IAOM Inaugural South Asia Region Meetings
Delhi, India: December 3-4 2018
Bangalore, India: December 6-7, 2018

Flour Heat Treatment

SUNIL MAHESHWARI
SIEMER MILLING COMPANY
TEUTOPOLIS, IL USA
What is Flour Heat Treatment?

• Flour Heat Treatment is a process designed to modify the properties of flour.

• Divided into two basic processes:
  o Hydrothermal treatment
  o Thermal treatment

• Stabilize Germ, Bran and Whole Wheat Flour.
FHT – Product Properties
Process – Key Elements

• Time
• Temperature
• Moisture
• Particle Size
• Viscosity
  • Cold Water Viscosity
  • Hot Pasting Viscosity
FHT – Viscosity Adjustment

- None HT
- Short-Time HT
- Long-Time HT
FHT – Viscosity Adjustment

Left: Str. Grade Flour VS Right: HT Flour
FHT – Starch Molecule Changes

Before Treatment

After Treatment
FHT Product Application

- Food Safety
- Soup, Sauce and Gravy
- Batter and Breading
- Non-Chlorinated Cake Flour
- Stabilized Bran, Germ and Whole Wheat Flour
FHT Product Application

• Food Safety
  o Validated 5-log microorganisms reduction
  o For products that may be consumed raw: ice cream inclusion, seasoning blends, etc.
  o Unique process for greater control of microbiological presence
  o Longer shelf-life
Pastry Flour

HT 2000

Cookie Spread

Dough Consistency Control

Reformulation

Food Safety
FHT Product Application

• Soup, Sauce and Gravy
  o Replacement of chemically modified food starch; clean label
  o Stability
    o pH
    o Shear
    o Freeze-thaw
    o Viscosity
  o Optimum/clean flavor profile
  o Cost-effective
## FHT Product Application

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Modified Starch</th>
<th>HT 3000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solid/Liquid</td>
<td>Solid/Liquid</td>
</tr>
<tr>
<td>Str. Gr. Wheat Flour</td>
<td>6.6%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Modified Corn Starch</td>
<td>0.4%</td>
<td>x</td>
</tr>
<tr>
<td>HT 3000</td>
<td>x</td>
<td>0.7%</td>
</tr>
<tr>
<td>Oil/Fat</td>
<td>7.3%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Salt</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Black Pepper</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Milk, Whole</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
FHT Product Application

- Sensory Survey
  - A double blind taste test with consumers at a local grocery store
  - 52 individuals tasted two samples of cheese sauce

CUSTOMER PREFERENCE

HT 3000 79%
Modified Corn Starch 21%
FHT Product Application

- Flavor
- Texture
- Appearance
- Mouthfeel
FHT Product Application

• Batter and Breading
  o Highly controlled batter viscosity; even coating on substrate
  o Superior adhesion to substrate; prevent moisture from migrating to the other substance components
  o Crispy-to-crunchy textures
  o Extend hold times under heat lamp
## Tempura Coating Ingredients

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Weight</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat Flour/HT Flour</td>
<td>150 g</td>
<td>72.8%</td>
</tr>
<tr>
<td>Corn Flour</td>
<td>40 g</td>
<td>19.4%</td>
</tr>
<tr>
<td>Salt</td>
<td>6 g</td>
<td>2.9%</td>
</tr>
<tr>
<td>Seasoned Salt</td>
<td>2 g</td>
<td>1.0%</td>
</tr>
<tr>
<td>Baking Powder (MCP &amp; SAPP)</td>
<td>6 g</td>
<td>2.9%</td>
</tr>
<tr>
<td>Milk Powder</td>
<td>1 g</td>
<td>0.5%</td>
</tr>
<tr>
<td>Dextrose</td>
<td>1 g</td>
<td>0.5%</td>
</tr>
<tr>
<td>Water (40 F)</td>
<td>290 g</td>
<td>140.8%</td>
</tr>
</tbody>
</table>
FHT Product Application

Left: Str. Gr. Flour vs Right: HT 3500

Left: Str. Gr. Flour vs Right: HT 8500
FHT Product Application

Complete Batter Viscosity

Pick-up Pre-frying

Pick-up Post-frying

Brookfield Viscosity (cp)

<table>
<thead>
<tr>
<th>Str. Gr.</th>
<th>HT 3500</th>
<th>HT 8500</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>1.15</td>
<td>1.2</td>
</tr>
<tr>
<td>1.2</td>
<td>1.25</td>
<td>1.3</td>
</tr>
<tr>
<td>1.3</td>
<td>1.35</td>
<td>1.4</td>
</tr>
<tr>
<td>1.4</td>
<td>1.28</td>
<td>1.29</td>
</tr>
</tbody>
</table>

Ratio

Pick-up

<table>
<thead>
<tr>
<th>Str. Gr.</th>
<th>HT 3500</th>
<th>HT 8500</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.02</td>
<td>1.08</td>
<td>1.17</td>
</tr>
</tbody>
</table>
FHT Product Application

• Non-chlorinated Cake Flour
  
  o Clean label - without chlorination and bleaching
  
  o Used for cakes with high sugar and fat contents
  
  o Improved appearance and texture
FHT Product Application

• Stabilized Bran, Germ and Whole Wheat Flour
  o Extend shelf-life – 6 to 9 months at ambient temps
  o Deactivate enzymes
  o Does not alter nutritional profile or label ID
  o Pleasant nutty flavor
FHT Product Application

HT Germ Bread
Thank You!

Sunil Maheshwari
Siemer Milling Company
Teutopolis, Illinois, USA