Pfeifer & Langen

02 Sweet Science

Sugar: The Versatile All-Rounder

Sugar Knowledge for Nutrition Professionals

Sugar brings sweetness to foods and dishes – but that's just the beginning. Its versatility makes it indispensable both in the kitchen and in food production, offering a wide range of functions that go far beyond sweetening. Sugar is a key flavor carrier and also influences characteristics such as color, texture, volume, and shelf life – all in a natural way. It's also easy to store, dose, and process, thanks to its many available granulations, solubilities, formats, and flavor combinations. Sugar doesn't have a bestbefore date – an important factor when it comes to reducing food waste.

More Than Just Sweet: How Sugar Delights Our Senses.

Sugar has many advantages: it delivers pure sweetness without any off-notes and shapes the overall sensory impression of food – impacting flavor, color, aroma, and mouthfeel. As a seasoning, it intensifies and balances flavors, rounding out bitter, sour, or salty notes. A pinch of sugar can enhance savory dishes just as a pinch of salt elevates sweet treats.

Sugar also affects the texture, structure, and consistency of foods. It contributes to a pleasant mouthfeel and desired qualities – such as moist, fine crumb of baked goods, a crispy crust on bread, firmness and crunch in shortbread cookies, or the light and airy fluffiness of sponge cakes.

Website:
The Many Faces of Sugar

Did You Know? The sensory perception of sweetness is always described using sucrose as the reference. Sucrose serves as the standard and is assigned a value of 1 on the relative sweetness intensity scale. The sweetness intensity of other sweeteners is always expressed in relation to this benchmark.

Stability, Texture, Color: How Sugar Shapes Products.

Whether at home or in industrial production, sugar plays a key role in food preparation and manufacturing.

In dough, sugar is indispensable for stability while maintaining flexibility and workability. It influences the dough's structure and volume and acts as a fermenting agent by feeding yeast and bacteria – supporting processes like sauerkraut fermentation or the rising of dough.

By stabilizing protein structures, sugar helps foamed products like mousse, meringue, or whipped cream retain their texture longer. In ice cream, sugar lowers the freezing point, ensuring a smooth, creamy texture even at low temperatures. Sugar is essential for the Maillard reaction and caramelization, which produce characteristic baked, roasted, and toasted flavors as well as that golden-brown color.

Many production processes depend on sugar. Another important aspect is that its wide range of granulations and solubilities allows for precise dosing.

The Preserving Power of Sugar

Sugar naturally protects food from spoilage by reducing water activity. Water activity measures the amount of free water available for microorganisms like mold, yeast, and bacteria to grow. Sugar binds this free water, thus naturally inhibiting microbial growth. This is why preserved foods like jams, jellies, and fruit spreads last longer – helping to prevent food waste.

Less Sugar, More Challenge: Focus on Reformulation.

Reformulating food involves adjusting recipes – including reducing sugar – to improve a product's nutritional profile. However, reducing or eliminating key ingredients like sugar affects more than just nutrition. Flavor, texture, and shelf life can change significantly.

No single ingredient can fully replicate sugar's taste and function. Replicating its many properties often requires a combination of ingredients. These replacements, however, don't show up in the nutrition label as "sugar substitutes" – only in the ingredients list. Consumers, therefore, may not easily recognize which ingredients are replacing sugar.

Did you know? Beet sugar is a natural product and doesn't require an E number. In contrast, sweeteners and sugar substitutes are additives, and most of them must be labeled with an E number.

Sugar Substitute for Reformulation

Ingredient	Examples	Calories in kcal/g	Sweetness intensity compared to sucrose	Function							
				Sweetness	Taste/Aroma	Teture/Volume	Shelf life	Preservation/ Fermentation	Freezing point	Color	Moisture
Beet sugar	Sucrose	4		●	●	●	●	●	●	●	●
Sugar alcohols	Erythritol (E968)	0	70%	●	●	●					
	Sorbitol (E420)	2,6	60%	●		●					●
	Mannitol (E421)	1,6	50-70%	●	●	●					
	Isomalt (E953)	2	50%	●		●					
Sweeteners	Aspartame (E951)	4	200 times sweeter	●							
	Acesulfame-K (E950)	0	200 times sweeter	●							
	Saccharin (E954)	0	300 to 500 times sweeter	●							
	Steviol glycosides (E960)	0	200 times sweeter	●							
When sugar is reduced in foods, other additives have to be added to replace all the functions of sugar:											
Preservatives							●				
Colorants										●	
Flavor enhancers					●						
Glycerine		4	40%	●							●

02 Sugar: The Versatile All-Rounder

Sugar Reduction in Foods: We Need to Talk About It

Many consumers expect sugar-reduced products to contain fewer calories, allowing them to eat more. In practice, however, reducing sugar often doesn't deliver the desired calorie savings, as other ingredients such as carbs or fats are added to maintain volume and texture. If calories are reduced, the savings are often small and frequently overestimated, especially per serving. As a result, the impact on overall nutrition is often minimal. When sweeteners are used, additional substances must also be added. A holistic view of a product's energy content remains essential.

Instead of avoiding sugar entirely, it makes more sense to view it as part of a balanced diet. Mindful enjoyment in moderation following the principle of "less is more" should be the focus. After all, sugar provides a pure, natural sweetness that is simply essential.

Tips for Nutritional Counseling

- ✓ **Check the ingredients:** Don't just look at the nutritional information, but also check the list of ingredients. What ingredients have been added as sugar substitutes?
- ✓ **Question sugar substitutes:** Often, multiple ingredients such as additives, fats, and carbohydrates are used to mimic the properties of sugar. Therefore, consider whether the substitution is nutritionally beneficial.
- ✓ **Watch calories:** Replacing sugar with fat or other carbohydrates often doesn't reduce the total calorie content of a product.
- ✓ **Emphasize sustainability:** Beet sugar is local, sustainable, and naturally sourced. Its cultivation and processing are usually done regionally.
- ✓ **Eat mindfully:** Enjoy your food consciously and without guilt. Take time to savor the moment. It saves calories.

At a Glance: What Sugar Can Do