**Low Fat High Fiber Cheese?**

- Food producers are increasingly interested in developing food products that address nutritional issues related to “Chronic Lifestyle Syndrome.”
- A high fat diet increases the risk of Coronary Heart Disease, a major cause of death in U.S., which is about 26% of the total deaths.
- Various hydrocolloids are used as fat replacers in dairy products like starches, gum and fibers.
- **Inulin**, a fructo oligosaccharide derived from chicory roots, is a dietary fiber that forms a particle gel and behaves as a fat mimic in dairy foods (Fagan, et al. 2006).
- Numerical papers have established correlations with the material properties ( Yield values, Modulus) and texture in food. Compression and extension tests have been employed to characterize texture in cheese (Brown, J.A. 2003 and Lu, Y. 2008).

**Objective:**

This research aims to develop a reduced fat, high fiber, process cheese using inulin as a fat replacer, and to develop a rheological method to measure textural characteristics related to fat content in process cheese.

**How are we achieving it?**

Full fat (32%) processed cheese and reduced fat (27%) processed cheese with 0 - 3% added inulin were made, and resulting changes to texture were quantified. Protein content was similar for all cheeses.

**Process Cheese Manufacture:**

- **Ingredients**
  - Shredding cheese.
  - Weighing ingredients.
- **Stephan Cooker**
  - High Shear mixing @ 1200rpm
  - Pasteurization 85°C for 3 min
- **Filling & Storage**
  - Storage @ 4°C

**Chemical Analysis:**

- % Fat – Determined by Majonnier Method
- % Protein – By Kjeldahl Method
- % Moisture – Atmospheric Oven Method

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**Rheological Analysis:**

Cheese samples were cut into uniform slices, and rheological properties were determined under extension at constant rate (10 mm/sec) on an **INSTRON® Universal Testing Machine** (Model 3342, Canton, MA) at constant temperature of 4°C. Force and distance data were converted to stress/strain coordinates and plotted to determine yield stress values.

**Results & Discussion (Cont.)**

- Yield stress (point at which the material fails) derived from the process cheese stress-strain curves decreases from 18.5 kPa to 5.4 kPa when fat is lowered from 32% to 27%.
- Adding 1% - 3% inulin to reduced fat process cheese increases yield stress and at higher levels can approximate yield values of full fat cheese.
- Reduction in fat content makes the cheese more elastic. Adding inulin increase firmness corresponding to texture of full fat process cheese.
- Higher concentrations of inulin are better fat mimetics because they form a more compact particle gel (Phillips & Williams, 2000).

**Conclusion:**

Fat in processed cheese contributes to its material and textural properties which can be characterized by stress/strain curves generated by tensile deformation. Resulting yield stress measurements can be an important dimension in characterizing texture changes resulting from fat reduction and may be a predictive tool in reformulating reduced fat process cheese to mimic textural qualities of its full fat counterpart.

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**References:**


