Healthy food product development, the complexity of the multisensory experience

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We make sense – om smaksforståelse og matinnovasjon
Consumers’ sensory perception is what generally drives preferences...

...but choice goes much beyond the sensory experience.
"The consumer does not behave as he says, he does not say what he thinks and he does not think what he feels.” David Ogilvy Confessions of an Adman 1978
Because food choice is much more complex..
Food choice in a nutshell...

Based on food choice model by Koster & Mojet (2007)
Sensory experiences are individual

Ability to **taste bitter** is genetically determined
PROP status (insensitivity to aromatic thiurea compounds)
**nontasters** (30% Caucasians), **tasters** (45%) & **supertasters** (25%)

ca 425 papillae pr cm²
95 papillae pr cm²

http://faculty.uca.edu/~jmurray/baw2004/taste.pdf
Sensory experiences are individual

- Fatty acids detectable through **taste**
- Wide variability in **sensitivity**
- Genetics, Sex, diet, and BMI affect sensitivity
Sensory experiences are individual

People hyposensitive to fat consumed significantly more energy, fat & had greater BMI

PROP Non-taster children consumed more vegetables, particularly bitter ones

Sensitivity towards astringency can influence acceptability of astringent foods: tea, coffee, chocolate, bitter vegetables
To perceive or not to perceive? That is the question

Depending on what people perceive or do not perceive in a product, other flavors may be diminished or enhanced…

…and in turn will influence preferences and diet
Is it the flavour or is it the texture?

- Viscosity affects release of tastants and hinders aroma-taste interactions.

- **Fat content** influences the sensory profile of foods through their own taste, mouth-feeling, changing solubility, melting point, emulsifying.

- **Hydrocolloids** change the matrix structure and water/tastant availability.

- **Food structure** is a determinant of the sensory perception.
Sensory perception is dynamic

In-mouth-changes over time
- First impression
- Textural changes
- Flavour release
- Mouthcoating
- Swallowing
- Afterfeeling
Temporal aspects of perception

Which **attributes are important for the product** at each point in time (order, dominance and relevance)
A new sensory tool to analyse the oral trajectory of biscuits with different fat and fibre contents

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Jarlsberg-type cheeses from the Norwegian market
Understanding the role of dynamic texture perception in consumers’ expectations of satiety and satiation. A case study on barley bread

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The pooled standard deviation was used to calculate the intervals.
When to perceive or when not to perceive? That is also the question

Differences in **dynamic perception** can be utilised in product development, for example to get more satiating products (*obesity*) or less satiating products (*elderly*)
Multisensory perception: modulatory effect of visual cues on flavour perception

Zampini et al. (2007)
Different colours potentially carry different semantic meanings depending on a person’s previous experiences with specific colour–flavour co-occurrences.
Multisensory perception and crossmodal interactions

J. Prescott (2016)
To taste more or not to taste more? That is also the question

**Multisensory integration** could be utilised for example to formulate products with low salt or sugar
Effects of evoked meal contexts on consumers’ responses to intrinsic and extrinsic product attributes in dry-cured ham

Margrethe Hersleth, Erminio Monteleone, Anne Segtman, Torodd Næs

Please evaluate sample 894.

Imagine a situation where you eat dry cured ham in a meal with several small dishes i.e. “finger food” or “tapas”. How much do you like or dislike this dry cured ham?
Traditional vs novel meal context and origin

Imagine that you are in a shop and that you are going to buy a package of dry cured ham to *a meal with several small dishes i.e. "finger food" or "tapas".*

Look at the image, and rate your probability of buying this package of dry cured ham.
Choice: Effect of meal

Acceptance: Minor effect of meal

Consumers expect a difference dependent on meal, but they don’t perceive it in blind condition
To claim or not to claim? That is also the question

On-pack communication and product positioning can drive perception and acceptance, but drivers can work differently in different products.
Our perception of food draws on an integration of all the senses

We unconsciously discriminate between high and low-calorie foods by sight

Pictures of high- and low-calorie foods provokes responses in different parts of the brain, related to pleasure

Smell and taste are linked neurologically in a way that no other human senses are

Sound can also affect taste perception

In the orbitofrontal cortex of the brain there are neurons that respond specifically to the texture of fat in the mouth (creamy “touch”)

Bakalar (1012) Nature: Sensory sciences, partners in flavour
So...what would you like to eat for dessert?

Complex problems require multidimensional approaches

...because there is no such thing as a “simple” sensory experience
Takk for oppmerksomheten

www.nofima.no

• Fondet for Forskingsavgift på Landbruksprodukter (FFL)
• Norges Forskningsråd (NFR)
Forbrukertest - sjokolade

- Check – All – That – Apply (CATA)

https://tinyurl.com/sfidag
Forbrukertest - sjokolade

- Check – All – That – Apply (CATA)

På en skala fra 1 til 9, hvor godt likte du prøve 813?

- 1. Liker ikke i det hele tatt
- 2.
- 3.
- 4.
- 5. Hverken liker eller misliker
- 6.
- 7.
- 8.
- 9. Liker svært godt

Huk av for alle de egenskapene du synes beskriver prøve 578 best:

- Melk
- Vanilje
- Karamell
- Salt
- Nøttestmak
- Bitter
- Myk
- Fyldig
- Annet

- Tørr
- Klebrig
- Smelter
- Kakao
- Ettersmak
- Syrlig
- Hard
- Sot