

“Public Health England sugar reduction progress report underlines scientific complexities,” says Leatherhead

23 May 2018: Public Health England's (PHE) progress report on sugar reduction across nine food categories recognises the achievements of the industry to date. However, the task is more challenging for some categories than others, says Leatherhead Food Research, a Science Group company.

PHE says “results show an encouraging start with retailers and manufacturers achieving a 2% reduction in sugar against 5% first year target”, with yogurts and fromage frais, breakfast cereals and sweet spreads and sauces all meeting or exceeding the initial ambition.

Products not meeting the 5% interim reduction target include chocolate and sweet confectionery, ice cream, puddings and biscuits, which are some of the more challenging applications. The same is true of cakes and morning goods, although the agency doesn't yet have sufficient data to report on the progress being made. In these sweet treats, sugar not only sweetens the taste, it also plays a functional role. So, its reduction may impact properties such as texture, volume, shelf-life and appearance. Finding an alternative, in most cases, takes time and requires a science-led approach that considers multiple factors.

Leatherhead works closely with manufacturers to create foods and beverages that are aligned with consumer and governmental demands for lower amounts of sugar. It also helps clients find new technical solutions beyond substitutes.

Chris Wells, MD at Leatherhead, says sugar reduction has become a high priority for many manufacturers and a robust scientific understanding of the role sugar plays in products is an essential part of the process.

“Reducing sugar in categories such as breakfast cereals is relatively straightforward,” Wells explains. “It's generally used as a surface coating, and this can be thinned, replaced with a different sweetening ingredient and could even benefit from technical solutions such as hollow sugar crystals. When it comes to cakes, biscuits, ice cream and chocolate, sugar is more integral, interacting with other ingredients to influence core properties. For instance, removing or reducing sugar in cakes can have

a detrimental impact on the mixing and baking process. In some cases, recipes simply won't work without sugar, or the end product is unpalatable.

"There is no quick fix to these challenges, but in our experience they can be overcome with an approach we use known as blueprinting. This involves creating a technical map of a product using imaging, chemical analysis and rheology to analyse properties such as 'crispiness', 'creaminess' or 'crumbliness'. Understanding the science behind these attributes is the cornerstone of successfully and efficiently reformulating products with less sugar."

The functional role of sugar explained

Biscuits

Sucrose (granulated sugar), the commonly used sugar in biscuits, introduces air to the batter during the mixing process. Approximately half of the sucrose remains undissolved at the end of the mixing stage. When the dough enters the oven and its temperature increases, this sucrose dissolves to create more fluidity, allowing the biscuits to spread. This influences the surface appearance, and in some cases leads to surface-cracking which enhances the sensory experience, for instance making the biscuit more crumbly. Sucrose also contributes flavour and colour, caramelising while the biscuits are baked.

Ice cream

Sugar plays a vital role in the complex microstructure of ice cream, helping the water freeze as small crystals to create a smooth, creamy feeling in the mouth. This is particularly important in ice cream tubs that are moved in and out of the freezer several times during use. These significant changes in temperature encourage large crystals to form which will lead to gritty ice cream. The sugar helps minimise this change.

Chocolate and sweet confectionery

Confectionery products are extremely varied, ranging from boiled sweets (hard candy), through to jelly or gummy products, marshmallows and chocolate. This makes the sugar reduction challenge much more difficult since in each product category the sugar plays different functional roles.

In jellies and gummy sweets the sugar affects the microstructure and hence texture of the gelling agent used. Changes in the texture of these products also have an impact on flavour release in the mouth, so reducing the sugar will alter the properties of the whole product. Confectionery products

with sugar coatings are easier to target as the size of the sugar crystal and thickness of the coating can be reduced with less impact on flavour and texture.

Hard candy products are pure boiled sugar, so reducing the amount of sugar is very difficult to accomplish without stability issues. There are sugar-free versions available which use bulk sweeteners. In some confectionery products restructuring the sugar offers the option to deliver sugar reduction without loss of functionality.

Chocolate is a major confectionery product with sugar as an essential solid ingredient. The sugar in chocolate interacts with the other ingredients to deliver a smooth mouthfeel and chocolate taste as well as texture. Reducing the level of sugar means that these properties could be adversely affected. Additionally the replacement ingredient should be lower in calories to address the health requirements for sugar reduction. It's also important that it can be manufactured using existing processing and satisfies regulations regarding the nature of chocolate.

Pastries

The levels of sugar in pastries, e.g. Danish pastries, can be 20% or more. Pastry products are often composed of many components (pastry, icing, filling etc.), and therefore it is important to assess components separately, considering the role that the sugar plays in the structure and sensory properties of each. In pastries, sugar is not only important for sweetness but also the overall flavour, texture and stability. Any strategy for reducing sugar in these products will need to identify the amount of sugar contributed by each component as the first step and the consequences of reducing sugar in each component.

Fruit pies

In fruit pies, sugar can be present in the pastry case as well as the fruit filling and the total sugar can be more than 30%. The levels of sugar in the pastry component may be about 15% whereas the filling can be significantly higher. The sugar present in the pastry will provide sweetness and contribute to the structure. In the fruit filling, the levels of sugar will be made up of both added sugar and sugar present in the fruit/juice ingredients. The presence of sugar in the filling not only provides sweetness and flavour, but will aid gelling of the pectin in the fruit filling, and contribute to microbiological stability.

Cakes

Cakes have an open texture like a foam and most of this cellular structure is derived from egg protein – the agent which traps air when the cake batter is whipped in the mixing process. Sugar is important

to stabilise this beaten foam. Sugar also raises the temperature at which egg protein sets, delaying coagulation long enough to ensure that air is trapped, forming a light and airy structure in the finished cake. This results in the cake having a tender texture and good volume (it rises during baking). What's more, sugar contributes to several aspects of the taste of a cake, not only producing sweet flavours but a range of other baked flavours. It is also essential for a soft texture and brown surface colour.

Sugar replacers white paper

There are many sugar replacement options available, both natural and artificial. However, their use does not necessarily reduce overall calories, and there may be legislative implications.

Leatherhead has produced a free white paper outlining technical and practical considerations surrounding the selection of sugar replacers for reformulated products. It's available for download here: <https://www.leatherheadfood.com/news-detail/of-note-what-are-the-options-for-sugar-replacers/>

However the big challenge that Leatherhead and the industry are currently engaged in is combining technology and science to develop alternatives that retain all of the functional properties of sugar to deliver food and drink products that consumers love.

More information about Leatherhead Food Research is available at www.leatherheadfood.com

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Interviews and images are available to media on request.

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Notes to editors:

About Leatherhead Food Research

Founded in 1919, Leatherhead Food Research has been a trusted partner to the food industry for nearly a century, offering an unparalleled breadth and depth of experience to help food and beverage companies, large and small, innovate and succeed. Covering the full product lifecycle, services range from offerings such as consumer insight, sensory testing and ground-breaking ingredient and product innovation to expert advisory work around food safety and global industry regulations. Leatherhead also operates an internationally recognised membership programme which represents a who's who of the food and drinks industry. Alongside Member support and project work, Leatherhead's industry

professionals deliver cutting-edge research in areas that stimulate long term commercial benefit and growth for the food and drink industry.

Leatherhead Food Research is the trading name of Leatherhead Research Limited, a Science Group (AIM:SAG) company.

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