

Reformulation – challenges and
practical approaches

Examples of Sugar reformulation

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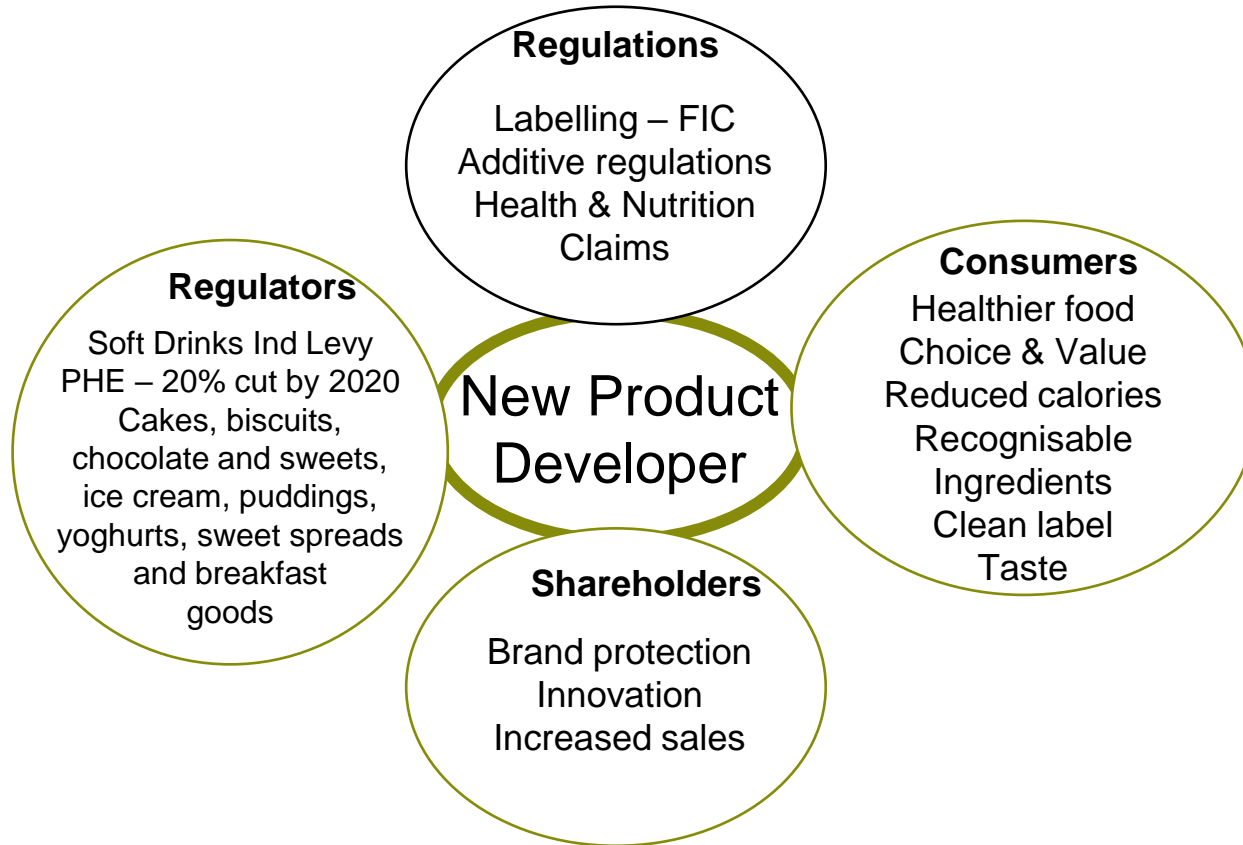


Presentation Overview

- Reformulation Drivers
- Functionality Replacers
- Challenges of Reformulation
- Strategies employed
- IFST



Reformulation Drivers



Sugar Reformulation – What can I use?

Sweetness —————> High intensity sweeteners, polyols

Mouthfeel/Texture —————> Hydrocolloids, polyols, sugars

Structure —————> Bulking agents, polyols, fibres

Colour —————> Colours

Flavour —————> Flavours

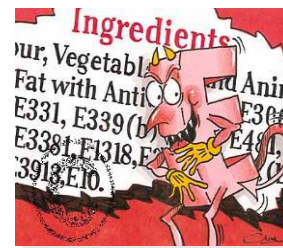
Stability/Preservation —————> Benzoates etc

Humectancy —————> Polyols



The Challenges when reducing/replacing sugar

- Multiple ingredients
- Increased labelling/warnings
- Gastro-intestinal consequences
- Food safety may be compromised
- Reducing sugar may increase calories (energy density)
- Taste and Consumer acceptance (manufacturer)



Sugar Reduction/Replacement Strategies

- 1. Remove/reduce sugar – add nothing
- 2. Gradually Reduce sugar
- 3. Change sugars form/properties – make it more effective
- 4. Add sweeteners (+ water!)
- 5. Add Polyols (+ warnings!)
- 6. Add everything ('kitchen sink')



1. Remove/reduce Sugars – Add Nothing

‘Reduced Sugar’ products



Product	Sugar g/100g	Energy cal/100g	Salt g/100g	Fat g/100g
Regular Sugar coated Product	37	371	1.15	0.6
‘Reduced Sugar’ Product	25	369	1.4	0.6
Regular Product	8	373	1.75	0.9



2. Stepwise Reduction

Shortbread recipe

Butter 110g; Flour 175g; Caster sugar 50g

Weight of sugar g	'Calories reduced'	Sugar g/100g	
50	0	14.9	
45	20	13.6	
40	40	12.3	
35	60	10.9	

'Calories reduced' = wt of sugar removed x 4cals



2. Stepwise Reduction

Stewise sugar reduction						
Shortbread						
Recipe		Fat g	Carb g	Protein g	Sugars g	
Butter	110	88				
Flour	175		122.5	17.5		
Sugar	50		50		50	
% composition		26.3	51.5	5.2	14.9	
Total Recipe Wt g	335					
Calories		792	690	70		
Total Cals	1552					
Cals/100g	463					



2. Stepwise Reduction

Shortbread recipe

Butter 110g; Flour 175g; Caster sugar 50g

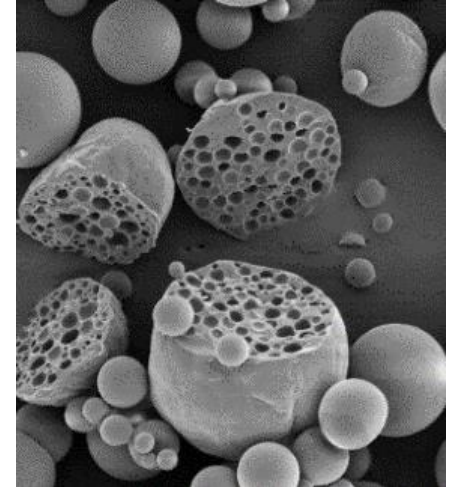
Weight of sugar g	'Calories reduced'	Sugar g/100g	Actual Calories/100g
50	0	14.9	463
45	20	13.6	464
40	40	12.3	465
35	60	10.9	466

'Calories reduced' = wt of sugar removed x 4cals



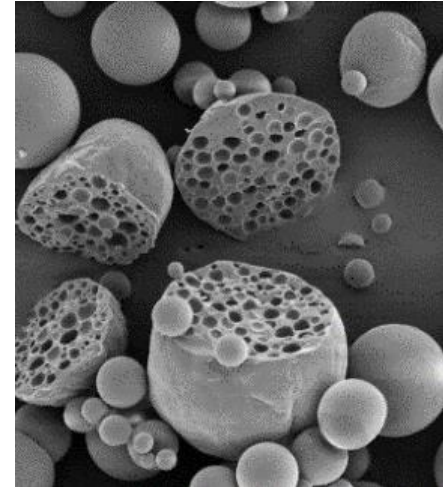
3. Change Sugars properties - Nestle

- Extensive press coverage in UK and Europe
- ‘Ground breaking material science’
- ‘Harnessed science to reduce sugar in chocolate’
- ‘Restructured sugar’
- ‘30% less sugar’
- Milky Bar Wowsomes
- White Chocolate plus crispy oat pieces
- 10g bar; 53 cal – 529cals/100g



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- Milky Bar Wowsomes
- White Chocolate plus crispy oat pieces
- 10g bar; 53 cal – 529cal/100g
- Regular Milky Bar (no cereal fibre!)
- 542 cal/100g – 13 cal more
- For 10g bar 54 cal – 2% calorie reduction!



4. Add Sweeteners



4. Add Sweeteners

Drink	Sugars g/100ml	Energy cals/100ml	Sweeteners
Coca Cola	10.6	42	none
Schweppes Tonic Water	5.1	22	saccharin
Tango Orange	4.2	19	saccharin, aspartame
Schweppes Lemonade	4.2	18	saccharin, aspartame
Oasis Summer Fruits	4.2	18	Aspartame. AceK
Sprite*	10.6	44	none
Fanta Orange	7.1	30	saccharin, aspartame
R Whites Lemonade	2.4	11	Saccharin, aspartame, AceK

- Sprite reformulated with steviol glycosides; sugars 6.6g/100ml; energy 28 cals/100ml
- Sprite now uses aspartame/Ace K; 3.3g/100ml; energy 14 cals/100ml

4. Add Sweeteners

Regular cake

'Cal reduced' cake

Wt(g)	cals	Ingredient	Wt(g)	cals
100	900	Fat	100	900
100	400	Sugar	50	200
100	400	Flour	100	400
300	1700	Totals	250	1500

4. Add Sweeteners

Regular cake			'Cal reduced' cake	
Wt(g)	cals	Ingredient	Wt(g)	cals
100	900	Fat	100	900
100	400	Sugar	50	200
100	400	Flour	100	400
300	1700	Totals	250	1500
	567	Calories increase/100g		600



5. Add Polyols

Fruit Flavour Gums

325
Calories per
100g



Ingredients:

Glucose Syrup, Sugar,

Fruit Flavour Gums with Sugars and Sweeteners

215
Calories per
100g



Ingredients:

**Sugar, Polydextrose, Wheat Dextrin,
Sweetener (Sorbitol),**



5. Add Polyols

“Important advice:

Reduced sugar sweets are **made with sweeteners**. If you eat too many it might temporarily cause you **mild stomach ache** or **laxative effect**. We really want you to enjoy these sweets, so we suggest you only **eat a few at a time**.”



6. Add Everything (Kitchen Sink!)

- Regular Jam
- Strawberries, sugar, glucose, glucose-fructose, pectin, citric acid
- Sugar Free Preserve
- Water, strawberries, polydextrose, maltodextrin, locust bean gum, natural flavour, citric acid, potassium sorbate, sucralose, calcium chloride, Red 40 (colour)



6. Add Everything



Regular Jam	Functionality	Sugar Free Preserve
Strawberries, sugar, glucose, glucose-fructose	Sweetness	Strawberries, sucralose
Strawberries, sugar, glucose, glucose-fructose, pectin	Bulk	Strawberries, water, polydextrose, fruit pectin, locust bean gum
Pectin, sugar, glucose, glucose-fructose	Gelling	Fruit pectin, calcium chloride
sugars	Preservative	Potassium sorbate
Citric acid	Acidity	Citric acid
sugars	Flavour	Natural flavour
sugars	colour	Red40



6. Add Everything



Ingredients:

Water, Thickeners: Xanthan Gum, Cellulose Gum, Colours: Anthocyanins, Carotenes, Acidity Regulator: Critic Acid, Flavour, Preservatives: Potassium Sorbate, Sodium Benzoate, Sweetener: Sucralose.

Possible unintentional quantities of: Milk, Soy, Mustard, Celery.

Thickened water, with colours, flavours, sweeteners and preservatives

8 Additives!!!

Summary

- No unique sugar replacer for all applications – impact on clean label, additives (Ultra Processed Foods), safety, cost & taste
- Reformulation is not the universal panacea it should deliver an improved nutritional profile and ideally a reduction in calories
- Reformulation in other areas will present different challenges



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