleasing neutral shades and maintenance of comfortable temperature and humidity conditions of the whole area or at least the panel room are desirable. The testing area where booths are located shall be separated from sample preparation and wash rooms and store by a complete partition.

4.1 Reception and Briefing Room — This room should be equipped with comfortable chairs and should be looked after by the panel organizer. It should be so designed as to ensure maintenance of pleasant attitudes and minimize traffic to the booths. Panel members shall assemble here, register, receive the evaluation cards and briefed about the test.

4.2 Panel Booths — These booths should be located between or adjacent to the reception and preparation rooms and should consist of test booths of identical design, a separate table having natural daylight or illuminated

with special daylight bulbs for evaluation of colours of samples and a table for the panel organizer.

4.2.1 Each booth may be 75 to 80 cm wide having adequate space to keep samples, drinking water, receptacle and writing space. It shall be separated by partitions to screen one person from the view of the other when they are seated. Revolving stool with back support or chairs should be provided for comfortable seating. Each booth should be provided with drinking water, cleansing towels and glasses and basins or receptacle for convenient and non-embarrassing expectorations. The lighting of booths shall be uniform and glarefree and arrangements should be made to provide white or coloured lights as required through use of independent bulbs or coloured lights. The serving counter continuous from the preparation area may be 90 cm in height and be extended about 40 cm in front of the partition.

4.2.2 The entry and exit to the panel booth area by independent doors may be useful to avoid any communication between panel members.

4.3 Preparation Room

4.3.1 The preparation room shall be suitably separated from the testing room and it should be equipped for preparing and serving food samples. The room should have facilities for cooking of samples with additional facilities for prepared food storage cabinets — hot and cold. The kitchen ventilation shall be such that cooking odours are expelled from the laboratory and should not penetrate the panel-booth area.

4.3.2 The layout shall be planned to permit efficient attendance to all booths by one person. To facilitate this, the serving vessels and containers should be kept handy below the serving counter. Glass and chinaware should be used as containers and cutlery of stainless steel.

4.3.3 The samples shall be passed to the test booths through a hatch in the partition. The hatch on the service counter should preferably be constructed in such a manner that there should be no recognition of individuals on either side of the partition.

NOTE — A typical layout of sensory evaluation laboratory is given in Fig. 1.

5. SAMPLING

5.1 General Requirements

5.1.1 Sampling should be carried out by a trained and experienced person as it is essential that the sample should be representative of the lot to be evaluated.

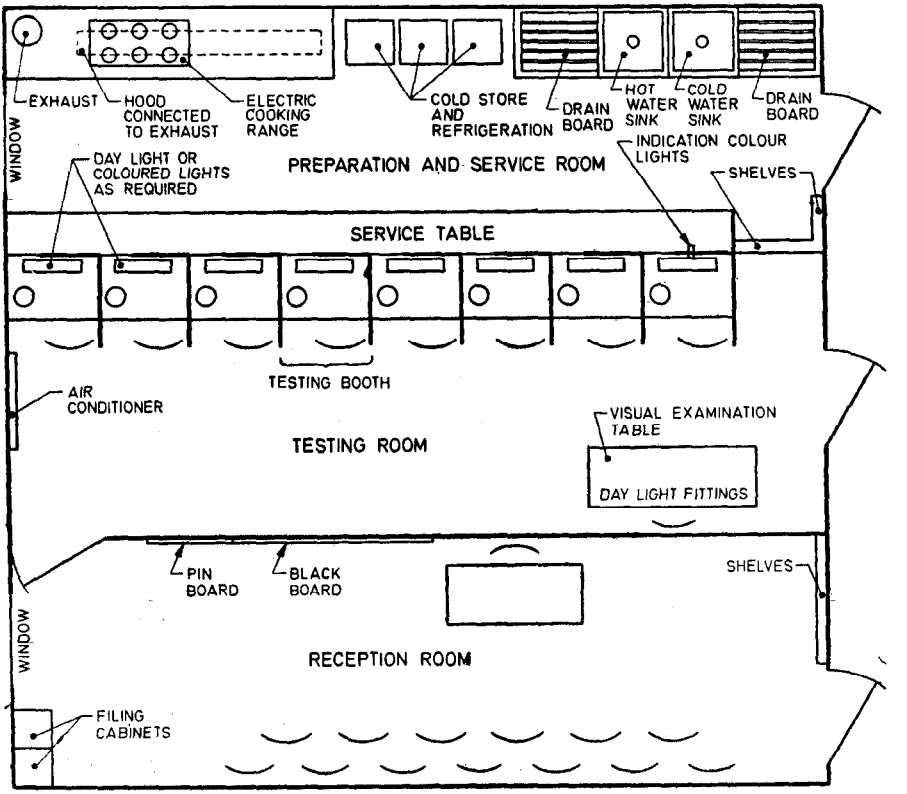

FIG. 1 A TYPICAL LAYOUT OF SENSORY EVALUATION LABORATORY

5.1.2 Precautions should be taken to avoid extraneous contamination of taste and odour while drawing and handling of samples and to preserve them in their original condition till they are ready for examination.

5.1.3 As far as possible, samples in original sealed containers should be drawn in order to avoid any contamination during handling and also help in revealing the true condition of the products as prepared and offered to the public.

5.1.4 Sampling appliances and sample containers should be clean, dry and free from foreign taste and odour.

5.1.5 Sampling appliances should be of glass or porcelain or stainless steel with suitable closures.

5.2 Scale of Sampling — The various sampling scheme described in the various individual commodity specifications, wherever available, shall be followed, and will be taken as guides for similar products. Details of sampling should be given when results are presented.

6. PREPARATION OF SAMPLES

6.1 A procedure of preparation which is most likely to bring out the difference in the particular quality attribute under evaluation shall be selected. While for overall quality testing, a method typical of normal use shall be adopted. All variables like temperature, time of boiling, quantity and composition of water, blending, etc, should be controlled to ensure identical method of preparation for all samples. Care shall be taken that no loss of flavour occurs and no foreign tastes or odours are imparted by the procedure during preparation, storage, serving, etc.

6.2 Depending upon the nature of the material and aim of the test, the need for a medium in testing auxiliary items should be decided. Foods like hot sauce, spices, vinegar, etc, may require dilution with some medium because of their intense physiological effects.

7. PRESENTATION OF SAMPLES

7.0 Uniformity in presenting the samples shall be maintained throughout within a given test. It is also desirable to maintain uniformity from one test to another within a given product type.

7.1 Size of Samples — The panelist should be allowed to have sufficient sample necessary to make judgements. In difference tests, the criterion for the lower limit should be to provide an amount sufficient to permit the average subject about three tests, that is, normal sips or bites. About 30 g of sample should be sufficient. In case the test procedure does not necessitate the panelists may be instructed to try each sample only once. The quantity of sample may be adjusted accordingly. Unless only one sample is to be tested, full normal serving quantities shall not be served even though the material is available.

7.2 Temperature of Sample — For sake of convenience and facilitating control, the samples should preferably be presented at room temperature. For difference testing, temperature should be such as to optimize the probability of discrimination. For preference testing, the temperature of sample for presentation should approximate common practice with the particular material.

7.3 The samples shall be served in utensils of the same type and appropriate size, shape and colour and they shall not impart any taste or odour to the sample.

7.4 Time of the Test — The test shall be carried out at least one hour before or after lunch.

7.4.1 Use of materials which are likely to vitiate results, such as smoking, chewing *PAN* and taking intoxicants by a panelist should have a time lapse of at least half an hour before the test. Use of strong odoriferous substances (cosmetics, flowers, hair oils, etc) should be avoided.

7.5 Elimination of Bias

7.5.1 *Appearance* — Differences leading to sample, identifications may be eliminated, when necessary, in one of following ways: reduced illumination, use of coloured lights, or the addition of colours normal for the product type.

7.5.2 Differences in texture or consistency may be eliminated by subjecting all samples to maceration or blending, normally with the addition of water.

7.6 Number of Samples — The number of samples served in any one session shall depend upon the sensory nature of the test product and upon the evaluation method used. In case the test products exert mild sensory effects, large number of samples may be evaluated at a time. The number of samples which may be accurately judged shall be limited, if the test product exerts strong prolonged sensory effects.

7.6.1 To eliminate carry-over of aroma and taste, when more than one sample is being tested, suitable material, such as water, soda, and bread should be given between the samples to eliminate carry-over of taste and aroma.

7.7 Coding — Since coding is necessary to obscure the identity of the sample, a multiple digit code generated from a table of random numbers should be used. Avoid constant use of certain codes or a set of codes to expedite tabulation of results.

7.8 Order of Presentation — When a test involves more than one sample the order in which the samples should be presented is very important. A panelist may respond differently to the samples simply because of the order of presentation. The samples shall be presented as per the experimental design to minimize error and bias. However, a definite order of presentation of samples required for tests, such as threshold and dilution methods.

7.9 Evaluation Cards — The evaluation cards should be clearly printed and the matter should be arranged in logical sequence for examination which is expected under each test. Appropriate terminology without ambiguity shall be used. The evaluation cards should be simple, brief, easy to follow and record what is exactly required; it should not lead to doubts—for instance, whether equal preference and ranking are allowed. Any doubt about the evaluation card shall be answered by panel organiser without affecting the aim of the experiment and influencing the panelists.