Fat substitutes

“We’ve discovered a fat substitute.”
What is a fat substitute?

- Product with the similar functions and properties as fat but with less calories and less fat.
- Fat 9 kcal/gram; protein and carbohydrates 4 kcal/gram
- Usually found in products where the original product has a high fat content
Desired qualities of a fat substitute

INGREDIENTS:
- rich flavor
- creamy texture
- heat stable
- lubrication
- volume/bulk
- heat transfer

IDEAL FAT REPLACER
Products with fat substitutes
Background

- Introduced in the second part of the 20\textsuperscript{th} century
- Simplesse – first natural based fat replacer
Why not to use fat?

The Surgeon General's Report on Nutrition and Health states: "High intake of total dietary fat is associated with increased risk for obesity, some types of cancer, and possibly gallbladder disease. Epidemiologic, clinical, and animal studies provide strong and consistent evidence for the relationship between saturated fat intake, high blood cholesterol, and increased risk for coronary heart disease. Excessive saturated fat consumption is the major dietary contributor to total blood cholesterol levels."
Some inspiration:

http://youtu.be/uOAogdazRlk?t=33s
Different types of fat substitutes

- Fat based
- Protein based
- Carbohydrate based
Carbohydrate based fat substitutes

- Cellulose, dextrines, maltodextrines, fibre, gum, inulin, modified starch, etc

- Absorbs water, providing thickness

- Fat soluble aromas often added along with emulsifiers

- Heat resistant but not suitable for frying

- Decrease in energy: 5 kcal/g replaced fat.
Protein based fat substitutes

- Whey protein / Egg white
- Microparticulation
- Heat sensitive; not suitable for baking, boiling, frying.
- Decrease in energy: 5 kcal/g replaced fat
Fat based fat substitutes

- Saturated → Unsaturated
- Emulsifiers; mono- and diglycerides
- Sucrose polyesters: No digestion

- Beneficial properties of fat
<table>
<thead>
<tr>
<th>Carbohydrate-Based</th>
<th>Protein-Based</th>
<th>Fat-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose (carboxy-methyl cellulose, microcrystalline cellulose)</td>
<td>Modified whey protein concentrate (Dairy-lo)</td>
<td>Caprenin</td>
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<tr>
<td>Dextrin</td>
<td>Microparticulated protein (Simplesse)</td>
<td>Olestra (Olean)</td>
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<tr>
<td>Fiber</td>
<td></td>
<td>Salatrim (Benefat)</td>
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<td>Gum (alginites, carrageenan, guar, locust bean, zanthan)</td>
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<tr>
<td>Polydextrose</td>
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<td>Emulsifiers</td>
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<tr>
<td>Maltodextrin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inulin</td>
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<tr>
<td>Oatrim (hydrolyzed oat flour)</td>
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<tr>
<td>Polyols</td>
<td></td>
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<tr>
<td>Starch (modified food starch)</td>
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</tbody>
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Whey protein

- Biproduct of cheese making.
- Texture similar to fat
- Found in dairy products, mayonnaise etc.
- Increases the amount of protein in product.
Modified starch

- Made by treating starch with approved chemicals.
- Cross-linking, adding small chemical groups.
- Physical methods; pH, temperature and pressure.
- Found in dairy products, dressings and frozen desserts.
Inulin

- A soluble fiber based fat replacer
Olestra

Sucrose polyester.
Olestra

Approved 1996 by FDA
Unapproved in European Union
Zero calories, properties of fat
Olestra

Drains fat soluble substances

"This product contains Olestra. Olestra may cause abdominal cramping and loose stools. Olestra inhibits the absorption of some vitamins and other nutrients. Vitamins A, D, E and K have been added."

Medicines are unaffected?
Gastrointestinal problems?
Conclusion

- Fat substitutes – Here to stay
- More research needed to conclude long term effects
Resources

- http://www.diet.com/g/fat-replacers
- http://circ.ahajournals.org/content/105/23/2800.full
- http://www.cspinet.org/olestra/11cons.html