Sensory analysis, the different methods and how it is used

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Content

1. Sensory evaluation – a scientific discipline
2. Human senses in action
3. The sensory panel – recruitment and screening
4. Control of sensory facilities, samples and panels
5. Sensory tests and their uses
1. Sensory Evaluation
Definition

Sensory evaluation is a ‘scientific discipline used to evoke, measure, analyse and interpret reactions to those characteristics of foods and other materials as they are perceived by the senses of sight, smell, taste, touch and hearing’.
Use of human subjects in sensory evaluation

- People are consumers (can be used in subjective consumer tests)
- They give rapid response that is easy to interpret
- They provide qualitative and quantitative information
- They can be trained (for objective product orientated tests) and used as analytical instruments
2. Human Senses in Action
The main sensory perceptions

- **Appearance**
  - colour, shape, size, surface texture, brightness

- **Odour**
  - smell, aroma

- **Taste**
  - the basic tastes

- **Flavour**
  - taste, aroma and trigeminal response

- **Texture**
  - body, mouth feel, hardness/softness
Flavour

The combination of taste, aroma and trigeminal response is often described as ‘flavour’.
Trigeminal response

• caused by irritating chemicals e.g. CO$_2$ in fizzy drinks
• can be either hot, burning, cooling, tingling/pain or astringent sensations
• occurs in mucus membranes of eyes, nose and mouth
• other examples of irritating chemicals: e.g. in chilli pepper
3. The Sensory Panel
Recruitment considerations

• types of tests to be conducted
• the number of sessions per day / week
• the number of panel needed
• internal or external assessors
Assessor screening criterion 1

• no sensory impairments

• ‘normal’ sensory acuity

• suitable personality traits

• willingness to assess ‘unusual’ products
Assessor screening criterion 2

• personal habits – be prepared not to smoke, use odorous cosmetics/soap, eat strong foods before tests

• good general health (no allergies/food intolerances)

• no availability/long-term commitment issues
Panel training

- increase knowledge of product and test method

- nature/amount of training relevant to type of test or product under investigation
4. Control of Sensory Facilities, Samples and Panel
Reasons for controlling facilities and procedures

• to minimise sources of bias
• to reduce variability of response between assessors
• to promote a professional approach to sensory evaluation within the organisation and to the assessors
Design of sensory facilities

- controlled lighting/colour; adequate illumination
- controlled air circulation, odour extraction
- controlled temperature
- quiet, undisturbed area
- adequate cooking / sample preparation area
- odour-free easy-clean materials and implements
- booths for separation of assessors
- computers or paper data capture
Panel booths with separate sections for each assessor.
Sample presentation

- standard/controlled procedures e.g. cooking regimes, serving temperature
- consistent portion size, representative of the sample to each assessor
- sample coding – commonly 3 digit random codes
- balanced, random order of presentation
A sample tray set-up for presentation to an assessor
5. Sensory Tests and their Uses
Types of sensory tests

- Discrimination
- Descriptive
- Affective (preference / acceptance)
Discrimination / difference tests

Scope:

“Does a sensory difference exist between my samples?”
Overall difference tests

Can be used to identify detectable difference between samples being compared in the same session

The most common method is Triangle Test

830  198  224
Applications of difference tests

- Screening and training assessors
- Assessing the effect of changes in raw material, process and/or packaging on finished product quality
- Investigating the presence of off-flavours and taints
- Determining changes in product quality over shelf life
- Verifying changes to formulations during product development
Descriptive tests
(descriptive profiling methods)

Scope:

“What is the nature of the differences between my samples?”
Descriptive tests

• The perceived levels (**intensities**) of each of the described attributes are measured (**quantitative aspect**)

• Methods of descriptive analysis can only be used by a **highly trained** (expert) panel, usually consisting of a minimum of 6 – 8 assessors

• The result is usually a **sensory profile** or fingerprint of each product.
Presentation of results

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- soft
- smooth
- sweet
- tart
- gummy
- lemon

sorbet 1
sorbet 2

the brighter choice
Applications of descriptive profiling

- Defining the sensory properties of a target product for new product development
- Defining the characteristics (specification) of a control or standard, for QA/QC and R&D purposes
- Monitoring changes in sensory properties of a product during shelf life
- Describing product attributes prior to consumer testing
Affective (acceptance and preference) tests

Scope:

“What sample is most acceptable or most preferred?”
Affective tests

• Affective testing is useful for preliminary investigations prior to consumer research i.e. consumer-orientated testing

• The tests require the use of untrained assessors; at least 50 – 100 are recommended

• Separate sensory panels should be established for affective testing
Preference tests

Ranking used for assessing order of preference

Q. Rank the drink samples in order of preference from least to most preferred
Acceptance (liking) tests

9 Point Hedonic Scale used for assessing degree of liking:

9   like extremely
8   like very much
7   like moderately
6   like slightly
5   neither like or dislike
4   dislike slightly
3   dislike moderately
2   dislike very much
1   dislike extremely
Sensory evaluation
a summary

• a scientific discipline

• basic requirements

• benefits and applications