Benefits of satiety for the consumer

Professor Marion Hetherington
Benefits of satiety to the consumer

Aim:

To consider and evaluate research on possible benefits of enhanced satiety and appetite control to the consumer

Specific objectives:
• to define satiation and satiety;
• to describe ingredients which may promote satiety;
• to provide examples of experimental evidence of enhanced satiety;
• to identify potential benefits to the consumer
How do we describe and measure satiety?
**Satiety cascade**

Blundell, Rogers and Hill (1987)
Defining satiety

**Satiation**

the process by which food intake is terminated; measured by within meal ratings of appetite and *ad libitum* intake of single food or meal

**Satiety** *(post-prandial)*

inhibition of further eating, modulation of hunger in post-ingestive period

Measured by *magnitude* or *duration* of changes in subjective ratings of appetite-related sensations usually by visual analogue scales (VAS)
How is functionality defined?
Defining functionality
Food products with hunger control or satiety claims
Food products with weight claims

"To help with your weight maintenance plan"
Satiety claims would be considered function claims based on the modulating effects of foods on sensations of appetite, such as increased feeling of fullness and/or reduced sense of hunger. These effects could potentially be beneficial to individuals who wish to control their energy intake.

.....satiety claims must be comparative claims....beneficial effects on measures of satiety when compared to a reference (control) food
<table>
<thead>
<tr>
<th>Type</th>
<th>Acceptable</th>
<th>Unacceptable</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative</td>
<td>Comparing magnitude of effect for a specific length of time (duration of effect must be included) A serving [of stated size] of product X is more filling than a serving [of stated size] of product Y for up to 2 hours.</td>
<td>Product X increases feelings of fullness longer than product Y (amounts of products X and Y must be stated if the serving sizes are not the same).</td>
<td>A serving (of stated size) of X with Y grams of ingredient Z can suppress hunger longer than the same amount of X without ingredient Z.</td>
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<tr>
<td></td>
<td>Comparing duration of effect A serving [of stated size] of product X gives feelings of fullness longer than a serving [of stated size] of product Y.</td>
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<tr>
<td></td>
<td>Comparing both magnitude and duration of effect A serving [of stated size] of product X is more filling and for longer than a serving [of stated size] of product Y.</td>
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<tr>
<td>Unacceptable</td>
<td>Ingredient Z helps suppress hunger (no comparator; extrapolation of the effect of an ingredient or generic macronutrient content across product types or forms cannot be made without supporting evidence).</td>
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<tr>
<td>Absolute (Non comparative)</td>
<td>Acceptable A serving (of stated size) of X helps reduce the desire to eat for up to 4 hours.</td>
<td>Unacceptable A serving (of stated size) of X is satisfying for up to 4 hours (vague and not an outcome based on VAS).</td>
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</table>

The serving sizes in brackets do not need to be stated if they are the same for the products being compared.
<table>
<thead>
<tr>
<th>Food product</th>
<th>Claim</th>
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<tbody>
<tr>
<td>Nutrition shake</td>
<td>“freedom from hunger”</td>
</tr>
<tr>
<td>Vanilla milkshake</td>
<td>“re-programs appetite to reduce hunger and cravings”</td>
</tr>
<tr>
<td>Oatmeal, cereal, milkshakes</td>
<td>“helps satisfy your hunger”</td>
</tr>
<tr>
<td>Yoghurt, ready-to-eat meals</td>
<td>“Fuller for longer”</td>
</tr>
<tr>
<td></td>
<td>“Fuller longer”</td>
</tr>
<tr>
<td>Egg protein</td>
<td>“helps you want to eat less”</td>
</tr>
<tr>
<td>Protein shake</td>
<td>“keep me going to prevent hunger”</td>
</tr>
</tbody>
</table>
What foods or ingredients may promote satiety?
Properties of foods which could promote satiety

Macronutrient content (e.g. protein > fat)

Fibre content (high fibre > low fibre)

Glycaemic index (low GI > high GI)

Energy density (low kcal/g > high kcal/g)

Structure (solid food / viscous food > liquids)
Effect of low fat yoghurt enriched with protein and fibre

• Casein protein
• Guar gum

Suppressed hunger for 2hr
Reduced energy intake at lunch (~65kcal)

Less hunger reported while losing more weight

Daily hunger VAS averaged over 3 days
Difference between groups (p < 0.03)
No difference in daily fullness VAS

What do consumers understand by "satiety" claims?
Evidence from consumers

**Health** benefits are important to consumers e.g. cholesterol lowering ingredients

Preventing disease and concerns about body **weight** are commonly cited health considerations

**Managing hunger** is also mentioned in relation to weight control

Satiety effects are experienced **immediately** and are easily **discernible**
Consumers describe **fullness** as

- “a feeling of food in the stomach”
- “stomach stretch”
- “satisfaction”
- “lack of the desire to eat”

- The term « satiety » is not typically used

Murray & Vickers Appetite (2009)

Replies from


d) de Graaf C. Trustworthy satiety claims are good for science and society. Comment on 'Satiety. No way to slim'. Appetite, 2011; 57(3):778-783.
Booth and Nouwen (2010) suggested that consumers believe enhanced satiety claims immediately equate to a slimming claim.

**Weight loss can only be achieved by sustained, goal-directed changes in lifestyle including diet and activity.**

**Satiety enhancement per se cannot produce weight loss.**
What are the (potential) benefits?
Potential benefits of satiety

Reduced **opportunistic eating** (some consumers)

Strengthen weak **internal cues** of satiety

**Pleasure** associated with lower energy food products without feeling “deprived”

Reduced **hunger dysphoria**

Improved **hunger management**

Improved **compliance** with goal directed behaviours

**Adjunct** to achieving weight loss and **reducing** the risk of weight gain
Model to understand benefits

Goal directed behaviour

Satiety enhancement may increase compliance with a **healthier** diet

Hunger management increases eating **self-efficacy** so healthy eating goals may be more easily achieved

Satiety enhancement may increase compliance with a **weight loss** diet (hunger and food cravings may impair compliance)
Goal directed behaviour

Targeting **appetite** using specific foods or meals can be a means of managing hunger arising from periods of energy restriction.

Hunger management may help individuals **resist** the strong environmental and situational cues to overconsume.

Success of **pharmacological** agents to manage hunger - can foods provide a similar if both smaller and more subtle effect on satiety (e.g. d-fenfluramine)
Model to understand benefits

- Greater liking of satiating foods
- Greater food ‘reward’

Consumption of more satiating individual foods or pattern of eating

Greater overall summed satiety effect for total diet

- Improved acceptance lower energy foods
- Reduced hunger dysphoria

- Greater ease of dietary control (meeting desired goals, patterns, choices)

Less stimulus for ‘opportunistic’ eating

- Better control of (reduced) energy intakes

- Improved potential for achieving weight management goals

Improved quality of life and health outcomes

Perceived hunger predicts failure to lose weight in clinical trials (Womble et al., 2001)

Higher fasting state ratings of appetite associated with lower weight loss (Drapeau et al., 2007)

Hunger is associated with weight regain (Pasman et al, 1999)

Market research reasons for non-compliance to weight loss diets:

“Cravings for foods I love”
“Always being hungry” (Unilever Strategic Segmentation Study, 2007, US)
Reduced hunger with high protein low CHO diets

Over the 4-wk period, hunger was significantly lower with the LC diet than with the MC diet.

Mean (SEM) daily hunger (mm), HPLC (ketogenic) diet and HPMC (nonketogenic) diet. Over the 4-wk period, hunger was significantly lower with the LC diet than with the MC diet.

Overweight adults (n = 773) from 8 EU countries lost at least 8% of their body weight on an 800 kcal low-calorie diet (LCD) then randomised to one of 5 ad libitum diets to prevent weight regain over a 26-week period.

Maintenance diets were either high or low in protein and GI according to a two-by-two factorial design or a control diet.

Completion rate and maintenance of weight loss were highest with the high-protein low GI diet; (Larsen et al., 2010).
High protein and low GI promote weight loss maintenance.
Model to understand benefits

- Consumption of more satiating individual foods or pattern of eating
  - Greater liking of satiating foods
  - Greater food ‘reward’
  - Greater overall summed satiety effect for total diet

- Improved acceptance lower energy foods
- Improved ease of dietary control (meeting desired goals, patterns, choices)
- Improved quality of life and health outcomes
- Improved potential for achieving weight management goals
- Reduced hunger dysphoria
  - Less stimulus for ‘opportunistic’ eating
  - Better control of (reduced) energy intakes

Satiety enhancement may be **desirable** to some consumers
May **strengthen** internal cues of satiety
Offers **pleasure** without feeling deprived
Potential for improved dietary **compliance** (healthy diet or weight loss) since perceived **hunger** is a barrier to dietary compliance
Enhanced satiety may confer consumer benefits including those related to **weight management**
Acknowledgements

ILSI expert panel

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Anne Lluch (Danone)
David Mela (Unilever)

ILSI staff

Athanasia Baka
Frederic Timmermans