REMYPURE
Great Texture & Unique Stability
Andy Estal – Technical Director
The World of Remypure

- Introduction to RI
- Why rice starch?
- REMYPURE
Introduction to RI
From rice to rice starch & rice protein

(*) starch-protein separation process step

raw material
soaking
wet milling
sieving
refining(*)
dewatering
drying
rice starch
precipitation
dewatering
drying
rice protein
## Why rice starch?

### Rice starch vs. other botanical sources

<table>
<thead>
<tr>
<th></th>
<th>rice starch</th>
<th>wheat starch</th>
<th>corn starch</th>
<th>tapioca starch</th>
<th>potato starch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>size (µm)</strong></td>
<td>2-8</td>
<td>3-40</td>
<td>15-25</td>
<td>20-35</td>
<td>15-80</td>
</tr>
<tr>
<td><strong>shape</strong></td>
<td>hexagonal</td>
<td>oval</td>
<td>hexagonal</td>
<td>hexagonal (truncated)</td>
<td>oval</td>
</tr>
<tr>
<td><strong>color</strong></td>
<td>very white</td>
<td>greyish white</td>
<td>yellowish white</td>
<td>greyish white</td>
<td>white</td>
</tr>
<tr>
<td><strong>taste</strong></td>
<td>neutral</td>
<td>cereal taste</td>
<td>protein taste</td>
<td>light off-taste</td>
<td>potato taste</td>
</tr>
<tr>
<td><strong>gel structure</strong></td>
<td>soft and creamy</td>
<td>firm</td>
<td>firm</td>
<td>sticky</td>
<td>sticky</td>
</tr>
</tbody>
</table>
### Starch morphology

Molecular insights - amylopectin & retrogradation

<table>
<thead>
<tr>
<th>length of A-chains</th>
<th>wheat amylopectin</th>
<th>rice amylopectin</th>
</tr>
</thead>
<tbody>
<tr>
<td>n&lt;16</td>
<td>less</td>
<td>more</td>
</tr>
<tr>
<td>16&lt;n&lt;22 (promote retrogradation)</td>
<td>more</td>
<td>less</td>
</tr>
<tr>
<td>n&gt;22</td>
<td>less</td>
<td>more</td>
</tr>
</tbody>
</table>

![Structure of amyllopectin, a branched starch](image)
Functional Properties Native Rice Starch

- **Soft** gel structure and **creamy** texture
- Excellent **stability** over time (no syneresis)
- Freeze-thaw **stability**
- (pH & shear **stability**)
- High variation in functionality within the **natural variety** of native rice starches…
Remypure PURE technology ("thermal inhibition")

Remypure PURE technology ("thermal inhibition")

STARCH

HEAT

TIME

DRY

FUNCTIONALIZED STARCH

FUNCTIONALIZED STARCH
PURE technology
Improved functionality (viscosity build-up) at neutral pH
Remypure S51
Increased tolerance towards acidity
Remypure S51
Tolerance at pH 3.2 comparable to modified rice starch
Remypure
Functional native rice starch with …

- **Natural** status
- **Clean label** status
- **High tolerance** in low pH, high temperatures and high shear
- **High product stability** (shelf-life, freeze-thaw)
- **Unique textures** from the unique molecular structure
- **Neutral** taste
Fruit Preparations: Recipe and Process

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry</td>
<td>50.00</td>
</tr>
<tr>
<td>Water</td>
<td>22.62</td>
</tr>
<tr>
<td>Sugar</td>
<td>22.00</td>
</tr>
<tr>
<td>“Starch”</td>
<td>5.00</td>
</tr>
<tr>
<td>Citric acid</td>
<td>0.30</td>
</tr>
<tr>
<td>Sodium citrate</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Total fruit prep</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Process**
- Sterilize pan with direct steam injection
- Add the dry ingredients to water and strawberries
- Heat up to 92°C (at 300rpm)
- Hold 5 min at 92°C (at 300rpm)
- Fill in cups
- Keep refrigerated
Fruit Preparations – Bostwick Viscosity

- Remygel 652
- Native rice
- Native corn
- Remypure S51
- Remygel 663

After 1 day 30sec  |  After 1 day 60sec
Béchamel : Recipe and Process

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>92</td>
</tr>
<tr>
<td>Butter</td>
<td>4</td>
</tr>
<tr>
<td>‘Starch’</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
</tr>
</tbody>
</table>

**Process**

- Mix all ingredients approx 8 min @ 75°C
- Heat to 85°C
- Hold at 85°C (5 mins)
- Hot fill
Béchamel: Rheology

Viscosity (mPas) at 0.88s⁻¹

- Remyline AX-DR
- Remypure S51
- Remygel 652
- Native rice
- Remygel 663

Viscosity (mPas)
# Custard: Recipe and Process

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skimmed milk</td>
<td>82.485</td>
</tr>
<tr>
<td>Sugar</td>
<td>9.00</td>
</tr>
<tr>
<td>Skimmed milk powder</td>
<td>2.00</td>
</tr>
<tr>
<td>Cream 40</td>
<td>2.30</td>
</tr>
<tr>
<td>“Starch”</td>
<td>4.00</td>
</tr>
<tr>
<td>Carrageenan</td>
<td>0.075</td>
</tr>
<tr>
<td>Flavour</td>
<td>0.12</td>
</tr>
<tr>
<td>Beta-carotene</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

**Process**

- Blend all the dry ingredients
- Disperse the dry blend into the cold milk, while mixing
- Homogenize at 65°C at 80bar
- Pasteurize at 95°C, 5 mins
- Fill below 25°C, store refrigerated
Viscosity (mPas) at 0.88s⁻¹

- Remygel 652
- Remypure S51
- Native Rice
- Native Corn
- Remygel 663
Remypure
Portfolio overview

**T - time**
- RETORTING (121°C - long time)
- UHT (>121°C - short time)
- PASTEURISATION (<100°C)

**pH**
- ACID
- NEUTRAL

**SHEAR**
- COLLOID MILLS
- HIGH SHEAR MIXERS
- PUMPS

**APPLICATION**
- Dressing
- Baby food jar
- Fruit preparation
- Dairy dessert
- Sauce
- Meat

Remypure S51
- Remyline AX DR
Questions & answers

Thank You