

# The Sugar Fix: A True Balancing Act

Sugar is unique and can't be replicated on a like-for-like basis. So understanding the strengths, weaknesses and limitations of alternative ingredients – and how to use them effectively in different applications – is crucial to finding the right solution.

by Carole Bingley

There is no escaping the fact that sugar is often seen as the enemy when it comes to public health. Excessive consumption is linked to obesity, tooth decay and a spiraling diabetes crisis. So it's not surprising that food and drink producers are under increasing pressure to support ambitious legislative targets for a reduction in sugar intake.

Translating this directive into a commercially-viable reality is a challenge for product developers, but one which can be achieved with the right approach. It starts with the understanding that sugar has many important functional properties, as well as a distinctive flavor profile. Sugar is unique and can't be replicated on a like-for-like basis. So understanding the strengths, weaknesses and limitations of alternative ingredients – and how to use them effectively in different applications – is crucial to finding the right solution.

## Sweet Selection

Artificial high potency sweeteners, such as sucralose, aspartame and acesulfame-K, have long been used in the diet and sugar-free beverage sector. These low-calorie ingredients provide an intense sweetness at a very low use level. This may not be exactly the same profile as sugar, but it is now so well-established that it has gained high acceptance among consumers. The extra good news for beverage manufacturers is that this generally results in an equal or lower formulation cost when compared to sugar, so it makes sense from a commercial perspective too.

This group of synthetic sweeteners can be an equally useful option in reduced sugar variants in other product categories, where structure and shelf-life are less of an issue. Lending a sweet taste to sauces, dairy desserts and milkshakes, for example, and any texture require-

ments can be provided by the addition of hydrocolloids or starches.

However, recent negative media coverage around the dangers of artificial sweeteners – particularly aspartame – has fueled consumer health concerns. This is despite the lack of significant scientific evidence to support the claims and a re-evaluation by EFSA which concluded that: *“Aspartame remains safe for human consumption and there is no scientific basis for reconsidering its use in food.”*

As a result, interest in naturally-derived alternatives is growing – but these ingredients come with their own set of complications.

## The Stevia Story

Making its first appearance in retail products a few years ago, the naturally-derived sweetener stevia initially appeared to have all the answers. Extracted from a species of plant known as *stevia rebaudiana*,

this sugar substitute is calorie free and can taste up to 400 times sweeter than the same amount of granulated sugar. So far so good – or is it?

The taste quality, although improving, is not judged to match that of sucrose; with stevia tending to give a bitter or licorice aftertaste at higher usage levels.

Regulatory constraints can also mean that it is difficult to achieve the level of intensity that consumers expect in some products; making it hard to sweeten a drink using stevia alone.

The addition of fruit juices is one way to resolve the issue but is only suitable for certain products, such as lightly sweetened soft drinks. For those products needing greater flavor impact, exploring a suitable blend may be the best option – although compromises on overall calorie content will then need to be made.

There is also the question in consumers' minds about the credibility of its “natural” claim. Although sourced from a plant, the purification process needed to produce the extract means that the final ingredient is not exactly the same composition as is found in nature.

## What's Next?

Despite these shortcomings, however, stevia is being used in an ever-increasing range of products and has prompted greater interest in the burgeoning category of natural sweeteners. For those looking for “the next stevia,” there are a number of ingredients which – although not yet as commercialized in Europe – may be serious contenders in the future.

- **Luo Han Guo (also known as monkfruit):** Traditionally used in Chinese medicines and as a syrup in water-based drinks, this fruit extract has gained US Food and Drug Administration (FDA) approval and is currently being evaluated by European authorities.
- **Thaumatococcus:** This EU-approved, low-calorie fruit extract is gaining traction as a flavor modifier rather than as a sweetener. Used in low levels, it can round out flavors – such as the bitterness in stevia. But it cannot be used alone to add sweetness, as the higher quantities required leave an unpleasant, lingering aftertaste.

› It's not surprising that food and drink producers are under increasing pressure to support ambitious legislative targets for a reduction in sugar intake.



- **Brazzein:** Found in a West African fruit, this protein sweetener shows promise but is yet to gain regulatory approval.
- **Monatin:** A plant-based extract found in the root of a South African shrub, it is not currently under development but has potential.

### Bulk Sugar Replacers

Replacing the sweetness of sugar is only part of the reformulation story. Sugar also acts as a preservative, stabilizer, thickener, fermentation substrate in a range of different products. Plus, it can be used to create the distinctive flavor and color brought about by caramelization and the Maillard reaction. These are attributes which can't be replicated by the use of sweeteners alone – whether artificial or natural.

So for categories such as confectionery and baked goods, where sugar makes up a significant part of the formulation and water certainly can't be added – bulking agents become part of the equation. And this brings a new set of challenges in the form of EU regulations.

From a technical point of view, polyols are a highly effective group of bulk sugar replacers. Maltitol, isomalt, sorbitol and a number of other well-established types; all work well in terms of providing structure and some sweetness. However, current European legislation states that they can only be used if the product has no added sugar or a total energy reduction of 30%.

This is not an issue for applications such as reformulating full sugar chewing gum or hard candy; sugar content can be halved or even removed; so comfortably reducing overall calorie content and allowing polyols to be used without running the risk of non-compliance.

In fact for applications where polyols can be used, the main consideration is more focused on the likely consumption rate and quantity. This is because polyols have a known laxative effect and any products containing more than 10% are required to carry a corresponding warning on pack (Reg. (EU) 1169/2011, Annex III, 2.4). So for hard-boiled candy which is eaten slowly over time it is less of a problem, but for jelly varieties which can be consumed in large volumes, there are likely to

be some digestive issues. But when it comes to products with a high fat content, such as chocolate, biscuits and baked goods, the impact of this EU Directive does have a direct impact on which bulking agent can be used. This is because fat contributes 9 calories per gram whereas sugar is 4 calories per gram, so even if all the sugar is removed reaching the magic 30% energy reduction figure is difficult to achieve.

### What's Available?

Alternative bulking agents include a number of soluble fiber-based in-

redients which can offer formulators additional benefits – but again are not without drawbacks.

Fructo-oligosaccharides are a case in point. As a chicory root extract, they are a source of fiber, which appeals to consumers looking for recognizable ingredients on-pack. However, as a prebiotic it provides a source of food for good bacteria which can lead to a tolerance issue if consumed in large amounts, so quantities and volume of consumption need careful consideration.

A number of large industry suppliers have also launched proprie-

tary ingredients onto the market. Offering a label-friendly proposition, such as corn fiber or maize dextrin, these can be used to replace the bulk of sugar in many applications. The downside is their low sweetness profile. Here formulators are faced with the choice of using sweeteners – as long as the product complies with Reg. (EC) 1333/2008 – or building back the sweetness with the use of flavors and other ingredient combinations. Either way, it is a challenging process.

Of course, in many ways, it is easier to formulate a new product with

**Bell**

**Get in touch with taste.**

**MEET OUR EXPERTS!**

**Bell @ FiE 2017:**  
Hall 8, Stand 08.0L1

Bell Flavors & Fragrances invites you to explore new innovations in flavours and extracts for the entire world of beverages, savoury products and sweet & dairy products.

Meet Bell's top flavorists, marketing and sales experts at this year's biggest food industry event and get inspired by high-quality solutions for your new product developments.

**Get in touch with taste!**  
**... and visit Bell in hall 8 at stand 08.0L1!**

**Bell Flavors & Fragrances**  
Tel.: +49.341.9451.0  
E-Mail: info@bell-europe.com

[www.bell-europe.com](http://www.bell-europe.com)

## U.S. LEADS CONCERN FOR SUGAR CONTENT IN CARBONATES

% of consumers who pay attention to the sugar content of carbonates (2016)



Source: Consumer Survey, 2016

no added sugar or a lower level of sugar, as there are no expectations in terms of matching an existing product and formulators can start from scratch. But taking this route brings with it all the risks and costs associated with a new launch.

On the other hand, reformulation comes with a benchmark in terms of taste, texture and appearance. And positive communication of any changes will be essential to secure consumer buy-in. But the question of how to position such a product to ensure consumer buy-in

requires careful navigation.

From a labeling perspective, claims are closely governed by the Annexes of EC Regulation 1924/2006 on Nutrition and Health Claims Made on Foods. In basic terms, this means that a “reduced sugar” product would need to have a third less sugar content than the original. Whereas promoting a “sugar free” message can only be considered if the product contains no more than 0.5g of sugars per 100g/ml, while the choice of “no added sugars” severely limits the type of permissible ingredients.

### What's Most Appealing?

It may be that the more traditional approach is no longer relevant to a modern audience. Certainly, terms such as “light” and “low” have fallen out of favor. Some consumers are turning away from negative messaging, equating it with a possible lack of flavor or quality – and they aren't prepared to compromise on taste.

Perhaps we will see more creative ways of labeling products; where the reduced sugar content is not the key selling point but rather part of the overall product offer. They may tap

into the wider trend for wholesome and simple ingredients.

### A Balancing Act

One thing is certain: manufacturers urgently need to have a reformulation strategy in place in order to demonstrate commitment to the issue. Progress will constantly be reviewed against targets. Public Health England, for example, set out guidelines to achieve a 5% sugar reduction by August 2017, and this will no doubt be reviewed and help to inform its far more ambitious goal of a 20% cut by 2020.

It is a challenging balancing act. Reducing sugar in a product may tick a box and win approval from government and health bodies, but this success will be short lived if consumers don't buy it. Ultimately, whether a product succeeds or fails comes down to its taste – a guiding principle which applies no matter which reformulation route is taken. ▼

Carole Bingley is an Associate Principal Scientist working in the Product and Ingredient Innovation Team at RSSL.

**Allied Biotech Corporation**  
*The Carotenoid Company*

Visit us at  
Fi Europe  
Stand #08.Q76

How may we help  
to enhance your  
product and label  
profile with our comprehensive  
range of carotenoid colours?

www.altratene.com

HEALTHY  
FOOD  
COLOURS

Lutene®

Apocrotene®

Beta-carotene

Lycotene®