



Top 10 Tips for Sugar Reformulation

How to Develop a Successful Sugar Reformulation Strategy

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A Leatherhead Food
Research white paper

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Sugar reduction continues to be a hot topic for the food industry. In this white paper, Persis Subramaniam, gives her tips for developing a successful sugar reformulation strategy.

Industry is facing the ongoing challenge to find ways of reducing the sugar content of products without compromising on sensory quality.

These top 10 tips will help you in developing a sugar reformulation strategy which delivers against the following key criteria:

- Food safety and stability
- Taste, texture and appearance
- Clean label and/or naturalness perception
- Shelf life performance and stability
- Ingredient functionality
- Ease of manufacture
- Ingredient cost

1. Don't forget that sugar is a natural and clean label ingredient

If your agenda is really about natural or clean-label ingredients, then remember that sugar fits into these categories and that using replacement ingredients may not be appropriate. At the very least, the number of ingredients will increase, as it will probably not be possible to remove the sugar completely. Even sweeteners that are extracts of natural plant materials, may not be considered by consumers to be acceptable, if they are not familiar store cupboard ingredients.

2. Be clear whether your aim is sugar or calorie reduction

Before you start your reformulation exercise, decide if sugar reduction is really the objective

or if it is, in fact, calorie reduction. Addressing the obesity issue is really one of calorie reduction, and fat reduction has a role to play in this as well as sugar reduction. It is therefore a good idea to use a simple spreadsheet model to evaluate a number of reformulation scenarios before getting too deep into product trials in your development kitchen or pilot plant.

3. Watch the calories when reducing the sugar level

The approach of using a simple spreadsheet model may demonstrate that reducing the sugar in your product with no other formulation changes may leave the calories per 100g unchanged or even increased slightly. This may be acceptable if the target really is sugar reduction, but your product may still be open to attack on the obesity agenda. Therefore, it is worth considering how to reduce the calorific content too, if only by a small amount.

4. Consider portion control as a strategy

Considering that the broader obesity debate is really about calories, then the portion size of your product becomes an important consideration. If you can reduce the portion size per serving, for example by making clever use of packaging, then the calories and sugar level are automatically reduced, as are the salt and fat levels. Care must be taken, however, to ensure that consumers don't simply

compensate by consuming more than one portion, or that consumers aren't disgruntled by changes to product size.

5. Sugar contributes much more than sweetness

Sugar is the gold standard for sweetness – the reference point by which all sweetening agents are defined. If you are looking for a pure, sweet taste then there is really no alternative to sugar. Sugar, however, contributes much more than sweetness to foods; it is an important ingredient for providing texture and 'body', especially to 'solid' foods, such as cakes and biscuits, but also to some beverages. Any sugar reduction activity will need to take this important functionality into account.

6. Remember 'sugar' and 'sugars' aren't the same

The terms 'sugar' and 'sugars' are often confused by consumers and even by manufacturers on food labels. Of course, they are not the same thing. 'Sugar' is the disaccharide sucrose, whereas 'sugars' refers to a range of monosaccharides and disaccharides, such as glucose and lactose, as well as sucrose. It is important to always use the correct terminology when labelling and formulating your products, and to assist your consumers in appreciating the differences too.

7. Consider all elements of the sugar reduction toolkit

There are many options available for sugar reduction in foods. In some types of foods, it may be possible to simply remove some sugar with no remedial action. Ingredients for replacing the sweetness and texture

contributions of sugar are plentiful, and some ingredients will do both. There may also be some technology solutions that are worth investigation. You will need to select the appropriate option or combination that is applicable to your product or brand. It may also provide the opportunity to improve the overall nutritional profile of the product by increasing protein and fibre as part of the sugar reduction strategy.

8. Stealth reductions may not work in the way they did for salt

Stealth or gradual reductions with no remedial action have been successful in reducing salt levels in many food categories. The basis of this approach is that consumers' palates gradually adjust to lower levels of saltiness and then the original, higher salt options are rejected. It has not yet been established whether this strategy can apply to sugar reduction, and even if it applies to sweetness, the texture changes may be more noticeable. There is also a word of caution that alternatives, such as high potency sweeteners, may work against an overall stealth reduction strategy by maintaining high levels of perceived sweetness. The stealth approach which has been successful with salt was an overall, graduated reduction of salt, which in turn led to a reduced sensory desire by the consumer. The over sweetening of products 'artificially' may therefore not help in this approach.

9. Clever blending of sweeteners may be required

There is a wide range of intense sweeteners available and new ones are coming on to the market, some of which are around 20,000

times sweeter than sucrose. In many cases the optimum product properties are derived from a blend of sweetening agents. This is fairly obvious in the case of maintaining sweetness and texture with separate ingredients; however, blends of two or more intense sweeteners can work in a synergistic manner with one compensating for unacceptable flavouring notes of the other. Sweetener selection for products is important as certain sweeteners may work better by not only delivering sweetness but also masking unpleasant flavours.

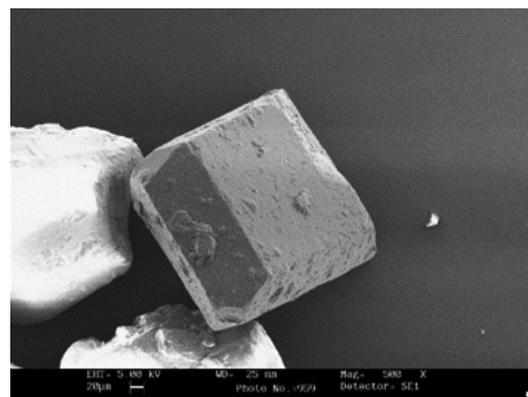
10. Technology solutions may be applicable

If you want to reduce sugar and maintain sweetness perception without the use of intense sweeteners, then reduction of the sugar crystal size, shape and density may be effective, as well as manipulation of the product structure to enhance sugar dissolution in the mouth. A range of sugar crystal sizes are already available. Leatherhead's work has shown that altering the size of sugar affects the flavour and texture of sugar-based products, so both aspects must be considered when using this approach.

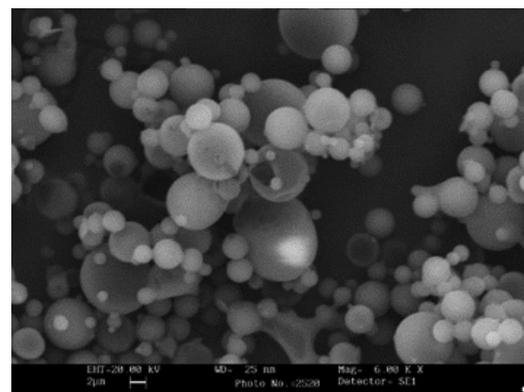
Emerging technologies that will produce hollow sugar 'crystals' or thin coatings of sugar around an inert low calorie ingredient (such as calcium carbonate) can deliver a sweet taste at lower sugar levels. A typical sugar crystal (solid and irregular) and a spray dried sugar (hollow and thin walled), as seen in the electron microscope, are shown opposite. The spray dried, hollow, thin-walled sugar is significantly smaller and has the potential to deliver the sweet taste with a lower sugar level. Leatherhead has an interest in new

technology for sugar reduction and will continue research in this area.

An eye on the regulatory implications needs to be maintained when reformulating products. The existing regulations such as the Food Information to Consumers (FIC) Regulation (EC) No. 1169/2011, plus the Nutrition and Health Claims Regulation (EC) No. 1924/2006 with respect to 'Low sugar', 'Sugar-free' claims etc. need to be considered as part of the reformulation exercise.



Sugar crystal through electron microscope



Spray dried sugar particles through electron microscope

Sugar reduction is a particularly challenging example of food product reformulation and getting it wrong can have serious implications on the business. By following these tips, you can avoid making mistakes and achieve your sugar and/or calorie reduction targets with confidence.

How Leatherhead can help

Leatherhead Food Research has, for many years, been carrying out reformulation exercises on behalf of food and drink manufacturers, helping to reduce sugar, as well as salt and fat in products, often as part of a holistic reformulation strategy.

About the author

Persis Subramaniam graduated with a degree in Food Science from the University of Strathclyde and has a Diploma from the institute of Packaging. She started her career at Express Dairies, working within the Quality Control section, before joining Leatherhead Food Research in 1984. During her time at Leatherhead, Persis has been involved with research and confidential projects for client companies studying a wide range of products and processes. Her current role is Team Leader for Product Development within the Food Innovation Group.

About Leatherhead Food Research

Leatherhead Food Research provides expertise and support to the global food and drink sector with practical solutions that cover all stages of a product's life cycle from consumer insight, ingredient innovation and sensory testing to food safety consultancy and global regulatory advice. Leatherhead operates a membership programme which represents a who's who of the global food and drinks industry. Supporting all members and clients, large or small, Leatherhead provides consultancy and advice, as well as training, market news, published reports and bespoke projects. Alongside the Member support and project work, our world-renowned experts deliver cutting-edge research in areas that drive long term commercial benefit for the food and drink industry.

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