Zerose® erythritol

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Itasca – USA

Peter Decock – Cargill R&D Centre Europe
Global Nutrition Innovation Leader
What is Zerose® erythritol?

**Bulk sweetener**
- Similar to sugar
  - Appearance
  - Crystallinity/density
  - Sweetness quality (SEV ~ 0.6)

**Natural**
- Naturally occurring in many fruits and fermented foods
- Made by yeast fermentation

**Zero Calories**
- 90% is absorbed
- Not metabolized
- Well-tolerated

* FDA does not define natural. Contact Cargill for source & processing information
Compared to sugar, erythritol …

• has a higher pH/T stability, osmolarity, crystallization speed, cooling effect

• has a lower hygroscopicity, solubility, viscosity, sweetness intensity

• is non-caloric

• is non-glycemic and non-insulinemic

• is toothfriendly, even reduces risk of cavities
3-Year Caries Study in Children

Effect of three-year consumption of erythritol, xylitol and sorbitol candies on various plaque and salivary caries-related variables

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b Institute of Dentistry, University of Turku, Finland
c Faculty of Dentistry, Kuwait University, Kuwait
d Department of Biostatistics, Faculty of Medicine, University of Turku, Finland
Erythritol reduced dental plaque weight
Sorbitol and xylitol did not

Dental Plaque Weight
Change against baseline over 3 years

Saliva SM count and plaque SM counts in quadrants 1 and 2 were significantly lower in erythritol group than in the sorbitol (control) group.
Erythritol reduced caries development and dentist treatments compared to sorbitol and xylitol.

- Enamel/dentin caries development: Erythritol reduced by 16%.
- Dentin caries development: Erythritol reduced by 28%.
- Increase in caries score: Erythritol reduced by 13%.
- Intervention by dentist: Erythritol reduced by 33%.

143 less treatments in 129 children.

*p<0.05, **p<0.01, ***p<0.001, ****p<0.0001, all comparisons vs sorbitol (control)
There are more important differences between Erythritol and Xylitol

<table>
<thead>
<tr>
<th></th>
<th>Xylitol</th>
<th>Erythritol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical manufacturing process</td>
<td>Hydrogenation of xylose</td>
<td>Yeast fermentation of carbohydrates</td>
</tr>
<tr>
<td>Number of carbon atoms (Molecular Weight)</td>
<td>5 (152)</td>
<td>4 (122)</td>
</tr>
<tr>
<td>Heat of solution (cal/g)</td>
<td>-35</td>
<td>-43</td>
</tr>
<tr>
<td>Solubility at 20°C (g/100ml water)</td>
<td>170 (63%)</td>
<td>47 (32%)</td>
</tr>
<tr>
<td>Speed of crystallization</td>
<td>slow</td>
<td>fast</td>
</tr>
<tr>
<td>Deliquescent point at 25°C (%)</td>
<td>79</td>
<td>92</td>
</tr>
<tr>
<td>Moisture barrier properties</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Relative sweetness (sucrose is 1)</td>
<td>1</td>
<td>2/3</td>
</tr>
<tr>
<td>Sweetness quality synergy with stevia</td>
<td>n.a.</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Nutritional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metabolized</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Rate of absorption (%)</td>
<td>25-40</td>
<td>~ 90</td>
</tr>
<tr>
<td>Fermented in the colon</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Maximum bolus dose not causing laxation (g)*</td>
<td>~ 20</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>Glycemic response, relative to glucose (%)</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Insulinemic response, relative to glucose (%)</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td><strong>Regulatory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caloric value in US and EU (kcal/g)</td>
<td>2.4</td>
<td>0</td>
</tr>
<tr>
<td>Toothfriendly claim</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Regulatory status in US</td>
<td>additive</td>
<td>GRAS</td>
</tr>
</tbody>
</table>

* consumed in a liquid on an empty stomach by adults

Not only as sweetener, but also to improve the flavor by decreasing bitter, sour and chemical tastes/aftertastes
• **Ingredient declaration:** Natural Flavor
• **Use conditions:** for flavor modification only, at ≤1.25% in non-alcoholic beverages, instant coffee and tea, fruit ices, and in processed fruits

**FEMA GRAS**  
for use as a **flavor** and **not** for sweetening purposes

- Ingredient declaration: Erythritol
- Use conditions: versatile technical purposes, long list of GRAS uses and use levels varying from 3.5% in non-alcoholic beverages to 100% in sugar substitutes

**Nutrition Facts Label:** if total carbs is above 0.5g/serving, count erythritol as part of it
- separate declaration as “sugar alcohol” or “erythritol” is **voluntary except** if a sugar label claim (like sugar free or reduced sugar, etc..) is made
No Sugar Claim
No Erythritol
Carb Callout

Sweet Tea
Made with EverSweet™ next generation sweetener

<table>
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<th>Nutrition Facts</th>
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<tr>
<td><strong>Sweet Tea</strong></td>
</tr>
<tr>
<td><strong>Made with EverSweet™ next generation sweetener</strong></td>
</tr>
<tr>
<td>Ingredients: water, natural flavors, tea extract, citric acid, steviol glycosides.</td>
</tr>
<tr>
<td>Cargill ingredients are in bold.</td>
</tr>
<tr>
<td><strong>Allergens:</strong> Manufactured in a facility that uses dairy (milk), soy, wheat, egg, peanuts, tree nuts, fin fish and crustacea.</td>
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</tbody>
</table>

**Total Carbs = 3 grams**
Sugar Claim

Erythritol Carb Callout

No Sugar Added Sweet Tea
Made with EverSweet™ next generation sweetener

Ingredients: water, natural flavors, tea extract, citric acid, steviol glycosides.

Cargill ingredients are in bold.

Allergens: Manufactured in a facility that uses dairy (milk), soy, wheat, egg, peanuts, tree nuts, fin fish and crustacea.

Total Carbs = 3 grams
New launches past 10 years
Erythritol-containing foods that claim Natural, Organic, or No Additives

Source: INNOVA Market Insights
New launches with Truvia® stevia

Erythritol-containing foods

Source: INNOVA Market Insights
New launches with Monk Fruit
Erythritol-containing foods

Source: INNOVA Market Insights
Erythritol-containing toothpaste

*No artificial sweeteners, no fluoride, no SLS, no dyes*

Erythritol related claims

- Prevents cavity-causing bacteria from sticking to teeth
- Tastes awesome
- Natural sweet
Thank You