

# The Role of Non-Nutritive Sweeteners in Promoting Health



Innovating to Meet Nutrition,  
Health, and Wellness Needs Every Day

**TASTEVA® Stevia Sweetener**  
**PUREFRUIT™ Monk Fruit Extract**  
**SPLENDA® Sucralose**



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# Non-nutritive Sweeteners: Role in Calorie Reduction and Health Promotion

## Obesity: A global health concern

Genetic, behavioral, and environmental factors play a role in obesity development<sup>1</sup>. According to the World Health Organization (WHO), worldwide obesity has more than doubled since 1980<sup>2</sup>. In 2008, more than 1.4 billion adults 20 years and older were overweight or obese<sup>2</sup>. As of 2010, 92 million children were at risk of overweight, and in 2012, more than 40 million children five years and younger were overweight or obese<sup>2,3</sup>. Currently, overweight and obesity lead to an estimated 3.4 million adult deaths annually<sup>2</sup>. Furthermore, these conditions contribute to 44% of the diabetes burden, 23% of the ischaemic heart disease burden, and between 7% and 41% of certain cancer burdens<sup>2</sup>.

The economic consequences of overweight and obesity and their associated health problems have a significant impact on the health care system<sup>4</sup>. Using the United States as an example, in 2008, medical costs associated with obesity reached \$147 billion<sup>5</sup>. These statistics are staggering, but obesity and overweight are largely preventable and the associated health risks and expenses associated with these conditions can be reduced<sup>2</sup>. Balancing calories consumed and calories expended is key<sup>1</sup>. The excess energy that contributes to the current obesity epidemic is estimated to range from 100 to 400 extra calories per day<sup>6</sup>. In an effort to prevent weight gain, authoritative bodies worldwide are calling for a reduction in the consumption of excess calories<sup>7</sup>.

## Non-nutritive sweeteners: A calorie-reduction solution

To help improve health and wellness globally, public health agencies and expert scientific organizations are calling on the food industry to reduce calorie content and portion sizes<sup>10</sup>. Low- and no-calorie sweeteners that reduce calorie content in foods while meeting taste expectations can help to meet these goals.

In a 2012 position paper, the Academy of Nutrition and Dietetics concluded that consumers can use a range of nutritive sweeteners and non-nutritive sweeteners (NNS) as part of a healthy diet that follows current nutrition recommendations while meeting individual health goals and personal preferences<sup>11</sup>. The American Heart Association (AHA) and American Diabetes Association (ADA) in a 2012 scientific statement concluded NNS, when used carefully, may aid in reducing total energy intake and assist with weight loss/control, while providing beneficial effects on related metabolic parameters<sup>12</sup>. Further, the AHA has suggested that food manufacturers need more innovative low- and no-calorie sweeteners, bulking agents, and sweetness enhancers as options to use in food and beverage products<sup>12</sup>.

## Non-nutritive sweeteners: Impact on health

Several research studies have linked intake of NNS to weight management, improved blood glucose control, and better overall health. A meta-analysis of sixteen randomized controlled trials concluded that using food and drinks sweetened with NNS instead of sucrose resulted in small, but significant, reductions in energy intakes and, consequently, body weight<sup>13</sup>. The authors concluded that using foods and drinks sweetened with NNS instead of those sweetened with sucrose can be an effective way to reduce excess calories and manage weight<sup>13</sup>.

Choosing NNS can also be helpful in moderating carbohydrate intake, which is important for blood glucose management. Four randomized trials, varying from 1 to 16 weeks in duration, found no deleterious impact on measures of glycaemic response when NNS were consumed compared to various nutritive sources (e.g., sucrose, starch) or placebos (e.g., cellulose)<sup>14-17</sup>. Further, a 2010 review paper concluded that consumption of NNS does not affect glycaemic response in people with diabetes mellitus<sup>16</sup>. In terms of overall health, a study of more than 9,000 adults found that people using NNS tended to consume more vitamins and minerals and eat fewer calories overall<sup>18</sup>.



# Innovative Sweetener Ingredient Solutions

Taste is a main driver when choosing foods and beverages to consume<sup>20</sup>. Research indicates that consumers show a strong interest in reducing sugar and calories in their diets, but ultimately taste drives purchase decisions<sup>20</sup>. A variety of NNS can help reduce the amount of calories in food products to varying degrees without sacrificing taste. These sweeteners can be utilized in higher energy foods and beverages to reduce calories and potentially overall energy intake. Tate & Lyle develops ingredients that provide nutrition, health, and wellness solutions including a strong portfolio of zero-calorie sweeteners that the food industry can utilize in foods and beverages in response to global health efforts to combat obesity.



## TASTEVA® Stevia Sweetener

TASTEVA® Stevia Sweetener is a high-potency, zero-calorie sweetener of natural origin made from the stevia plant that allows for calorie reduction without sacrificing taste.

Sensory data shows that approximately 80% of the population is sensitive to bitter off-notes associated with some natural, stevia-based sweeteners on the market. However, TASTEVA® Stevia Sweetener has a substantially cleaner aftertaste than other stevia-derived sweeteners, allowing higher sugar replacement levels without sacrificing taste. It is 200 to 300 times more potent than sugar and allows for 50% or greater reduction in sugar levels in some foods and beverages.

**TASTEVA® Stevia Sweetener is appropriate for a wide range of applications, including\*:**

- Baked goods
- Beverages
- Dairy
- Dressings, sauces
- Frozen foods
- Processed fruits and vegetables
- Snacks, cereals



## PUREFRUIT™ Monk Fruit Extract

PUREFRUIT™ Monk Fruit Extract is a sweetener that provides natural, great-tasting, zero-calorie sweetness and is extracted from the monk fruit. Monk fruit grows on lush vines in small farms in the sub-tropical climate of Asian hillsides, where temperate conditions and elevation are ideal.

At around 100 to 200 times the sweetness of sugar, this ingredient allows for sugar reduction up to 100% in certain foods and beverages.

**PUREFRUIT™ Monk Fruit Extract is appropriate for a wide range of applications, including\*:**

- Baked goods
- Beverages
- Cereals
- Confections
- Dairy
- Desserts, ice cream
- Dressings, sauces
- Nutritional supplements
- Processed fruits



## SPLENDA® Sucralose

In 1976, Sucralose was discovered as the result of a joint sweetener research project conducted by Tate & Lyle and Queen Elizabeth College in London, UK. SPLENDA® Sucralose is a leading zero-calorie sweetener that has a sugar-like taste profile because it is made from sugar. It has about 600 times the sweetness of sugar and, depending upon the application, can be used to replace nutritive sweeteners such as sugar or glucose syrup. SPLENDA® Sucralose is heat stable in cooking and baking and works well in a broad range of food and beverage systems including low pH environments and in the presence of live cultures.

Food and drinks with sucralose elicit a lower blood glucose response than similar products with sugar<sup>21</sup>. Unlike sucrose and glucose, sucralose has the added benefit of maintaining tooth mineralization<sup>21-22</sup>.

**SPLENDA® Sucralose is appropriate for a wide range of applications, including\*:**

- Breakfast cereals
- Canned fruit, jams, jellies, pie fillings
- Chilled and frozen desserts
- Condiments, relishes, dressings
- Gelatin desserts, puddings
- Gum, breath mints, candies, cough drops
- Ready-to-eat/frozen baked goods
- Sauces, toppings
- Soft drinks, flavoured milk, nutritional beverages
- Yogurt, ice cream

\* Subject to local regulations.

# Nutritional Impact of the Use of TASTEVA® Stevia Sweetener, PUREFRUIT™ Monk Fruit Extract, and SLENDA® Sucralose

In this menu example, simple substitutions with products containing these non-nutritive sweeteners could result in a reduction of 235 calories per day. When extended over one year, this could result in a 25-pound weight loss.\*

2,000-calorie menu, baseline**	With TASTEVA® Stevia Sweetener, PUREFRUIT™ Monk Fruit Extract, and SLENDA® Sucralose Substitutions
<b>Breakfast:</b> <ul style="list-style-type: none"> <li>• 1 English muffin w/ 2 tbsp apricot spread</li> <li>• 1 lg hard-boiled egg</li> <li>• 1 med banana</li> <li>• <b>1 cup orange juice</b></li> </ul>	<b>Breakfast:</b> <ul style="list-style-type: none"> <li>• 1 English muffin w/ 2 tbsp apricot spread</li> <li>• 1 lg hard-boiled egg</li> <li>• 1 med banana</li> <li>• <b>1 cup Tropical Tangerine Juice, made with PUREFRUIT™ Monk Fruit Extract</b></li> </ul>
<b>Lunch:</b> <ul style="list-style-type: none"> <li>• Tuna salad sandwich: 2 oz water-packed tuna, 1 tbsp mayonnaise, 2 slices rye bread, 1 lettuce leaf</li> <li>• ½ cup baby carrots</li> <li>• 1 cup low-fat milk</li> <li>• <b>6 oz low-fat strawberry yogurt</b></li> </ul>	<b>Lunch:</b> <ul style="list-style-type: none"> <li>• Tuna salad sandwich: 2 oz water-packed tuna, 1 tbsp mayonnaise, 2 slices rye bread, 1 lettuce leaf</li> <li>• ½ cup baby carrots</li> <li>• 1 cup low-fat milk</li> <li>• <b>8 oz blueberry drinkable yogurt, made with TASTEVA® Stevia Sweetener, PROMITOR® Soluble Corn Fibre, and Krystar® Crystalline Fructose</b></li> </ul>
<b>Dinner:</b> <ul style="list-style-type: none"> <li>• Spaghetti with meatballs: 1 cup spaghetti, ½ cup marinara sauce, 2 ½ oz meatballs</li> <li>• 1 tbsp shredded parmesan</li> <li>• 2 cups mixed green salad w/ tomatoes</li> <li>• 1 tbsp vinegar and oil dressing</li> <li>• 1 cup low-fat milk</li> </ul>	<b>Dinner:</b> <ul style="list-style-type: none"> <li>• Spaghetti with meatballs: 1 cup spaghetti, ½ cup marinara sauce, 2 ½ oz meatballs</li> <li>• 1 tbsp shredded parmesan</li> <li>• 2 cups mixed green salad w/ tomatoes</li> <li>• 1 tbsp vinegar and oil dressing</li> <li>• 1 cup low-fat milk</li> </ul>
<b>Snacks:</b> <ul style="list-style-type: none"> <li>• ½ cup grapes</li> <li>• <b>1 oz raisin-nut granola bar</b></li> <li>• <b>12 fl oz soft drink</b></li> </ul>	<b>Snacks:</b> <ul style="list-style-type: none"> <li>• ½ cup grapes</li> <li>• <b>1 coconut and apple bar, made with SLENDA® Sucralose, PROMITOR® Soluble Corn Fibre, and Krystar® Crystalline Fructose</b></li> <li>• <b>12 fl oz blackberry peach flavoured sparkling juice beverage, made with TASTEVA® Stevia Sweetener and PromOat® Beta Glucan</b></li> </ul>



Nutrition Facts		Change	% Change
<b>Baseline menu:</b>	<b>Menu with TASTEVA®, PUREFRUIT™, and SLENDA® Sucralose:</b>		
<b>Calories 2,115</b>	<b>Calories 1,880</b>	-235 calories	-11%
Total Fat 53 g Saturated Fat 17 g	Total Fat 51 g Saturated Fat 16 g		
Cholesterol 305 mg	Cholesterol 305 mg		
Sodium 2,390 mg	Sodium 2,380 mg		
Total Carbohydrate 326 g Dietary Fibre 20 g <b>Sugars 173 g</b>	Total Carbohydrate 277 g Dietary Fibre 30 g <b>Sugars 129 g</b>	-44 g	-25%
Protein 87 g	Protein 88 g		

\*While the majority of the calorie and sugar reductions in these menus are derived from monk fruit, stevia, and sucralose, fibres can also be used to reduce calories and sugar.

\*\*Menu based on USDA Food Pattern, Dietary Guidelines for Americans, 2010.

# Innovating to Meet Nutrition, Health, and Wellness Needs Every Day

## A commitment to innovation

Tate & Lyle, a global leader in wellness innovation, is committed to delivering innovative ingredients that can be incorporated into great-tasting foods to help consumers meet their nutrition, health, and wellness needs every day. That is because Tate & Lyle invests heavily in innovation and research and in developing ingredients that can be incorporated into a wide variety of great-tasting food and beverage solutions. Teams of food and nutrition scientists are continuously innovating, researching, and testing ingredients that will meet current and future health and nutrition needs.

At the same time, Tate & Lyle has a robust market research program designed to provide the necessary insights on consumer preferences around the world. The research program allows Tate & Lyle to customize its offerings and provide tailor-made solutions in local and regional markets.

## Better-for-you ingredients for health and wellness

In response to global public health efforts calling for people to reduce calories and sodium and increase fibre intakes, Tate & Lyle offers a number of innovative ingredient solutions that meet these needs.



*Tate & Lyle's global Commercial and Food Innovation Center, Hoffman Estates, Illinois, USA*

*To learn more about Tate & Lyle ingredients and innovation as well as health benefits and relevant research, please visit [www.foodnutritionknowledge.info](http://www.foodnutritionknowledge.info) and [www.tateandlyle.com](http://www.tateandlyle.com)*

### TASTEVA® Stevia Sweetener

For more information on TASTEVA® Stevia Sweetener, visit [www.yourdrinksolutions.com/our\\_ingredients/our\\_sweeteners/pages/tasteva.aspx](http://www.yourdrinksolutions.com/our_ingredients/our_sweeteners/pages/tasteva.aspx).

### PUREFRUIT™ Monk Fruit Extract

For more information on PUREFRUIT™ Monk Fruit Extract, visit [www.purefruit.com](http://www.purefruit.com).

### SPLENDA® Sucralose

For more information about SPLENDA® Sucralose, visit [www.splendasucralose.com](http://www.splendasucralose.com).

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