Session 7: An Introduction to Sensory Evaluation
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19-22 March, 2018
1. Understanding the basics of sensory evaluation

The human senses
Sensory evaluation

Product

Sensory interaction

Human
The human senses

- Visual
- Sound
- Aroma/odour
- Taste
- Texture
Visual

- Overall impression and acceptability
- Indicator of quality, maturity, degree of flavour
- Effect on flavour - anticipation
Sound

- Noise produced during mastication
- May have positive or negative impact
- Consumer use sound as an indicator of quality – eg. A crunchy apple
Taste

- Five basic tastes
  - Sweet
  - Salt
  - Sour
  - Bitter
  - Umami (savoury)

- Perception is affected by a number of conditions – e.g. Personal phenotype and illnesses

Taste exercise

- Five basic tastes
Aroma/odour

- Detected via 2 pathways
  - The nose – orthonasal
  - The mouth – retronasal

- Thresholds of detection vary from person to person
  - Some people have specific anosmias (a lack of ability to smell)

Aroma exercise

- Mint
Texture

- Rheological and structural attributes
- Perceived through sight, touch and sound
- Texture assessment if made as food is moved around the mouth
- It is important to consumers as an indicator of quality
- Astringency is a common texture attribute
Trigeminal nerve

- Senses detected through the trigeminal nerve
  - Pungeancy of ginger
  - Heat of chilli
  - Cooling of menthol
  - Temperature of a product
Limbic system

- Part of our brain structure, includes the olfactory bulb
- Supports many functions including smell, emotion, behaviour, motivation and long term memories
- Humans have a strong emotional connection to food
2. Understanding the basics of sensory evaluation

Sensory test types
Test types – an overview

- Sensory evaluation
  - **Difference testing**
    - Using standard test types to determine a difference
    - e.g. triangle test, ranking test, paired comparison...
  - **Descriptive profiling**
    - Profiling samples qualitatively and quantitatively

- Consumer evaluation
  - Acceptability and preference testing
  - Focus groups
  - Behaviour / Psychology
Test types – an overview

Sensory testing methods

- Preliminary screening
  - Analytical (Objective)
  - Hedonic (Subjective)

- Discriminative tests
- Descriptive tests
- Preference and acceptability
3. Understanding the basics of sensory evaluation

The testing environment and sample preparation
Sensory principles and practices

Sensory evaluation;

“A scientific method to evoke, measure, analyse and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing”

(Stone and Sidel, 1993)
Things to consider

- People / panellists
- Designing the experiment
- Samples
- Test environment
- Logistics
People / panellists

- Appropriate for your test type
- Age / gender / ethnic group
- Likes / dislikes
- Allergies and intolerances
- Eating / smoking before testing
- Perfume / aftershave
- Motivation
Samples – preparation considerations

- Hygiene and safety
- How much sample do you need per person per test
- Uniform temperature, cooking methods
- Representative of product as a whole
- Representative as a commercial product
- How long before testing can you prepare samples?
Samples – serving considerations

- Adequate size / volume but not excessive
  - Usually 10 – 50 g but depends on sample type
- How do you ensure uniform temperature
- Plates / serving vessels / trays (white / colourless)
- Number of samples to serve at a time (fatigue)
- Pace presentation of samples
  - Consider a delay between samples to avoid fatigue
Samples – palate cleansers

- Some common options
  - Filtered water
  - Sparkling water
  - Plain water crackers / dry bread
  - Green apple slices

- Think about your product and what would help to cleanse the palate
Samples - examples
Testing environment – when a controlled environment is applicable

- To provide an area which is constant and controllable and allows panellists to make their assessments with minimal distraction.
  - Uniform lighting
  - Constant and comfortable temperature
  - Odour free
- Sensory booths can be permanent or temporary
- Spittoons, tissues, napkins etc.
- Meeting rooms for discussion and individual tastings if booths not available

Refer to International standard (ISO 8589 - 1988)
Testing environment – in the field

- Still important to practice good sensory methods
- Clean environment
- Sample preparation standardised
- Include multiple panellists – team, co-workers, related and/or unrelated to the product
Assessment across the mango supply chain

4. Putting it into practice

Objective measurements - the retail industry
- Appearance
- Aroma
- Flavour
- Mouthfeel

Subjective measurements – the end consumer
- Overall acceptability
Objective measurements

- **Test type & aim**
  - **Profiling** – to determine what sensory attributes are present and how they change over time; appearance, aroma, flavour and mouthfeel.

- **Panellists required**
  - Up to 10 individual consumers

- **Testing conditions**
  - Central meeting location

- **Sample preparation**
  - Identical preparation for all samples, placed in individually blind coded pots/plates.

- **Methodology**
  - Assess each product and identify the intensity of the aroma and flavour as well as individual sensory attributes present.
Product profiling

Name…………………… Date ……………..

Instructions:
Taste the samples provided.
1. score them for aroma and flavour intensity and
2. identify the aroma, flavour and mouthfeel attributes present

Aroma/flavour intensity – rate the intensity on the scale below

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Below level of acceptability</td>
</tr>
<tr>
<td>2</td>
<td>Low-medium</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
<td>At the level of acceptability</td>
</tr>
<tr>
<td>4</td>
<td>Medium-high</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>High</td>
<td>High level of acceptability</td>
</tr>
</tbody>
</table>

Sensory attributes – identify the sensory attributes present and note any others detected.

<table>
<thead>
<tr>
<th>Aroma</th>
<th>Flavour</th>
<th>Mouthfeel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>Fresh</td>
<td>Firm</td>
</tr>
<tr>
<td>Tropical</td>
<td>Tropical</td>
<td>Soft</td>
</tr>
<tr>
<td>Citrus</td>
<td>Citrus</td>
<td>Juicy</td>
</tr>
<tr>
<td>Musty/stale</td>
<td>Sour</td>
<td>Dry</td>
</tr>
<tr>
<td></td>
<td>Sweet</td>
<td>Stringy</td>
</tr>
<tr>
<td></td>
<td>Bitter</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

Any other attribute(s) ………………………………………………………………………………………….
Objective measurements

- **Test type & aim**
  - **Triangle Test** – to determine whether a significant difference exists between 2 samples (eg. Control vs. test sample)

- **Panellists required**
  - >10 trained sensory assessors

- **Testing conditions**
  - Isolated sensory booths/individual assessment area

- **Sample preparation**
  - Identical preparation for both samples, placed in individually blind coded pots/plates. Samples to be randomised.

- **Assessment of outcome**
  - Refer to statistical table defining critical number of correct responses in a Triangle Test.
**Triangle Test**

Name…………….. Date ……………..

**Instructions:**
Taste the samples on the tray from left to right.
Two samples are identical; one is different.
Select the odd/different sample and indicate by placing an X next to the corresponding code.

<table>
<thead>
<tr>
<th>Samples on tray</th>
<th>Indicate odd sample</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>……………………</td>
<td>………………</td>
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If you wish to comments on the reasons for your choice or if you wish to comment on the product characteristics, you may do so under ‘Remarks’.
Objective measurements

- **Test type & aim**
  - **Difference-from-control test** – to determine whether a difference exists between 1 or more samples and a control and estimate the size of any such differences.

- **Panellists required**
  - 20-50 assessors

- **Testing conditions**
  - Isolated sensory booths/individual assessment area

- **Sample preparation**
  - Identical preparation for all samples. A labelled control sample must be presented with each test sample, placed in individually blind coded pots/plates.

- **Assessment of outcome**
  - Analysis of variance (ANOVA) appropriate for randomized (complete) block design; the assessors are the “blocks” in the design.
# Difference-from-control

<table>
<thead>
<tr>
<th>Name ................</th>
<th>Date ...............</th>
</tr>
</thead>
</table>

**Instructions:**
You have received 2 samples, one labelled C (control) and one labelled with a 3-digit code.
Taste sample C and then rinse your mouth with water.
Taste the second sample and indicate on the scale below the size of the difference in firmness, relative to sample C.

<table>
<thead>
<tr>
<th>Please circle your response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>No difference</td>
</tr>
</tbody>
</table>

Remarks

If you wish to comments on the reasons for your choice or if you wish to comment on the product characteristics, you may do so under ‘Remarks’.
Subjective assessments

- **Test type & aim**
  - **Acceptance testing** – to determine overall liking of a product.

- **Panellists required**
  - Consumers of the product. With the aim of having a cross section of age and gender.

- **Testing conditions**
  - Suitable testing environment; meeting room, retail store, market place etc.

- **Sample preparation**
  - Identical preparation for all samples. Blind coding required to prevent consumer bias.

- **Assessment of outcome**
  - Mean score
  - Analysis of variance (ANOVA) when >1 sample assessed for comparison of liking
Acceptance testing

Name…………….. Date ……………..

Instructions:
Please smell and taste each of the products and answer the questions provided.

How much do you like the sample 123 overall? (Scale types are optional).

1  Dislike very much
2  Dislike slightly
3  Neither like nor dislike OR
4  Like slightly
5  Like very much

(question can be repeated for aroma, flavour, texture and overall liking)

Remarks

If you wish to comment on any particular likes or dislikes of this sample you may do so under ‘Remarks’.
5. Helpful information

- **Text books**
  - “Sensory Evaluation Techniques, Fourth Edition”
    - Meilgaard, Civille & Carr
    - CRC Press 2007
  - “Sensory Evaluation of Food”
    - Lawless & Heymann
    - International Thompson Publishing

- **ISO & ASTM standards**
  - ISO 8586 Sensory Analysis – General guidelines for the selection, training and monitoring of selected assessors and sensory assessors
  - ASTM E2164-08 Standard test method for directional difference test
  - ISO 4120 Sensory Analysis – Methodology – Triangle test