
UNIT 9 DEFINITION, APPLICATION OF SENSORY QUALITY PARAMETERS AND SENSORY LAB REQUIREMENTS

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9.0 OBJECTIVES

After reading unit we should be able to:

- 1 Define sensory evaluation and apply it for different uses;
- 1 State the role of different receptors/senses in sensory evaluation;
- 1 Control the different factors for proper conduct of sensory evaluation; and
- 1 Design and develop a sensory laboratory.

9.1 INTRODUCTION

We, as consumers, eat only that food which is palatable and enjoyable. Palatability means the quality of food should be appealing and appetizing and we crave for more. The primary consideration for selecting and eating a food commodity is thus the palatability or eating quality, and other quality parameters, such as nutrition and wholesomeness are secondary. For the consumers the eating quality attributes – aroma, taste, aftertaste, tactual properties and appearance are the deciding factors in food acceptance. Thus quality is that “which the consumer likes best” and the grades of quality are understood more by the degree of desirable attributes and absence of undesirable characteristics. All these attributes are detected by

our sensory organs, hence this method of deciding quality of a food is called as sensory evaluation.

In our country, the dairy industry so far considers the chemical and microbiological quality as the sole criteria of deciding food quality. With the availability of more milk, increased competition and consumers' awareness about quality, the significance of sensory evaluation is being realized and it is emerging as an important analytical tool in fast growing dairy industry.

9.2 DEFINITION, IMPORTANCE AND USES OF SENSORY EVALUATION

i. Definition

Sensory evaluation may be defined as a scientific discipline used to evoke, measure, analyze and interpret results of those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste, touch and hearing.

ii. Importance

A number of quality assurance procedures are used to examine and maintain quality of a dairy product. The testing starts from reception of raw material, for example, milk, to close examination of finished product. These tests are physical, chemical, microbiological and sensory. The sensory evaluation is very important in product evaluation on account of following advantages:

- i) It is a simple analytical tool,
- ii) It identifies the presence or absence of perceptible differences in terms of flavour, texture, colour and appearance,
- iii) These important quality attributes are measured in a fast and quantifiable manner employing sensory techniques. The use of chemical and instrumental methods for examining sensory characteristics are time consuming, complicated and expensive,
- iv) It enables identification of a particular problem or defect that cannot be detected by other analytical techniques,
- v) Sensory evaluation techniques help in ensuring that the consumers get a non defective and enjoyable product.

In recent years, the competition in food/dairy corporate has tremendously increased. The companies are making very fast changes in their existing product in terms of ingredients, value addition, packaging etc. or developing new products to grab larger market share. In all these situations, sensory evaluation plays a critical role. You can adopt sensory evaluation for following uses.

- i) **Inspection of Raw Materials:** The main raw material for dairy industry is milk. Any defect in quality of milk related to colour, appearance, aroma and taste can be quickly detected on the reception dock by the senses of smell, taste and sight. This will help producing final product of good quality. The other raw materials, such as, sugar, stabilizer, emulsifiers, flavouring and colouring substances and other additives are also examined for colour and flavour.

- ii) **New Product Development or Improvement of Existing Product:** According to a survey more than 90% of the new products developed result into failure mainly because of poor sensory attributes and rejection by the consumers. The adoption of appropriate sensory methods during new product development is thus inevitable.
- iii) **Cost Reduction:** In addition to eating quality of a dairy product, the cost is also an important consideration for selection of the product by consumers. Hence, dairy product manufacturers always try to reduce the cost by either using low cost ingredients or adopting good management skills. The use of low cost or alternative ingredients may adversely influence the sensory characteristics of the product and may not find good acceptability. The sensory evaluation of product during these modifications is, therefore, highly advantageous.
- iv) **Quality Control:** The modern day concept of “Total-Quality-Control” (TQM) involves sensory evaluation at all stages of product flow. This includes, not only the sensory quality of raw material, but also quality of product during processing and storage. The changes in product quality in terms of colour, flavour and texture during processing and storage has to be regularly monitored using sensory techniques.
- v) **Selection of Packaging Material:** Now the consumers have become very quality conscious and prefer to buy properly packaged processed food. This has resulted into development of various types of packaging materials for food applications. The newer types of packaging materials, particularly in forms of flexible films/pouches/laminates are being extensively used. The suitability of these films for packaging a particular dairy product in respect of containment of product, its non-reactiveness with food ingredients and compatibility to storage conditions has to be examined adopting sensory analysis along with some chemical/ instrumental method.
- vi) **Shelf Life Studies:** Dairy products during storage undergo many types of changes, for example, chemical, bacterial, enzymatic, physical, etc. All these alter the sensory properties, such as taste, colour, flavour, texture and appearance. Application of sensory evaluation not only monitors these changes but also determine the nature and extent of the defects in dairy product during storage so that corrective measures can be adopted. As per the existing rules, the mention of ‘manufacture date’ and “expiry date or use before date” on the label are mandatory. The expiry date has to be determined by using chemical and sensory techniques together.
- vii) **Establishing Analytical/ Instrumental/ Sensory Relationships:** Such relationships are highly useful for quick evaluation of the product quality and for designing new equipment for product manufacturing. Some relationships between sensory properties of milk and dairy products with that of analytical or instrumental techniques have already been established, for example, the titratable acidity of fresh milk ranges between 0.14 to 0.16%, and at 0.17% and above it may impart sour flavour. Similarly the free fatty acid (as oleic acid) in ghee of good quality (no rancidity) should be less than 2.8%. Relationship between sensory textural attributes, hardness, stickiness, chewiness, gumminess and elasticity/ sponginess with that measured by an instrument can also be established.

Check Your Progress - 1

1) What are the important parameters for deciding eating quality of a food?

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2) Define sensory evaluation in your own words.

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3) Describe the advantages of sensory evaluation in comparison with of other analytical methods

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4) List the major applications of sensory evaluation.

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9.3 SENSORY RECEPTORS AND THEIR ROLE IN SENSORY EVALUATION

Sensory receptors are detectors (or senses), which indicate about the physical and chemical changes in our environment, Psychologists recognize 22 special senses, out of which 5 are primary senses and perceive stimuli. These senses are sight, hearing, touch, smell, and taste. Other senses include: temperature, pain, visceral, hunger, thirst, fatigue, sex (drive) and equilibrium.

In human beings at least three different senses respond to specific chemical stimuli: taste, smell and common chemical or pain sense. The sense organs consist of sensory cells or group of cells, which respond to stimuli and transmit an impulse via the nervous system to the brain. Human nervous system constitute of chemical senses, somatic senses and auditory. The type of stimulus, corresponding receptors and human experience exhibited by these senses is shown in Table 9.1.

Table 9.1

Type of Senses	Stimulus Type/ Reaction	Receptor	Human Experience
1. Chemical			
Gustatory	Chemicals (water soluble)	Taste buds	Tastes
Olfactory	Chemicals (gas soluble/ volatile)	Olfactory cells	Odours
2. Somesthetic (Body)			
Cutaneous	Temperature change	Cells in skin	Warmth/ coldness
	Mechanical pressure	Cells in skin	Pain
	Intense energy/ heat	Free nerve endings	Pain
Kinesthetic	Mechanical pressure	Cells in tendons, muscles	Deep pressure
Vestibular (static)	Heat movement	Cells in semi-cellular canals and vestibule	Balance
Organic	Chemical or mechanical action	Cells in viscera	Pressure, Hunger, Nausea
3. Distance			
Visual	Light waves	Rods and cones of retina	Colour
Auditory	Sound waves	Hair cells of corti	Sound/ pitch

i. Taste Receptors

The tongue serves as the major organ of taste. The raised portions on the tongue, known as papillae, are considered to be sites of taste buds, the receptors of taste. The tongue is insensitive to taste in the regions where there are no papillae. Gustatory (taste) sensibility is mainly confined to the tip and edges of the tongue and absent in middle of the tongue.

Four kinds of papillae are found on the human tongue as shown in Fig. 9.1 These are *Foliate*, *Circumvallate*, *Fungi* form, and *Filli* form.

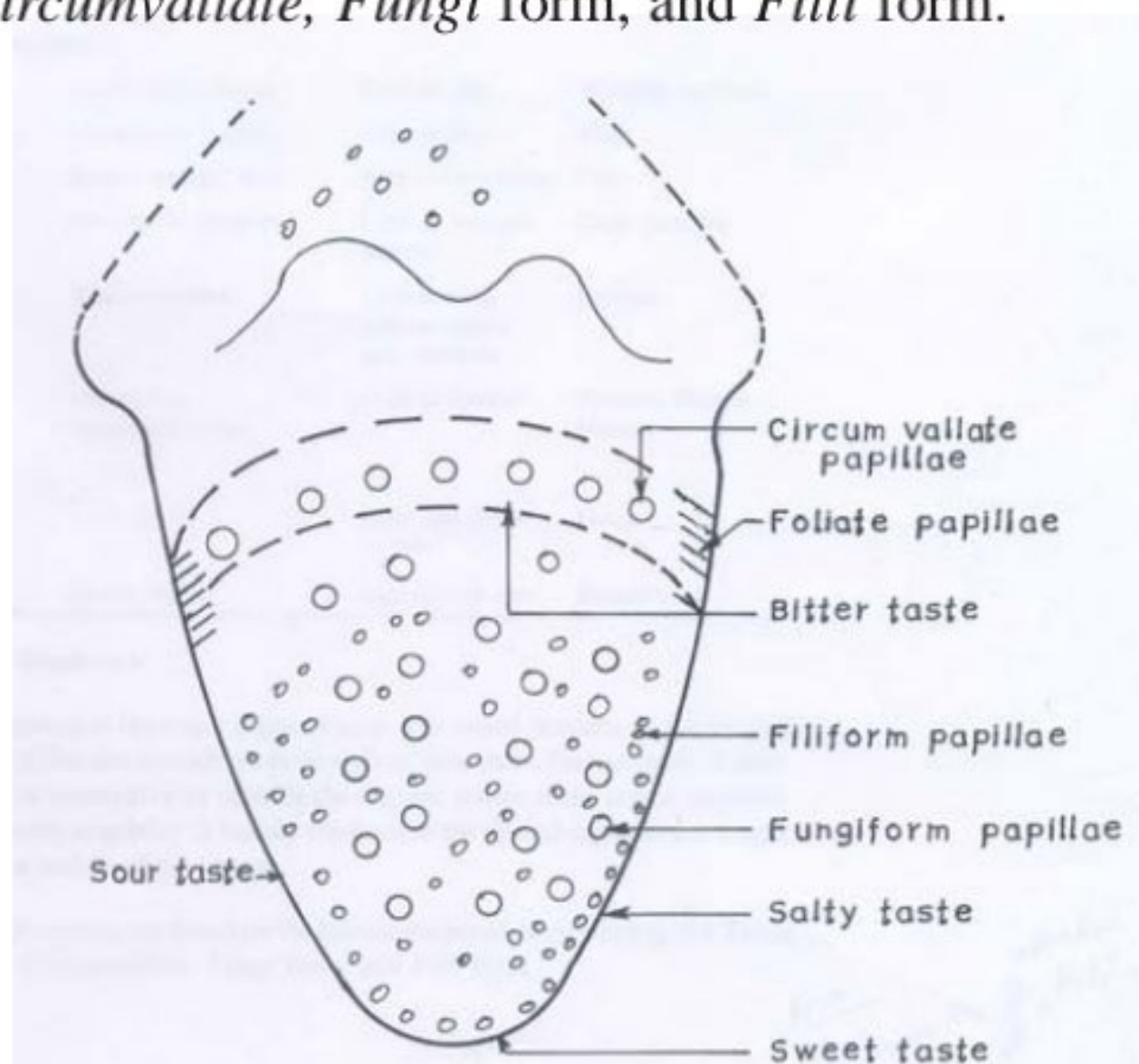


Fig. 9.1: Front View of Tongue Showing Different Papillae and The Regions Where Basic Tastes are Perceived

Filliform papillae, evenly distributed on the anterior 2/3 of the tongue are most numerous but have no taste buds. Fungiform papillae, large and round and mushroom-like in appearance are large in number at the tip and sides of the tongue. Foliate papillae are found on the posterior one third of the tongue, usually in folds on the sides. These are also not well developed in man and have little function. The circumvallate papillae present in form of “V-shape” on the back of the tongue are large and easily visible.

Human taste buds are located on moist surfaces within the oral cavity and pharynx. A few non-papillae associated taste buds may also be found in such locations as the Soft palate, Pharynx and Larynx. These taste buds are simply embedded within the epithelium of the mucous membrane. The group of epithelium cells, some of which are supporting cells and other taste cells are innervated (stimulated) by sensory nerve endings. When a taste bud is exposed to the taste stimulus, strong taste signals are transmitted by taste nerves into the central nervous system and finally taste reflexes are integrated into the brain stem directly into superior and inferior nuclei. Based on transmission of these impulses to the submaxillary, sublingual and parotid glands, excretion of saliva is controlled during ingestion of food.

Taste perception: Taste buds differ somewhat in their response to stimuli. The four basic taste solutions are perceived by different regions of the tongue (Fig.9.1).

- 1 Sour taste may be noted chiefly along the sides of the tongue
- 1 Saltiness along the sides and tip
- 1 Sweet taste generally at the tip
- 1 Bitter taste perceived at the base of the tongue.

ii. Odour/ Smell Receptors

The sense of smell is far more sensitive than the sense of taste. An average person requires relatively concentrated solution to perceive taste sensation. In contrast an odoriferous substance, e.g. mercaptan may be diluted to the extent of 0.43×10^{-15} mg/litre of air and yet be recognized as such by the sense of smell.

The nose equipped with olfactory nerves, is the special organ of smell. The olfactory receptors are located mainly in the uppermost region (roof) of the nasal cavity and are lined with so-called olfactory epithelium, which is yellowish in colour with pink respiratory epithelial cells around it. The surface of the olfactory epithelium is coated with a layer of mucous. Embedded in the mucous layer is a mat of fine hair-like appendages of the olfactory cells called cilia. The cilia are excited by molecules of odorous substances. The olfactory area, about 2.5 cm size, is reached chiefly by eddy currents rather than the direct passage of air during inhalation. The odorous substance must, therefore, be sniffed or whiffed rather slowly but strongly. The molecules of odorous substances also reach the olfactory area from the mouth during mastication of the food. Therefore, during the tasting of dairy products the judge/ evaluator actually is sensing the odour and taste of the product at the same time. The overall physiological concept of odour perception is schematically shown in Fig. 9.2.

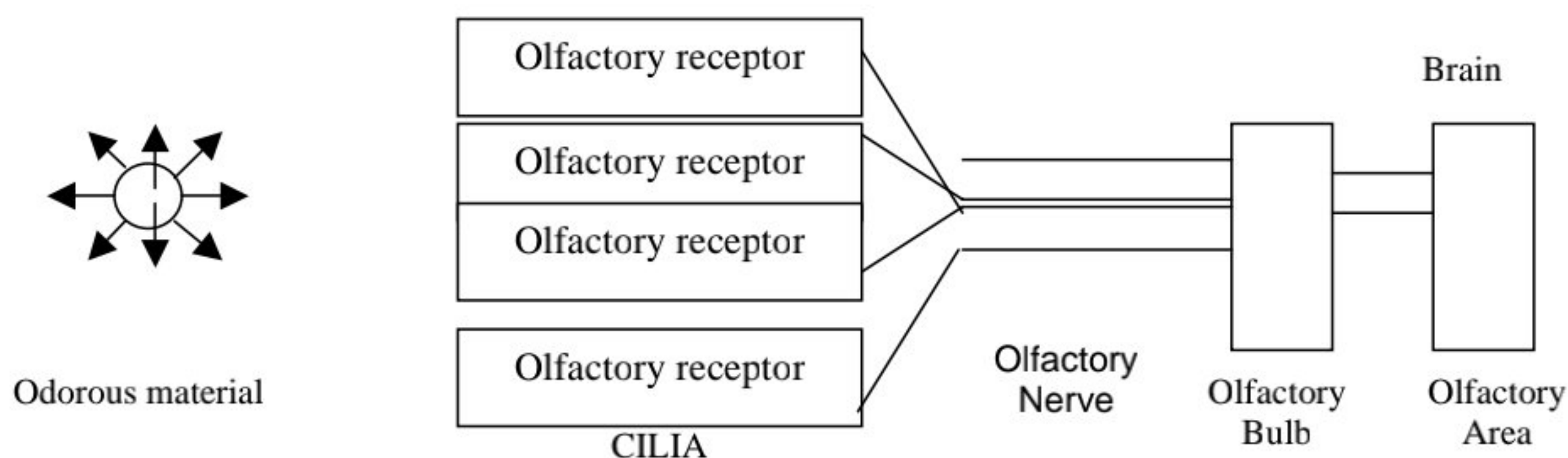


Fig 9.2. Physiological concept of odour perception

Odour Perception: In order to properly perceive the odour of a substance, the following aspects are important and should be kept in mind.

- i) The prospective odorous substance/chemical must be volatile. The volatility of a substance depends on its molecular weight and molecular bonding properties. The upper limit of a 'smellability' is usually a molecular weight of about 300, although a compound of molecular weight, 394 has odour. This means that substances with heavier molecular weight, such as proteins, fats, starches and sugars are too heavy to be airborne. The breakdown of these heavy molecular weight compounds produces low molecular weight substances, which impart desirable and undesirable flavours in dairy products. The volatility of chemical substances also increases with the increase in temperature.
- ii) The odour-laden air must reach the olfactory receptors. The substance must, therefore, be strongly sniffed.
- iii) Odorous substances must be adsorbed or adhered to the chemoreceptors sites in the nose. To be absorbed, the volatile substance must be soluble to some extent in the receptor cell membrane, which consists of lipids, proteins and water.
- iv) The evaluator should have normal smelling capacity. People with obstructed nasal passage, brain lesions or injured olfactory nerve are unable to smell, either partially or of have a particular substance or group of substances. The situation is called as "anosmia".

9.4 ROLE OF PRIMARY SENSES IN JUDGING DAIRY PRODUCTS

The relationship of five primary senses with different attributes of dairy products is shown in Fig. 9.3 below.

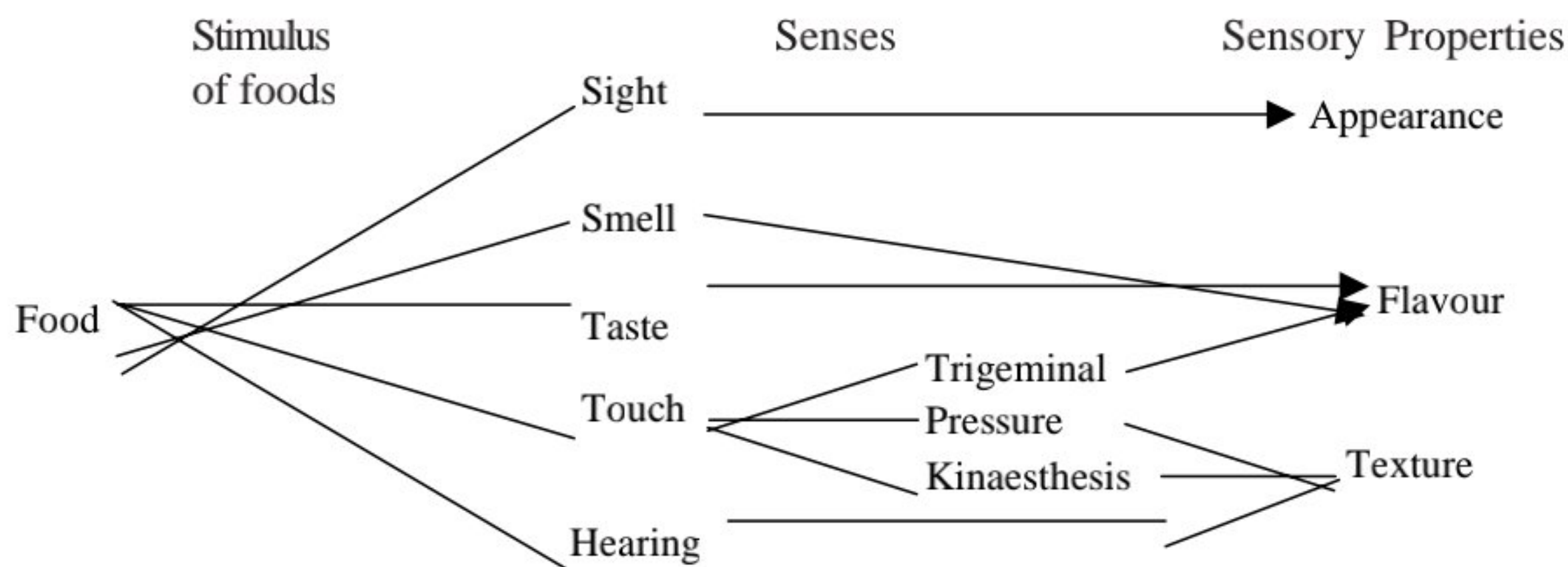


Fig. 9.3 Relationship of the Five Primary Senses with Sensory Attributes of a Food Product

- a) **Sight:** The characteristics of a dairy product that can be evaluated by sense of sight are: style, neatness and cleanliness of package exterior, attractiveness of product finish, package closures, colour consistency, body and texture and overall appearance. The labeling of the packaging has also to be examined. Colour and appearance aspects of dairy products should not be overlooked because these features may render the product acceptable/ unacceptable.
- b) **Smell (Aroma):** This sense plays paramount role in evaluation of quality of dairy products. The role of olfactory perception is greater in overall flavour than the taste. Milk and dairy products are smelled for aroma perception immediately after the opening of closure/ package and earlier than the taste.
- c) **Taste:** It is a companion sense with aroma in establishing the overall flavour of dairy products. In some of the products, particularly frozen dairy product where volatile compounds are not perceived by sense of smell at very low temperature, the sense of taste plays deciding role for evaluating the flavour.
- d) **Touch:** Tactual and mouth feel play an important role in examining the body and texture characteristics. The tongue and palate evaluate feeling of meatiness and grittiness in butter and sandy defect in ice cream and sweetened condensed milk. The pressure between the teeth and jaws determine the hardness, chewiness and gumminess. The fingertips and ball of the thump help in determining other textural attributes, notably stickiness, elasticity/ sponginess and brittleness.
- e) **Sound:** The evaluator can detect the presence of ice crystals while drawing a ice cream sample with spoon. The relative size and distribution of holes in Swiss cheese can be felt by the gentle tapping of the outside of the cheese.

Check Your Progress – 2

1) Name the primary senses of human beings.

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2) List the different receptors that detect the quality parameters in a food.

3) Which conditions are important for a substance to be perceived by the sense of taste and sense of smell?

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9.5 REQUIREMENTS FOR SENSORY EVALUATION

A successful implementation of sensory evaluation programme requires three major components:

- i) Proper laboratory facilities
- ii) Sensory panels/evaluators, and
- iii) Rigorous training programme

The first requirement, that is, proper laboratory facilities is discussed in this unit, and the other two will be dealt in unit 2.

i. Sensory Evaluation Laboratory

Many designs of the sensory evaluation laboratory are available. One such design has been shown in Fig. 9.4. Generally sensory laboratory should include a briefing room, an office, testing booths and sample preparation room. Irrespective of the design, the most important considerations for a sensory laboratory are location, ventilation, lighting, traffic pattern, sample preparation and presentation, evaluators communications and experimental comfort.

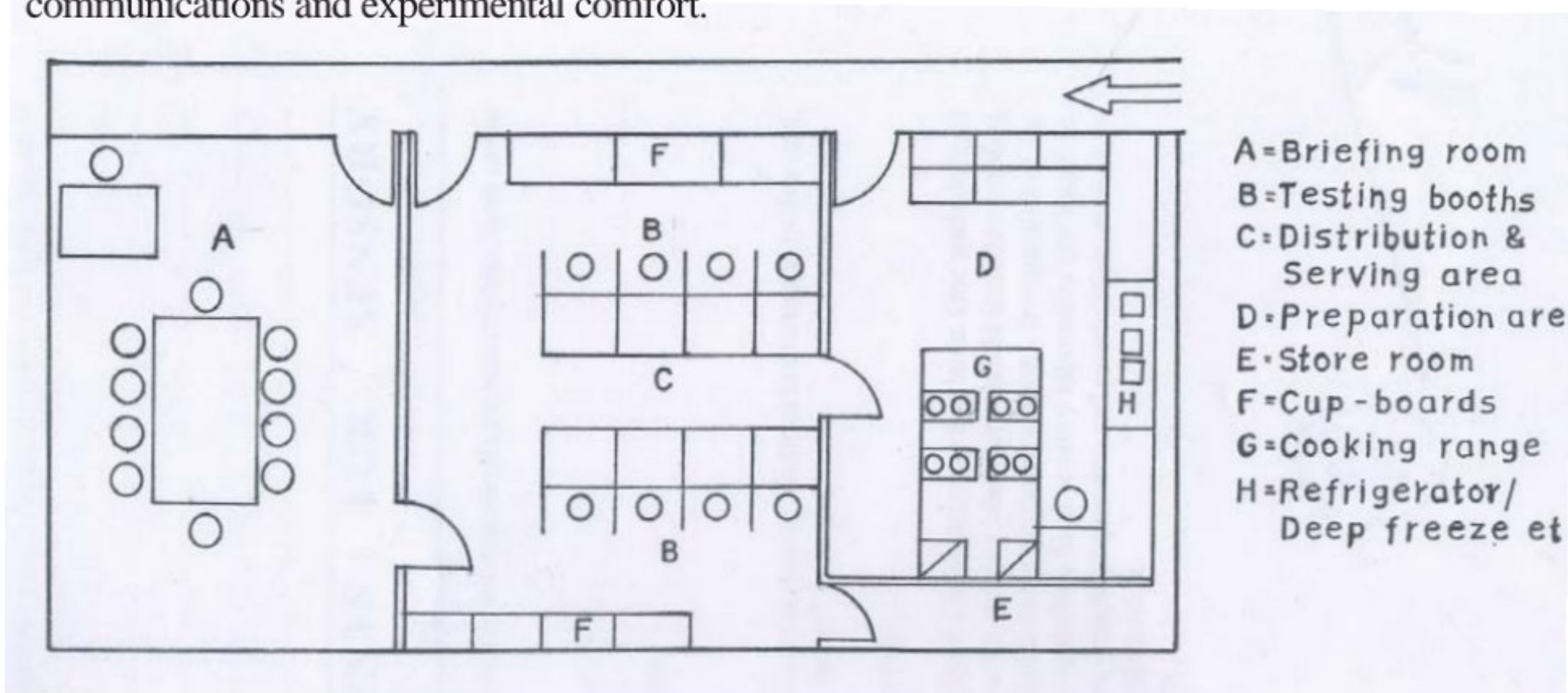


Fig. 9.4: Design of a Sensory Evaluation Laboratory

- a) **Briefing Room:** All the sensory evaluators are first assembled here. They are briefed by the organizer/leader of the project about the objective of the sensory work, scorecard and its use and give other instructions. This room should be adjoining to testing booths and have facilities for comfortable sittings. If enough space is not available for a separate office for sensory leader or organizer, briefing room should also serve as office.
- b) **Testing Booths/Area:** This is the area where panel members carry out actual sensory evaluation of dairy products. Testing area shall be located separately but in the immediate vicinity of the preparation area. This area is normally divided in to small booths (number of booths between 5 to 10) so that each panel member can independently evaluate the product. Following conditions have to be maintained in testing area for obtaining best results:
- The temperature and relative humidity shall be constant, controllable and comfortable for evaluators. A temperature of about 20°C and 62% relative humidity are considered to be optimum.
 - Noise level shall be kept to a minimum during the tests. The movement of persons shall also be restricted in the area.
 - The testing area shall keep free from odours. A slight positive pressure may be created in the testing area to reduce inflow of odorous air from other area.
 - Lighting is very important in all sensory testing. It is particularly important in colour examination of dairy products. Lighting particularly in testing booths shall be uniform, shadow free, controllable and of sufficient intensity to permit effective evaluation of the colour and appearance of samples. In most cases, lights having a correlated colour temperature of 6500 K (or 110 candle foot light) are desirable. In order to mask differences in colour and other appearance characteristics special lighting devices, such as a dimmer device, colored lamps/filters or sodium vapour lamps, may be provided.
 - The size of each testing booth shall be sufficiently large to accommodate the samples, utensils, sink, rinsing agents and score sheet/card. An area of 0.9 m wide and 0.6 m deep is considered optimum for this purpose. The height of working space in the booth should be appropriate to allow comfort to the evaluator.
 - A counter on the serving/distribution area side shall be provided. Openings, covered by sliding doors, of convenient size may be provided for supplying samples into the booths from the serving counter. A system, such as light bulb on the counter side, is devised for evaluator to signal to the operator when he is ready for a sample.
- c) **Preparation Room:** A laboratory (or kitchen) for the preparation of samples shall be located adjacent to the testing area. Its location shall be such that the evaluators do not have to pass through testing area. The preparation area shall be well ventilated so that odours emanating from the samples preparation are removed. The type of equipment required in this area depends on the range of products, which will be processed here. The main components of the preparation room for dairy products are: working space, sink, cooking range, oven,

refrigerator, deep freeze, blender, scoops, knives, balance, dishes, spoons, and cleaning and storage facilities. Utensils and cutlery used in sample preparation and presentation shall be of the materials, which do not impart any odour or taste to the product.

9.6 FACTORS AFFECTING SENSORY EVALUATION

- i) **Health of Evaluator:** The evaluator should be physically and mentally in good health. The sensitivity for evaluator in respect of sense of smell and taste should be normal. He/she should not be suffering from anosmia and ageusia.
- ii) **Age:** Evaluators should preferably be in the age group of 18-50 years. Persons of younger age are unable to properly interpret and communicate the sensory results, whereas at older age the memory decreases. Sharp memory of evaluator is considered highly useful in judging of dairy products, particularly for quality control applications.
- iii) **Interest and Motivation:** Sensory evaluation work is very time consuming and sometimes fatigue also. The evaluator should, therefore, have interest and be motivated.
- iv) **Adaptation:** Continuous exposure of evaluator to a particular stimulus, particularly at high concentration for long time, leads to decrease in his sensitivity (also called as fatigue). It is therefore desirable either to give sufficient time between the samples or use taste sanitizers, such as brine solutions, fruits and mild acids. The taste sanitizers improve the taste sensitivity or bring it back to normal level.
- v) **Sampling:** The sample should be representative of the lot. Care shall be taken that no loss of flavour occurs and no foreign tastes or odours are imparted during the sample presentation. The sample should be drawn from a bulk lot in such a way that body and texture characteristics are not changed.
- vi) **Sample Numbers and Quantity:** For economic efficiency of sensory testing, larger the number of samples per session, the better it will be. However, the size and quantity of sample for each judging session vary from product to product. Normally 5-8 samples with average intensity of flavour for each sitting are optimum. Number of samples may be increased in case of odorous material of low intensity. The amount of each sample should be about 25-50 ml or gm, which is sufficient for one full sip or bite.
- vii) **Score Card:** The evaluation card should be simple, brief, easy to follow and all important sensory attributes included in it. It should be clearly printed and the matter should be arranged in logical sequence. Terminology used shall be clear and understandable.
- viii) **Miscellaneous Factors:** The temperature of serving should be close to that recommended for each product (Unit 3). The test should be carried out preferably one hour before or after lunch. Use of materials, which are likely to vitiate results, such as smoking, chewing pan and taking intoxicants by the evaluator should have a time lapse of at least 30 minutes before the test. Use

of strong odoriferous substances such as cosmetics, flavours, hair oil should be avoided by the evaluator as well as in the testing area.

Check Your Progress – 3

- 1) Name the most important area of a sensory evaluation laboratory and write the conditions to be required in this area.

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- 2) What facilities in a testing booth can be provided to mask colour effect while judging dairy products?

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- 3) Define adaptation. What is its importance in sensory evaluation?

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- 4) Write important Do's and Don'ts for proper judging of dairy products.

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9.7 LET US SUM UP

The measurement of the eating quality of food, such as colour, appearance, aroma, taste and texture with the use of our primary senses is referred to as sensory evaluation. In a modern food processing unit, sensory evaluation plays a critical role starting from the reception of raw material till the processed food reaches to the consumers. In fact the success of a food processing unit is based on the acceptability (sale) of their product by the end users i.e. consumers. Sensory evaluation as an analytical tool is simple, measures the quality attributes in fastest manner and ensures that consumers get palatable and enjoyable food. The important applications of sensory evaluation are: inspection of raw materials, new product development, improvement of existing product, cost reduction, quality control, selection of packaging materials, study of shelf life of product and establishing relationship between sensory, analytic and instrumental methods.

Sensory attributes of dairy products or any food are measured mainly by our five primary senses, namely sight, hearing, touch, smell and taste. Rods and cones of retina in our eyes determine the colour and its intensity. Hair cells of corti relate to auditory sense and perceive the food characteristics related to sound. The cells in skin, free nerve endings, tendons, muscles and joints (in mouth) help us to determine the textural properties, warmth/coldness and pain. Olfactory cells are the receptors for aroma/odour detection and taste buds located on papillae of our tongue recognize the taste characteristics of foods.

Sensory evaluation laboratory should be properly designed and equipped with all the basic facilities needed for smooth conduct of sensory evaluation. Briefing room shall be adjacent to the testing area and have an environment of comfortable sitting to the evaluators. Sensory booths located in the testing area are important parts of a sensory laboratory where evaluators do actual testing of products independently. It should have sufficient ventilation, working space and lighting facilities and should be free from odours and outside noise. All facilities related to sample preparation, presentation and storage of dairy products should be provided in preparation room.

9.8 KEY WORDS

Adaptation	: Loss of or change in sensitivity of a given stimulus as a result of continuous exposure to that stimulus. Also known as fatigue.
Ageusia	: Lack or impairment of sensitivity to taste stimuli.
Anosmia	: Inability to smell either totally or a particular substance.
Aroma	: The fragrance or odour of food perceived by the nose of sniffing.
Cilia	: Fine hair-like appendages of the olfactory cells, that are excited by the molecules of odoriferous substance and transmit to olfactory bulb.
Cutaneous	: Sensory system consisting of cells in skin and free nerve endings responding to warmth, cold, pressure and pain.
Evaluator	: Person who is evaluating the sensory quality of a food. Its synonyms are Assessor, Judge, Panelist.
Flavour	: Total impression about a product as a result of combined smell (aroma), taste and after taste perceptions.
Gustatory	: The sense of taste.
Kinesthesia	: The sense whose end organs lie in the muscles, tendons and joints and are stimulated by bodily tensions.
Olfactory	: The sense of smell.
Palate	: The roof of the mouth.

- Perception** : The process of becoming aware of objects, qualities, or relations by way of the sense organs.
- Quality Control** : Means maintenance of quality of the product at par with certain defined limits of attributes or parameters.
- Quality** : It is the combination of attributes or characteristics of a product that have significance in determining the degree of acceptability of the product to a user.
- Score Card** : A tabulated list of various attributes or characteristics (like colour, flavour, texture, etc.) with a numerical value assigned to each for assessing the sensory quality.
- Sensory Receptors** : These are detectors, which inform us about the physical and chemical change in our environment.
- Shelf Life** : Defined as the period between manufacture and retail purchase of a food product during which the product is of satisfactory quality.
- Stimulus** : Any substance that incites or excites the receptors, for example an odorous substance or a rapid solution or even an electric current. Stimuli is plural.
- Texture** : Properties of a food stuff apprehended both by the eyes and by the skin and muscle senses in the mouth, embracing roughness, smoothness, graininess, etc.

9.9 SOME USEFUL BOOKS

- Amerine, M.A., Pangborn, R.M. and Roessler, E.B. (1965). Principles of Sensory Evaluation of Food, Academic Press, New York.
- Bodyfelt, F.W., Bobias, J. and Trout, G.M. (1988). The Sensory Evaluation of Dairy Products, AVI Publ. Co., New York.
- Eggert, J. and Zook, K. (1986). Physical requirement guidelines for sensory evaluation laboratories. ASTM STP913. American Soc. Testing Materials, Philadelphia.
- Nelson, J.A. and Troat, G.M. (1964). Judging of Dairy Products, AVI Publ. Co., New York.
- Stone, H. and Sidel, J. (1993). Sensory Evaluation Practices, Academic Press, Inc. London.

9.10 ANSWERS TO CHECK YOUR PROGRESS

Your answer should include the following points:

Check Your Progress – 1

- 1) The eating quality of a food is decided on the basis of sensory attributes – aroma, taste, feel, tactual property, colour and appearance.

- 2) An objective method of determining those attributes or characteristic, which are perceived by the sense of smell, taste, sight, touch and hearing.
- 3) Advantages of sensory evaluation are:
 - 1 simple and quick technique of measuring quality of a food
 - 1 can identify those desirable and undesirable characteristics of a food which can not be measured by chemical and instrumental methods.
 - 1 non-defective food can be provided to the consumers and thus sensory evaluation helps increasing acceptability and sale of the product..

You may mention the more important applications of sensory evaluation, e.g. inspection of raw materials and finished product, new product development, quality control, determination of self life, selection of packaging materials, cost reduction etc.

Check Your Progress – 2

- 1) Primary senses in human beings are smell, taste, sight, touch and hearing.
- 2) The main receptors and the corresponding human experience are:
 - a) Taste buds – detect types of taste.
 - b) Olfactory cells – recognize odours.
 - c) Cells in skin and free nerve endings – warmth, coldness, pain and textural characteristics.
 - d) Cells in tendons, muscles and joints – texture of foods such as hardness, chewiness, gumminess etc.
 - e) Hair cells of corti – sound/ pitch.
 - f) Rods and cones of retina – colour and hue of foods.
- 3) For a substance to be perceived by sense of smell, it must be air borne (odorous), preferably having low molecular weight (about 300) and should be brought to the olfactory cells and to bulb. A chemical substance should be sapid (in liquid form) and make contact with the taste buds.

Check Your Progress – 3

- 1) The most important area of a sensory evaluation lab is testing area. The necessary conditions is testing are: a) humidity about 60%; b) temperature about 20°C; c) lighting – sufficient (correlated colour temp. 6500 K), uniform and shadow free; d) sensory booths – facilities of sink, writing space, colour masking device, comfortable sitting facilities etc.; and e) sufficient space (0.9 m wide x 0.6 m deep)
- 2) In some experiments or situations, the influence of colour of the product has to be masked or ignored. The colour masking facilities in sensory booths are, therefore, provided. This can be achieved by providing a dimmer device, coloured

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lamps/filters (normally red and green are more effective) or sodium vapour lamps in the sensory booths.

- 3) The decrease or loss of sensitivity of a evaluator due to continuous exposure to a particular stimulus or substance or use of high concentration of the stimulus is called as adaptation. Under this condition the evaluator is unable to either completely detect the sense reactions or cannot detect the problem at low concentration. Therefore to overcome this condition, sufficient gap is given between two samples, or proper mouth rinsing or conditioning has to be done.
- 4) Do's: For proper judging of dairy products, the laboratory conditions should be favourable, size of sample should be sufficient, sample should be representative and at proper temperature, numbers of samples at each session should be 5-6.

Don'ts: Evaluator should not use perfumes, cosmetics or odoriferous substances; should not smoke, chew pan or use intoxicants atleast 30 min before judging; interval/gap between judging and lunch should not be less than one hour before and after.