



Leading to Better

FSA 2017 Sugar Reduction Technologies



Taste and Nutrition

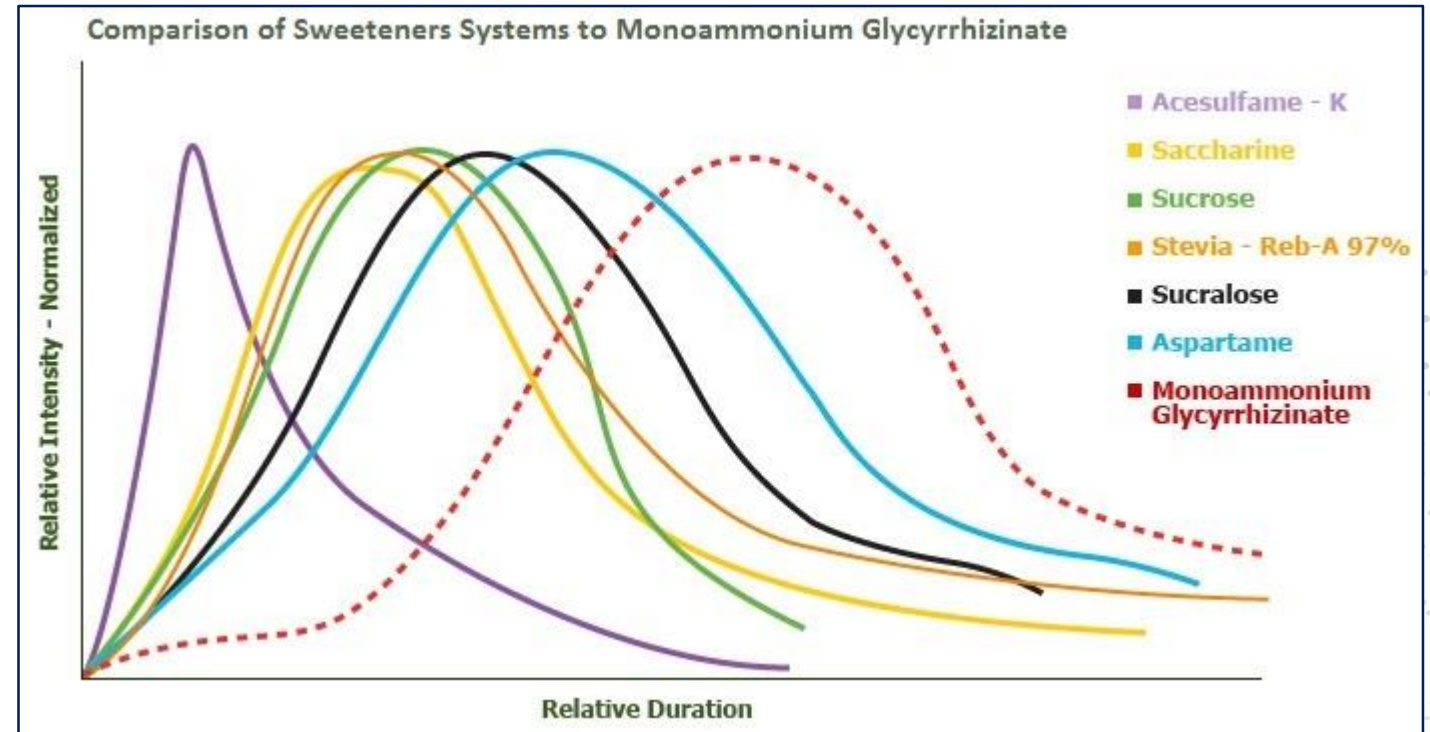


Kerry Global Technology Innovation Centre – Naas, Ireland



Effects of Reducing Sugar

- When Sugar is reduced; several things happen:
 - Sweetness reduced
 - Sourness increases
 - 'Bitter' or 'off' tastes increase
 - 'Mouthfeel' or 'Viscosity' decreases
- 'Alternative' sweetener may build back sweet, but other attributes must be adjusted
 - Temporal profile
 - Onset, middle, finish
 - Adjustment of sourness / re-balancing of acidity
 - Masking of bitterness / off-taste from components in the food / beverage matrix
 - Masking of bitterness / off-taste from the alternative sweetener itself



Additional Kerry Resources and Collaborative Research

In addition to the applied work which Kerry does, we also fund researchers and organizations which are studying the basic science behind taste and olfaction. Their research helps to uncover how taste, olfaction and perception work. This, in turn, allows Kerry to develop better Taste solutions for the food and beverage industries.



MONELL CENTER

ADVANCING DISCOVERY IN TASTE AND SMELL

Monell Centre: This is a not for profit organization which focuses on the understanding the science of taste and olfaction (smell). In addition to understanding the mechanisms behind taste and smell, they also do behavioral and preference studies. In addition to being a corporate sponsor, Kerry has also done sponsored taste research with them.



AChemS

Association for Chemoreception Sciences

AChemS (Association of Chemoreceptive Sciences): This is one of the largest organizations in the world focused on the science of taste and olfaction. Kerry is proud to be one of the sponsors of their annual meetings the past few years. Here most of the people in the field of taste and olfaction come together to present their research and latest findings.

Kerry Nutrition Technologies

INGREDIENTS WITH NUTRITIONAL IMPACT

Milk Protein

- Isolates
- Fractions

Protein Hydrolysates

- Vegetable
- Dairy
- Mild or Extensive Hydrolysis

Enzyme Technology

Fermentation Technology

Cereal Technology – Bet Glucans

Nutritional Lipid Technology

Prebiotics

Taste Modulation – Sugar, Salt Reduction



Sugar Reduction Options



- Sugar reduction can be a complex process with multiple options
- The right choice is not always clear for food manufacturers

Coca-Cola life is to be withdrawn from the UK market in June 2017. due to declining sales

	Ease of use	Clean label	Label claim possible	Good taste profile
Stealth Reduction	✓	✓	✗	✗
Artificial Sweeteners	✓	✗	✓	✓
Naturally Derived Sweeteners	✗	✓	✓	✗

Artificial Sweeteners Or Diet Drinks May Cause Stroke And Dementia

Diet sodas may be tied to stroke, dementia risk

By Jacqueline Howard, CNN

Updated 2053 GMT (0453 HKT) April 20, 2017

The truth about sweeteners



Artificial sweeteners are low-calorie or calorie-free chemical substances that are used instead of sugar to sweeten foods and drinks.

Kerry's Solutions to Enable Consumer Preferred Sugar reduced products

TasteSense™
By Kerry

Optimising Taste & Balancing Nutrition





What is the TasteSense™ Sweet offering?

- ✓ Natural flavour solutions
- ✓ Contain fruit and botanical extracts, which are screened and selected specifically for their functional properties
- ✓ Interact with the taste receptors of the mouth, modifying overall taste perception
- ✓ Optimised taste profile for your product
- ✓ Derived from our strong heritage in plant extracts and creating successful flavour solutions

Sugar Reduction Options

- Sugar reduction can be a complex process with multiple options
- The right choice can be difficult for food manufacturers

	Ease of use	Clean label	Label claim possible	Good taste profile
Stealth Reduction	✓	✓	✗	✗
Artificial Sweeteners	✓	✗	✓	✓
Naturally Derived Sweeteners	✗	✓	✓	✗
TasteSense™	✓	✓	✓	✓

EmulGold™ Fibre

Emulgold™ is a range of soluble dietary fibres from plant origin with a fibre content of > 90% (AOAC, dry weight)

Application:

Suitable for all dairy & beverage applications, both neutral and acidic pHs

Features:

- All-natural, GMO-free
- High concentration of soluble dietary fibre
- Easy to use
- Halal & Kosher suitable

Benefits:

- Facilitates a high fibre claim to a dairy application
- Protects probiotics in acidic media
- Bulking agent which provides creaminess to ice creams
- Low Caloric value
- Prebiotic effect*
- Non-cariogenic
- Satiety effect**



Parameters in designing sugar reduced products



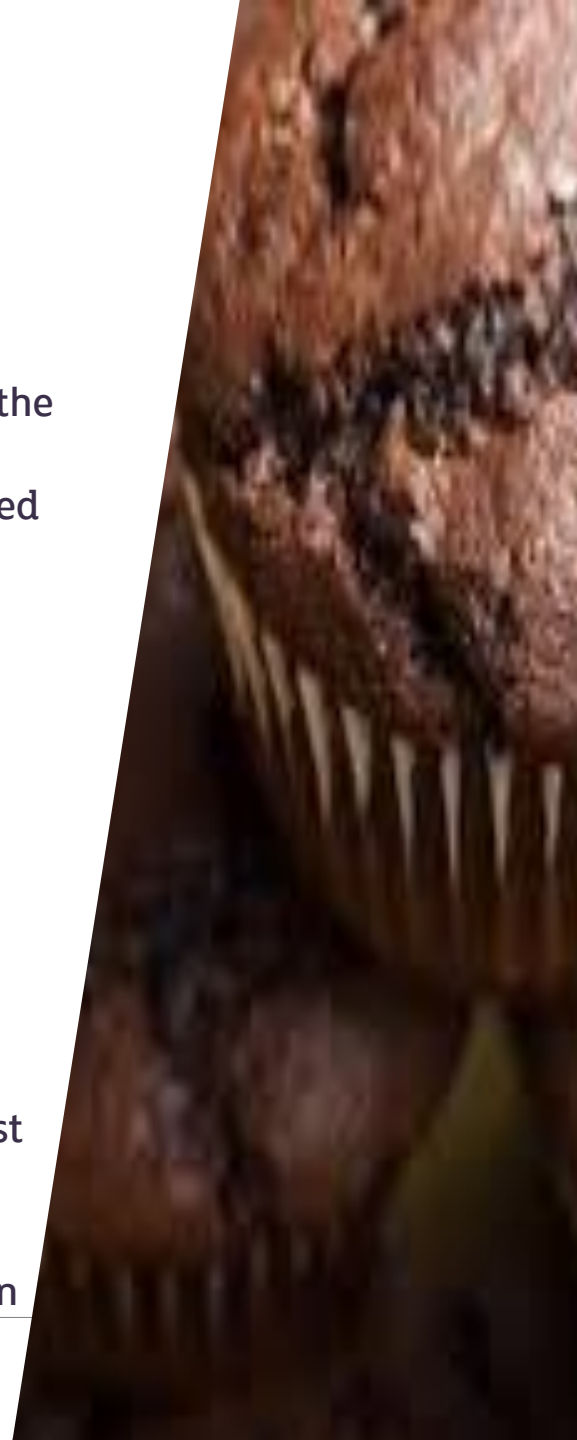
Sugar Reduction in Bakery

Sugar plays multi-functional and dynamic role in Bakery products

- Taste
- Processing– sugar is an essential ingredient for the extraction of formed baked products from the mould
- Sugar plays critical role in dough/ batter rheology, flow – self levelling of batters, flow and final baked product appearance (e.g. “cracked” appearance of muffins and cookies)
- Shelf Life– reducing sugar can change how products perform in application, controlling free high moisture content and this will affect the product’s shelf life and eat quality
- Labelling –clean label
- Binding – sugar acts as a binder in clusters for granolas
- Fermented Baked Goods – sugar activates yeast activity
- Colour, Gluten softening

Technology Solutions to enable Sugar Reduction:

- Flavour systems: TasteSense™ Flavour modulation system declared as natural flavour
- Bulk replacement, dough/ batter rheology: Balanced blend of Kerry fibres to maintain rheology, post bake characteristics and mold release for formed products
- Oat extract to replace sugar as binder for clusters – granolas, cereals
- Emulsifier systems : Blend of emulsifiers to create correct texture of product and when in application



Sugar Reduction in Confectionary and Sauce Products

Key Technical Challenges:

- Loss of taste
- Loss of texture and mouthfeel
- frozen texture, iciness for inclusions or sauce in ice-cream or frozen dessert; freezing point depression
- Loss of sweetness
- Loss of aW control; shelf life, micro stability
- Clean label

Kerry Technology Solutions to enable Sugar Reduction:

- Kerry's TasteSense™ technology and flavour expertise enhance the sweetness of confectionary preparations & sauces to allow for a reduction in added sugar without compromising on flavour and mouthfeel.
 - TasteSense™ - maintaining good flavour/ sweetness taste and texture
 - Frozen texture of the variegate and sugar crystallisation profile balanced with further aW control/ Kerry Texturing systems, such Emulgold gum acacia fibre



Sugar Reduction in Ice Cream Base – White Mass Soft Serve

Key Technical Challenges:

- Lower freezing depression point: Sugar reduces the freezing point below zero, as crystallisation begins water/liquid freezes out in its main form. Concentration of the remaining sugar solution is increased due to water removal & freezing point is further lowered. ***This results in tiny ice crystals & reduces the free moisture content (large ice crystals grainy/sandy)***
- Loss of sweetness
- Loss of texture and mouthfeel
- Loss of creamy dairy taste

Kerry Solutions:

- TasteSense™ sweetness modulator
- Kerry Texture Systems – Emulgold™, texturants
- Kerry enzymes - Biolactase
- Kerry emulsifiers

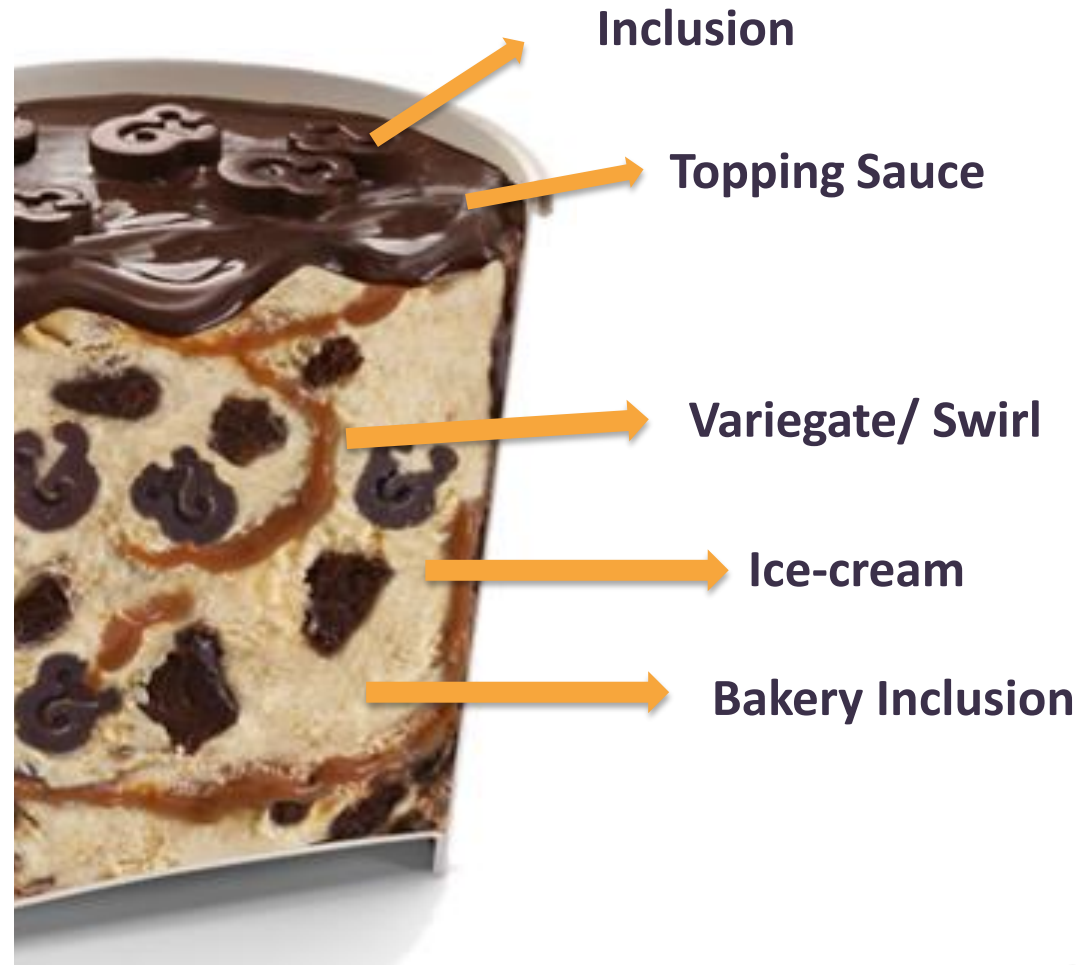


Reduced
Sugar in Ice-
cream

Ice-Cream “Pint Pot” –Sugar Reduction Product Example

Sugar: From

*28g / per
100g*



Sugar
Reduced To:

*17g / per
100g*

Reduced
Sugar in Ice-
cream

Ice-Cream Stick Bar – Sugar Reduction Product Example

Sugar From:

33g per
100 g



Coverture

Confectionary Sauce

Chocolate Coating

Ice-cream

Sugar
Reduced To

21g per 100 g

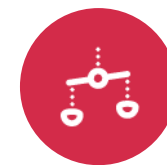


Leading to Better

FSA 2017
Sugar Reduction
Product Samples at Kerry Stand



Reduced sugar cookie



Better For You



Key Benefits

- **30% reduced sugar cookie**, with same baking and sensory characteristics as full sugar variant
- Maintain texture, appearance, chewiness and flavour of standard product
- Fibre claim (recipe dependent)

Kerry Technologies

- Bulk Sugar replacer: Balanced blend of Kerry fibres to give flow & texture
- Emulsifier systems : Blend of emulsifiers to create correct flow & soft chewy texture
- Flavour systems: 'TastesenseTM' - Flavour modulation system declared as natural flavour

Nutritional information (per 100 g):

Sample	Sugars (g)	Fibre (g)	Protein (g)	Salt (g)
Standard	32.2	0.7	5.3	0.2
Kerry Sample	22.5	5.4	5.7	0.2
% Reduction	30%			

Reduced sugar muffin



Better For You



Key Benefits

- 30% reduced sugar muffin, with same baking and sensory characteristics as full sugar variant
- Maintain volume, texture, appearance, and flavour of standard product
- Fibre claim (recipe dependent)

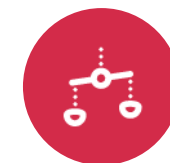
Kerry Technologies

- Bulk Sugar replacer: Balanced blend of Kerry fibres
- Emulsifier system
- Flavour systems: 'Tastesense™'

Nutritional information (per 100 g):

Sample	Sugars (g)	Fibre (g)	Protein (g)	Salt (g)
Standard Product	25.3	0.42	5.3	0.2
Kerry Sample	18.0	6.7	5.4	0.2
% Reduction	30%			

Mango and Passionfruit Sauce (Wet Sweet)



Better For You



Key Benefits

- 40% reduced sugar fruit preparation, with same freezing and sensory characteristics as full sugar variant
- 45% fruit content
- Maintain physicochemical, sensory properties as well as product functionality
- Fibre claim (recipe dependent)

Kerry Technologies

- Bulk Sugar replacer: Polyols, Emugold™ fibre
- Flavour systems: 'TasteSense'

Nutritional information (per 100 g):

Sample	Energy (K Cal)	Fat (g)	Saturated Fat (g)	Carbohydrates (g)	Sugars (g)	Fibre (g)	Protein (g)	Salt (g)
Kerry Reference	227	0.22	0.04	56.6	49.6	2.7	0.61	0.01
Kerry Sample	197	0.22	0.04	43.1	29.8	9.6	0.61	0.01
Reduction %	13.2%	-	-	-	40%			