

The Sugar Junction

By Carole Bingley - Technical Specialist, RSSL

Sugar reduction is top of the agenda for many manufacturers. Addressing the complexities of technical formulation and consumer expectations is a difficult balancing act - but one which can be negotiated. Carole Bingley, technical specialist for Reading Scientific Services Ltd (RSSL), explains.

Linked to obesity, heart disease, diabetes and tooth decay, excessive sugar consumption has become the nemesis of health and wellbeing. For food and drink manufacturers, this backlash presents a number of challenges – particularly how to cut sugar content without compromising the clean label platform.

Formulating a strategy

One of the main issues governing the formulation of products in this sector is the need to meet consumer expectations for wholesome and natural ingredients. This means that certain ingredients, which are often used to replicate the distinctive flavour profile or functional attributes of sugar, no longer fit the brief.

Yet while there are undoubtedly a growing number of natural alternatives, formulators need to carefully consider their use in the wider context of product positioning, brand values and overall costs. Understanding this strategy will inform the direction for product development and ensure the right decisions are made.

Sweet profile

For applications requiring a sweet taste there are a range of naturally derived ingredients which can be used to replace

refined sugar. Coconut sugar has become the latest fashion-forward option to be added to an ever-expanding list; made from the flowers of the palm tree, it has a caramel flavour and the added benefits of a low glycaemic index as well as trace amounts of vitamins and minerals – giving it a comparably better nutritional profile, although arguably by only a slim margin.

Other popular choices include honey, brown rice syrup and agave nectar. All can be used to boost a product's sweet profile, while also appealing to the consumer who is turned off by any chemical-sounding additions to a product label.

But this ignores one crucial issue. Sugar content, no matter what the source, will always register on the nutrition panel as such. So if the aim is to cut overall sugar content, rather than simply establish a consumer-friendly ingredients list, a different approach must be taken.

In this scenario, formulators are increasingly turning to stevia to provide part of the solution. One of the most commercially successful sugar substitutes, this plant extract is calorie-free and can taste up to 400 times sweeter than the same amount of granulated sugar – meaning far less is needed in the formulation and sugar content can be significantly reduced. A powerful combination of benefits, which tick a number of boxes in terms of its consumer appeal. But stevia is not without its drawbacks.

The main issue is its taste profile which, although improving, tends to leave a bitter or liquorice aftertaste which is difficult to mask. It's also hard to achieve the level of intensity that consumers expect. Fruit juice may be one way to resolve the issue in lightly sweetened soft drinks, but is not a suitable course of action for every application. For products needing greater flavour impact, exploring a partial sugar reduction may be the best option – although both approaches result in compromises on calorie content.

There is also the question in consumer's minds about the credibility of stevia's 'natural' claim. Although sourced from the species of plant known as *Stevia Rebaudiana*, the purification process needed to produce the extract means that the final ingredient is not exactly the same composition as is found in nature.

Despite these shortcomings, stevia remains the most widely adopted naturally derived sweetener and the subject of extensive R&D to further improve its performance. Other ingredients in this burgeoning category have yet to achieve a similar breakthrough but a number have caught the industry's attention. One is the fruit extract, monkfruit (*Luo Han Guo*). Achieving approval from the US FDA and currently under evaluation by the European authorities, it has gained some traction but issues around scalability may limit its potential.

Fibre-based solutions

Beyond a distinctive sweet taste, sugar also provides functional characteristics such as texture and structure. And again, while there are a range of possible substitutes, those that are label friendly are rapidly gaining ground - particularly soluble fibre-based ingredients.

Fructo-oligosaccharides and inulin, are among the most effective. Providing the required properties, they also benefit from a clean extraction process which means they can be labelled as chicory root or vegetable fibre. This is a crucial advantage which appeals to consumers wary of ingredients they do not understand or perceive as artificial. The only downside is that as a prebiotic, they provide a source of food for good bacteria which can lead to tolerance issues, so quantities and volume of consumption need careful consideration.

In practice this means that rather than using synthesised polyols, such as maltitol, in a reduced sugar formulation, a combination of a soluble-fibre based bulking agent together with stevia extract to boost sweetness could achieve the same, or similar, nutritional changes - but with the added benefit of a clean label.

Given this potential it is not surprising that there has been a noticeable push by suppliers to develop new proprietary bulking ingredients which are both label friendly and well tolerated. Getting the balance right, however, is not straightforward and often requires a compromise one way or another.

Soluble corn fibre and maize dextrin, for example, often have a better tolerance effect and resonate well with consumers, but have a lower sweetness profile. Similarly, isomaltoligosaccharide (currently available in the US) is better tolerated than many of its counterparts, but its appearance



on an ingredients panel is unlikely to be well received by discerning consumers.

Meeting expectations

Just how manufacturers choose to navigate the available options will depend to a large extent on the relative importance placed on a number of influential factors. Manufacturers can follow a sugar reduction route for a standard product and so demonstrate commitment to achieving legislative targets, such as a 20% reduction by 2020 set out by Public Health England. A cereal bar made with glucose syrup and cane molasses, for example, contains a high amount of refined sugar. By using fructo-oligosaccharides or inulin as a partial substitute, the total amount of sugar can be reduced while also maintaining texture to ensure eating enjoyment. Although care would need to be taken with overall levels to avoid tolerance issues – particularly if the product is aimed at children.

A raw fruit bar, however, packed with nuts and inclusions is not such an obvious candidate for reformulation in this way.



Dates are often the main source of sugar but they also hold the product together and ensure it is palatable, so removing them would significantly affect product quality. Technically it is possible to rebalance the formulation by increasing the nuts and oats for example, but whether this could be achieved while staying true to the product's brand values and simple ingredient list, is questionable. So too is whether consumers are willing to trade a nutritionally balanced product for a reduction in sugar content – especially when the source is a natural fruit puree.

This argument is also applicable to other categories such as smoothies, which are known for using only natural ingredients, but in terms of sugar content are relatively high. Most are a blend of fruit and vegetables, with banana generally used to create the required mouthfeel. So again, taking the sugar down is a challenge. It can be done by adding water and a naturally derived sweetener, such as stevia, together with a hydrocolloid for texture, but this approach adds more ingredients and may be a step too far for the brand.

On the other hand, yogurts do lend themselves to being reformulated with less sugar. In many cases, they are overly sweet so taking this flavour profile down and replacing it with a natural sweetener and/or fruit substitute fits well with the category's health platform. In fact, stealth reduction, where levels are gradually reduced over time in order to retrain the palate, can work well in this instance.

Of course, one of the main issues for manufacturers to consider as part of the sugar reduction strategy is cost. Natural alternatives do generally come at a higher premium than commodity based processed sugar – an issue which looks set to be further exacerbated by the end of sugar quotas and minimum pricing in Europe. But here again, the solution is not clear cut.

Consumers are generally unwilling to pay more for a product labelled as reduced sugar; sceptical of a negative taste impact and the rationale behind the price increase. Yet many so-

called functional products with strong 'naturally healthy' and nutritionally-balanced credentials, occupy a premium position in the market place – despite containing a relatively high amount of sugar.

Reconciling these conflicting demands may prove to be the driving force behind further exciting ingredient innovation focused on affordability, simple labelling and performance. In the meantime, asking the right questions and understanding the motivations behind consumer expectations will be a crucial part of the formulation process; providing a valuable framework around which to build the right technical solutions.

RSSL has a broad range of knowledge and expertise in sugar replacers and sweeteners, including natural sweeteners, and has experience in reducing sugar or calories in a variety of food categories. Contact us for further information or to discuss your needs Tel: +44(0) 118 9184076, Email: enquiries@rssl.com or Visit: www.rssl.com.



About Carole Bingley

Carole is a Senior Associate Principal Scientist working in the Product and Ingredient Innovation Team at RSSL. She holds a Bachelor of Science in Food Science and a Master of Science in Nutritional Medicine. Carole has worked with a wide range of sweeteners and bulking agents across many food categories during her 25 years in the food industry.

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