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Cheesecake Reformulation Technical Guidance

DAERA
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Introduction

The Food Standards Agency's (FSA's) Eating Well Choosing Better programme supports small and medium sized food businesses to reduce the calorie, sugar, saturated fat and salt content of the food they produce, sell or serve, as well as reducing portion sizes to help consumers make healthier choices.

'Puddings' are one of the top ten sources of sugar intake in Northern Ireland (NI) and are included in the UK Government's calorie, sugar and salt reduction programmes (PHE, 2017; PHE, 2020[a]; PHE, 2020[b]). Within the pudding category, cheesecake has been identified as a dessert of particular relevance to the NI population, as it is a popular option on dessert menus and many restaurants offer it as a handmade dessert. 76% of UK consumers reported eating this dessert recently (Mintel report, 2021[a], p.16). The unwavering demand for this dessert choice has recently seen other market sectors jump on its widespread appeal by launching 'cheesecake flavour' offerings in the dairy, biscuit and snack categories.

The FSA and the 11 district councils in NI carried out a nutritional survey of cheesecake served in restaurants and hotels in NI to determine the typical portion sizes and nutritional composition of this popular pudding. The results showed that portion sizes are often very large with bigger servings of cheesecake containing more energy, sugar, fat, saturated fat and salt. The average serving of cheesecake provided the equivalent of 5½ cubes of sugar and one tenth of the maximum guideline daily amount of salt.

Background

Cheesecake (unbaked) is traditionally made from a digestive biscuit and butter base with a middle or batter made from full fat cream cheese, whipping or double cream and icing sugar. Other ingredients such as fruit, chocolate and curd can be added to this mix to make many different flavours and varieties of cheesecake.

However, the very nature of these ingredients lead to the addition of calories, fat, sugar and salt. The biscuit crumb and butter used to make the base adds fat, sugar and salt. The ingredients for the middle can add fat from the cream cheese and cream, salt from the cream cheese and sugar from the cream and of course the sugar itself. Each gram of fat contributes 9kcal to the overall energy value of the dessert and each gram of carbohydrate and protein contributes 4kcal to the energy value of the finished product.

The COVID-19 pandemic has undoubtedly disrupted and reset every element of our day-to-day lives with significant changes witnessed across all aspects, not least of all in our dietary choices. Consumer insight research demonstrates interest in healthier food has grown even more as a result of COVID-19. For example, 66% of NI consumers would like to see more reduced sugar products and almost 60% would like to see more reduced fat and salt products (Ipsos MORI, 2021). However, life in lockdown fuelled an 8% increase in dessert sales which had previously seen a seven-year decline amidst the home cooking and baking trends. This was further witnessed by the hospitality sector as Just Eat reported a 36% rise in dessert orders (Mintel report, 2021[b], p. 26).

This reformulation guide has been designed to support cheesecake product development. By understanding the function of core ingredients, bakers, chefs and dessert producers will be able to create a cheesecake where the nutritional composition is:

- **Calorie controlled**
- **Complies with the Government sugar reduction guidelines**
- **Complies with the Government salt reduction guidelines**

Core cheesecake ingredients

Sugar

Sucrose (or sugar) is one of the most versatile ingredients used in the dessert industry. It not only makes food taste sweet but also has a number of other important functions. The most recognised functional property of sugar is its sweetness. The perception of its relative sweetness depends on a number of factors including product pH, temperature, concentration, the presence of other ingredients and an individual's own ability to taste. Sugar can heighten or depress flavour by interacting with other ingredients and it can also act as a tenderiser/aerator when beaten into cream for instance. It also acts as a bulking agent and as a texturiser can improve the mouthfeel of a product. Sugar also competes with other ingredients to bind with free water molecules in a product. Selecting sweeteners can reduce the calories but still keep the sweetness level for taste.
It is important to keep the addition at the correct level in proportion to the recipe (Gusba, 2008).

Biscuit crumb

Biscuits that have been baked and cooled can be subject to further secondary uses such as, incorporation into the base of puddings, pies or desserts such as cheesecake. 'Waste' biscuit products can also be used for various purposes including the biscuit crumb for cheesecake bases (Duncan, 2011).

In biscuit making the quality of the finished product is governed by the nature and quantity of the ingredients used. The biscuit crumbs used to make the cheesecake included in this guidance were made from wholewheat flour and wholemeal wheat flour. The crumb had a fibre content of 3.1g per 100g and a maximum particle size of 10mm.

The crumb also had a fat content of 17.3g per 100g. Fat has a number of technical roles and is present in short dough biscuits (like digestive biscuits) where its key role is 'shortening', the characteristic that gives biscuits their crumbly texture (Duncan, 2011). By coating flour particles during mixing, the fat prevents gluten from absorbing water and becoming elastic, a desirable property in bread making but not for achieving the crumbly texture desirable in biscuits.

Cream

The function of cream in desserts is to provide lactose, increase moisture absorption, increase protein, provide mouthfeel and texture and to enhance foaming/aeration ability. Cream is a thick, natural emulsion of dairy fat consisting of water, protein, lipids (fats), carbohydrates (including sugars), vitamins, minerals and various other minor components.

Cream consists of droplets of milk fat suspended in water (a fat in water emulsion). Proteins on the surface of the fat droplets act as emulsifiers allowing the fat and water to mix.

The fat content of cream ranges from 18 to 55% but a minimum fat content of 30% is required before cream will thicken on whipping. By using cream alternatives in reformulated cheesecake, it can keep the fat content low whilst creating a desirable mouthfeel and texture.

When cream is beaten, water and air from the beating process is enclosed creating a foam. Beating too quickly can cause the foam to collapse since the stabilised network of fat will not be properly mechanised. For whipping it is important that the fat in the cream is as solid as possible (Bakerpedia, 2020).

For a stable result the cream should be fridge cold and if possible, the whipping bowl should also be cold. Beat the cream at a low speed rather than a high speed and angle the bowl to allow maximum air into the cream. This should allow the volume of cream to double.

Butter

Butter is a dairy product made by churning cream or milk. It is a suspension consisting of butterfat, milk proteins and water - it is a water in fat emulsion.

Butter must contain at least 80% fat although some butters contain more. Unsalted butter is effective for use in reformulated cheesecakes as it reduces the salt content of the overall product.

Butter contributes flavour and texture to products as well as mouthfeel. The mouthfeel is determined by the ratio of crystalline (solid) to non-crystalline (liquid) components at a given temperature. The desirable mouthfeel is due to the ‘melt in the mouth’ sensation that happens around relatively low temperatures (38°C) (Bakerpedia, 2019).

The high fat content of butter also means it has a relatively low water activity which has a positive effect on product shelf life. Butter just barely melted at low temperatures and cooled again quickly, will not separate much and will retain a harder, denser texture. Melted at higher temperatures and the fat, liquid components and solids will separate and will almost be impossible to re-combine. Too high temperatures will also evaporate moisture/water from the butter leaving it with a grainy texture.

Fat

We rely on our senses to experience our surroundings (DeHoog et al., 2011) and often all of our five traditional senses are involved when we experience food, particularly taste and smell, which help us decide whether to eat a food or not.

The ultimate aim is to develop a good-tasting, indulgent and rewarding low-fat product that also induces an increased level of satiation, which will prevent consumers from overeating by early induction of the desired level of 'reward' from the food. As well as stimulating the senses, fat in foods plays other important roles including those of a lubricant, a texturiser and an aroma enhancer.

Any strategies to reduce fat in a product must follow the functionalities of fat (aroma, texture, taste) since reducing the fat content will have an effect on the satiety sensations of the food.

Sensory panel results

In a taste panel survey where reformulated cheesecakes were compared to a commercially available counterpart, panellists scored reformulated cheesecake more preferably on five different attributes – appearance, aroma, taste, texture and overall acceptability. 92% of panellists preferred the reformulated cheesecakes. Feedback from panellists highlighted that the reformulated cheesecake "tasted fresher", had a "nice creamy texture" and a "better overall taste, aroma and appearance".

Recipe ideas

Fruit flavoured cheesecake - strawberry cheesecake

Base ingredients (16.1%)	Quantity	%
Biscuit crumb	150g	10.7
Unsalted butter	75g	5.4

Filling ingredients (61.4%)	Quantity	%
5% Low fat soft cheese	250g	17.9
Icing sugar	80g	5.7
Unsweetened cream alternative (33.5%)	250g	17.9
Canned strawberries (drained)	278g	19.9

Topping ingredients (22.5%)	Quantity	%
Strawberry purée (from fresh strawberries)	120g	8.6
Icing sugar	16g	1.1
Fresh strawberries	180g	12.8

Total quantity	Total percentage
1399g	100%

Recipe for 20cm diameter tin with percentages to change recipe batch size if needed.

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	UK Government's calorie, sugar and salt reduction guidelines
Energy (kJ/kcal)	895/214	808/193	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	13.4g	12.1g	-
of which saturates	8.6g	7.7g	-
Carbohydrate	21.4g	19.2g	-
of which sugars	13.5g	12.2g	15.1g/100g
Fibre	1.3g	1.2g	-
Protein	2.5g	2.2g	-
Salt	0.19g	0.17g	0.33g/100g (Maximum)

***Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.**

Chocolate flavoured cheesecake - mint chocolate cheesecake

Base ingredients (25.5%)	Quantity	%
Biscuit crumb	150g	17.0
Unsalted butter	75g	8.5

Filling ingredients (73.4%)	Quantity	%
5% Low fat soft cheese	250g	28.2
Xylitol	30g	3.4
Unsweetened cream alternative (33.5%)	300g	33.9
Crushed mint chocolate	70g	7.9

Topping ingredients (1.1%)	Quantity	%
Crushed mint chocolate	10g	1.1

Total quantity	Total percentage
885g	100%

Recipe for 20cm diameter tin with percentages to change recipe batch size if needed.

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	UK Government's calorie, sugar and salt reduction guidelines
Energy (kJ/kcal)	1502/359	1351/323	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	27.1g	24.4g	-
of which saturates	17.6g	15.8g	-
Carbohydrate	23.4g	21.1g	-
of which sugars	9.3g	8.4g	15.1g/100g
Fibre	0.8g	0.7g	-
Protein	5.8g	5.2g	-
Salt	0.30g	0.27g	0.33g/100g (Maximum)

***Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.**

Luxury cheesecake - raspberry and white chocolate cheesecake

Base ingredients (21.7%)	Quantity	%
Biscuit crumb	150g	14.4
Unsalted butter	75g	7.3

Filling ingredients (76.4%)	Quantity	%
5% Low fat soft cheese	250g	24.2
Xylitol	20g	1.9
Cream alternative (28.5%)	250g	24.2
Canned raspberries	140g	13.5
White chocolate	130g	12.6

Topping ingredients (1.9%)	Quantity	%
White chocolate	20g	1.9

Total quantity	Total percentage
1035g	100%

Recipe for 20cm diameter tin with percentages to change recipe batch size if needed.

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	UK Government's calorie, sugar and salt reduction guidelines
Energy (kJ/kcal)	1343/321	1209/289	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	22.1g	19.9g	-
of which saturates	14.3g	12.9g	-
Carbohydrate	26.9g	24.2g	-
of which sugars	13.6g	12.2g	15.1g/100g
Fibre	1.3g	1.2g	-
Protein	4.3g	3.9g	-
Salt	0.30g	0.27g	0.33g/100g (Maximum)

***Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.**

Portion control recipe ideas

The link between portion size and consumption has been well documented. As large servings encourage over-consumption, the portion size of a dessert option is an important consideration. Reducing portion size is seen as an acceptable way to reduce the overall nutritional value by the vast majority (57%) of dessert eaters (Mintel report, 2019, p.62).

Portion control can allow for novel presentation and allow for greater consumer choice. For example, a trio of 30g cheesecake portions can offer three different flavours compared to a standard 90g slice. Research shows this concept is already desired with 25% of dessert eaters wanting to see more 'mini' dessert formats (Mintel report, 2021[a], p. 74).

The following trio option can be used as 3 cheesecakes at 30g each

Fruit flavoured cheesecake - mango and passion fruit

Base ingredients (19.7%)	Quantity	%
Biscuit crumb	150g	13.1
Unsalted butter	75g	6.6

Filling ingredients (63.7%)	Quantity	%
5% Low fat soft cheese	250g	21.8
Whipping cream	200g	17.5
Canned mango (drained)	220g	19.2
White chocolate	30g	2.6
Icing sugar	30g	2.6

Topping ingredients (16.6%)	Quantity	%
Juiced passion fruit (flesh and pips)	120g	10.5
Powdered gelatine (5g) water (50g)	55g	4.8
Lemon juice	15g	1.3

Total quantity	Total percentage
1145g	100%

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	Per 30g portion	UK Government's calorie, sugar and salt reduction guidelines
Energy (kJ/kcal)	1163/278	1046/250	347/83	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	19.0g	17.1g	5.7g	-
of which saturates	10.5g	9.5g	3.1g	-
Carbohydrate	23.4g	21.0g	7.0g	-
of which sugars	12.8g	11.5g	3.8g	15.1g/100g
Fibre	2.0g	1.8g	0.6g	-
Protein	4.4g	3.9g	1.3g	-
Salt	0.22g	0.19g	0.07g	0.33g/100g (Maximum)

Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.

Chocolate flavoured cheesecake - Belgian chocolate

Base ingredients (26.2%)	Quantity	%
Biscuit crumb	150g	17.5
Unsalted butter	75g	8.7

Filling ingredients (73.2%)	Quantity	%
5% Low fat soft cheese	250g	29.0
Whipping cream	270g	31.4
Belgian chocolate (reduced sugar)	70g	8.1
Icing sugar	40g	4.6
Vanilla extract	1g	0.1

Topping ingredients (0.6%)	Quantity	%
Belgian chocolate shavings (reduced sugar)	5g	0.6

Total quantity	Total percentage
861g	100%

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	Per 30g portion	UK Government's calorie, sugar and salt reduction guidelines
Energy (kJ/kcal)	1598/382	1439/344	481/115	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	28.6g	25.7g	8.6g	-
of which saturates	16g	14.4g	4.8g	-
Carbohydrate	25.7g	23.1g	7.7g	-
of which sugars	13.5g	12.2g	4.0g	15.1g/100g
Fibre	0.7g	0.6g	0.2g	-
Protein	5.9g	5.3g	1.8g	-
Salt	0.32g	0.29g	0.10g	0.33g/100g (Maximum)

Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.

Luxury cheesecake - lemon and coconut

Base ingredients (26.4%)	Quantity	%
Biscuit crumb	125g	14.7
Unsalted butter	75g	8.8
Toasted desiccated coconut	25g	2.9

Filling ingredients (72.5%)	Quantity	%
5% Low fat soft cheese	250g	29.4
Toasted desiccated coconut	90g	10.6
Fresh whipping cream	100g	11.8
Coconut cream	100g	11.8
White chocolate	30g	3.5
Icing sugar	30g	3.5
Lemon juice	15g	1.8
Lemon flavouring	1g	0.1

Topping ingredients (1.1%)	Quantity	%
Lemon rind	10g	1.1

Total quantity	Total percentage
851g	100%

Typical nutritional information

Energy/Nutrient	Per 100g	Per 90g*	Per 30g portion	UK Government's calorie, sugar and salt reduction targets
Energy (kJ/kcal)	1506/360	1356/324	452/108	**Portion guidelines** 220kcal SWA 450kcal maximum 550kcal maximum for OOH with additions
Fat	28.0g	25.2g	8.4g	-
of which saturates	17.9g	16.1g	5.4g	-
Carbohydrate	21.6g	19.4g	6.2g	-
of which sugars	11.5g	10.4g	3.5g	15.1g/100g
Fibre	0.9g	0.8g	0.3g	-
Protein	5.9g	5.3g	1.8g	-
Salt	0.28g	0.25g	0.08g	0.33g/100g (Maximum)

Food Standards Agency (2002); SWA: Sales weighted average; OOH: Out of home.

Hints and tips

Don't use a biscuit crumb size that's too small. In this reformulation project, a crumb with a coarser texture was used to create a base with a firmer texture. The crumb size used was grade 10.

Add the icing sugar/sweetener to the cream before whipping. This helps add volume to the cream.

Don't 'over-melt' the butter – just soften it. Melting butter at too high a temperature may evaporate moisture from the product and reduce the ability of the butter to reform its crystalline structure on cooling - essentially this is what binds the biscuit crumb together to form the base.

Keep cream as cold as possible for mixing.

Tilt the cream mixing bowl as you mix – this helps with aeration of the cream and adds volume. Beat the cream to as thick a consistency as you can – this helps maintain texture and consistency in the final product.

Before making canned fruit into a purée, use a sieve to drain as much of the residual liquid as possible.

Once the cream/sugar/sweetener has been whipped to the desired consistency, add the rest of the additions using a 'folding' action – further whisking/beating may adversely affect the consistency of the mix.

For the strawberry and raspberry/white chocolate cheesecakes, if you find puréed canned fruit in the middle produces a consistency you don't like, use the same weight of canned fruit unpuréed and fold thoroughly and evenly into the middle 'batter'.

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