BENEORemy Specialty Rice Ingredients

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Clean Label Conference
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# Rice Starch: Unique Properties

## Rice starch characteristics compared to other starches

<table>
<thead>
<tr>
<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>size µm</td>
<td>3–40</td>
<td>15–25</td>
<td>20–35</td>
<td>15–80</td>
</tr>
<tr>
<td>shape</td>
<td>oval</td>
<td>hexagonal</td>
<td>hexagonal</td>
<td>oval</td>
</tr>
<tr>
<td>colour</td>
<td>greyish white</td>
<td>yellowish white</td>
<td>greyish white</td>
<td>white</td>
</tr>
<tr>
<td>taste</td>
<td>cereal taste</td>
<td>protein taste</td>
<td>light off taste</td>
<td>potato taste</td>
</tr>
<tr>
<td>gel structure</td>
<td>firm</td>
<td>firm</td>
<td>sticky</td>
<td>sticky</td>
</tr>
</tbody>
</table>

*Images showing various starch types.*
Remyline AX DR
for Poultry Injection & Tumbling
Meat (injection and/or tumbling)

Objectives

- Add brine to meat to **increase the final yield** and **improve the quality** (juiciness)
- **Cost reduction**
Why rice starch in injected / tumbled poultry?

Ideal Properties

1. **Small granules size!**

![Granule sizes comparison](image)

- Rice 2-8 µm
- Wheat 3-40 µm
- Maize 15-25 µm
- Tapioca 15-35 µm
- Potato 10-80 µm

2. **Low gelatinization temperature (F)**

![Gelatinization temperature comparison](image)

- Potato 132°F
- AX-DR 140°F
- Tapioca 158°F
- Corn 167°F
- Wheat 176°F

3. **Low % amylose (< 3 %) ➔ very low retrogradation & syneresis**

4. **White/neutral gels, ideal for poultry applications!**
Experimental Design
Formula & Process

- Type of meat: **Chicken breast**

- Brine recipe:
  - Reference: 15% extended, water, 0.8% salt, 0.4% phosphate
  - Tests: 25% extended with 1%, 1.5% and 2% Remyline AX-DR
  - Benchmarks: 1.5% potato starch, 0.4% carrageenan

- Addition methods
  1. Starch injected with brine followed by tumbling
  2. Brine injection followed by tumbling with dry starch addition in the tumbler
  3. Tumbling only – “absorption” (starch in the brine)

- Cooking temperature
  - 155 (low) & 176F (high) core temperatures

- Cooked and stored chilled
Benefit: Ease of Use

Injection step

• Easy to disperse, no lumps, no foam ✓

• No increase of the viscosity ➔ no change to injector settings ✓

• Almost self-suspending, very low sedimentation vs. potato

• No blocking of injector filters nor clogging of the needles ✓
Cooking and Total Yield
Dose Response

1.5 % optimum % for AX-DR
Cooking and Total Yield
AX-DR vs. potato starch & CGN

- 2 - 3 % better cooking yield vs. potato, 5 % vs. CGN
- 2 - 4 % better total yield vs. potato, 4 - 7 % vs. CGN
Cooking and Total Yield
Phosphate free system

3 - 6 % better cooking yield vs. CTRL, 1 - 2 % vs. potato
4 - 7 % better total yield vs. CTRL, 2 - 3 % vs. potato
Purge Control
AX-DR vs. potato starch and CGN

By far the best purge control with AX-DR!
Benefit: Sensory Quality

Appearance

- Tiger stripes (gel pockets): Carrageenan > potato
  No tiger stripes with AX-DR ✓
- Fibrous appearance (tumbling > injection): maintain integrity of meat structure
- White (no pinking)

Carrageenan  AX- DR  Potato
Benefit: Sensory Quality
Texture, Juiciness, Taste

• Remyline AX-DR, the most tender!
  - AX-DR > Potato > Carrageenan > control

• Remyline AX-DR, the juiciest!
  - AX-DR > Potato > Carrageenan > control

• Maintain the pure meat taste, no off-flavor
Is AX-DR too expensive for the meat industry?

Let’s calculate...

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight</th>
<th>Price/kg</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>1000</td>
<td>5.38</td>
<td>5376</td>
</tr>
<tr>
<td>Brine</td>
<td>235</td>
<td>0.056</td>
<td>13.16</td>
</tr>
<tr>
<td>Potato starch</td>
<td>15</td>
<td>0.672</td>
<td>10.080</td>
</tr>
<tr>
<td><strong>Total cost Ingredients</strong></td>
<td><strong>1250</strong></td>
<td></td>
<td><strong>5399.2</strong></td>
</tr>
<tr>
<td><strong>Cooked meat sales</strong></td>
<td><strong>1100</strong></td>
<td><strong>5.91</strong></td>
<td><strong>6505</strong></td>
</tr>
<tr>
<td><strong>Profit</strong></td>
<td></td>
<td></td>
<td><strong>1106</strong></td>
</tr>
</tbody>
</table>

**Remyline AX-DR**

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight</th>
<th>Price</th>
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<tbody>
<tr>
<td>Meat</td>
<td>1000</td>
<td>5.376</td>
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<tr>
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<td>235</td>
<td>0.056</td>
<td>13.16</td>
</tr>
<tr>
<td>Starch</td>
<td>15</td>
<td>3.080</td>
<td>46.200</td>
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<tr>
<td><strong>Total cost Ingredients</strong></td>
<td><strong>1250</strong></td>
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<td><strong>5435.4</strong></td>
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<tr>
<td><strong>Cooked meat sales</strong></td>
<td><strong>1125</strong></td>
<td><strong>5.91</strong></td>
<td><strong>6653</strong></td>
</tr>
<tr>
<td><strong>Profit</strong></td>
<td></td>
<td></td>
<td><strong>1217</strong></td>
</tr>
</tbody>
</table>

**VARIANCE**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cost Ingredients ( $ )</strong></td>
<td><strong>36.12</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total cost Ingredients ( % )</strong></td>
<td><strong>0.7%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cooked meat sales ( $ )</strong></td>
<td><strong>147.84</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cooked meat sales ( % )</strong></td>
<td><strong>2.3%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Profit ( $ )</strong></td>
<td></td>
<td></td>
<td><strong>112</strong></td>
</tr>
<tr>
<td><strong>Profit ( % )</strong></td>
<td></td>
<td></td>
<td><strong>10.1%</strong></td>
</tr>
<tr>
<td><strong>Yearly production ( T )</strong></td>
<td><strong>3000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Extra Yearly profit ( $ )</strong></td>
<td><strong>335160</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extra profit of $335,000 for a company producing ~ 6.5 Million lb/yr!
Conclusions
AX-DR in injected-tumbled poultry meat

• Cost reduction ✓
  • Highest total yield vs. other solutions ✓
  ➔ Higher profit!

• Good solution for phosphate free systems ✓

• Clean label solution ✓
  • Labeled as (rice starch)
  • Natural
  • GMO-Free
Remy B7
for Confectionery Coating
Remy B7 vs. Titanium dioxide
Introduction and objective

• **Titanium dioxide** is today’s reference as whitening agent in sugar confectionery coatings.

• **Remy B7 rice starch** is a **natural, clean label, non-GMO alternative**, with good smoothening and whitening properties.

• **Remy B7** allows to avoid food additives for **smoothening and whitening** in gum and confectionery.
Titanium dioxide:

- White pigment with high brightness and refractive index
- Ingredient list: Food additive declaration as coloring agent (E171)
- Inhalation of titanium dioxide dust has been classified by the International Agency for Research on Cancer (IARC) as *possibly carcinogenic to humans.* (→ health hazard for workers)
- Typical dosage levels: 1%

Remy B7 rice starch:

- Natural clean label regular rice starch
- Ingredient list: Ingredient declaration as rice starch (no E-number / no food additive declaration) → clean label
- Typical dosage levels: 5-10%
Properties of rice starch in coatings

• Because rice starch granules are **very small** (2-8 microns):
  • they easily cover and smooth the surface
  • uniform colour distribution

Conditions of use

• Rice starch has to remain “raw = uncooked” to ensure **whiteness**
• → Temperature of the coating solution ≤ starting gel point of Remy B7 (158F)

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1 temperature at which granules start to swell (gelatinize)
### Remy B7 versus Titanium dioxide

**Recipe and process for sucrose coating**

<table>
<thead>
<tr>
<th>Ingredients (%)</th>
<th>Reference</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sucrose</td>
<td>70,0</td>
<td>70,0</td>
</tr>
<tr>
<td>Gum Arabic solution in water (50%)</td>
<td>4.10</td>
<td>4.10</td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Remy B7</td>
<td>0.0</td>
<td>5.0-10.0</td>
</tr>
<tr>
<td>Water</td>
<td>Up to 100</td>
<td>Up to 100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**PROCES**

- Heat up water to 70°C and dissolve the sugar while stirring
- Add Gum Arabic solution and continue stirring
- When the solution is at 60°C, add titanium dioxide or Remy B7
- Use high shear device (Silverson, Ultraturax) to properly dissolve Remy B7
- Apply coating mixture
- Dusting powder: icing sugar
Confectionery Coatings: Remy B7 versus Titanium dioxide

Conclusions

• **Remy B7**, a native rice starch, is a clean label alternative to titanium dioxide in confectionery coatings.

• Thanks to its natural whiteness and small granule size, **Remy B7** can be applied at dosage levels of 5-10% depending on the type of center and under conditions it is used in its “raw” form.
Rice starches for clean label solutions

- Remyline AX DR and Remy B7 are:
  - CLEAN LABEL*
  - GRAS*
  - Non-GMO*
  - Allergen free*
  - NATURAL*

- Remyline AX DR and Remy B7 are labeled as: RICE STARCH

* Statements available