Sucrose is the most commonly used type of sugar in sweetened baked products due to its availability, cost and suitability in baking (Nip, 2007). However, governments and health professionals are continuously putting pressure on the food industry to reduce the amount of added sugar and the mean caloric value of their products (Navarro et al., 2012). Two different strategies are used: (1) reducing the sucrose content and/or (2) using ingredients that mimic the functional properties of sucrose (Alija et al., 2012). In order to formulate pastries with a good amount of sucrose, their different roles in pastries must be understood beforehand. Sugar, mostly sucrose, plays multiple roles in pastries, such as sweetness, colour, texture and preservation.

Sweet Taste

The most notable function of sucrose in food is its sweet taste. A 25% sugar reduction is perceived as significantly less sweet than a standard biscuit (Drewnowski et al., 1998; Biguzzi et al., 2014). Polyols have been promoted as sucrose substitutes because of their low glycaemic index. The sweetness of chiffon cakes prepared with xylitol, a polyol, was similar to that of rice chiffon cake with sucrose (Kim et al., 2014). In a study by Gao et al. (2017), 50% sucrose was replaced by rebaudioside A and erythritol in cocoa and vanilla-flavoured muffins, and there was no significant effect on the sensory analysis results.

Colour and Flavour Profile

Maillard and caramelization reactions produce pleasant odours and colours using sugars.

Texture Properties

Sucrose plays an important role in tenderizing pastries. For example, Licciardell et al. (2012) have studied the influence of sugar/egg white ratio on meringues. A low sugar/egg white ratio determines an increase in the average pore size and hence, higher porosity. Sucrose acts as a stabilizer in egg white foam. Manisha et al. (2012) studied interactions between stevioside, liquid sorbitol, hydrocolloids and emulsifiers for the replacement of sugar in cakes (Figure 82.1).

Preservation

The hygroscopic nature of sugars plays a crucial role in reducing the water activity (aw) in foods. In simple terms, aw is a measure of the amount of free water available in a foodstuff. The average aw of a cake is between 0.8 and 0.9 (Figure 82.2).

As sucrose plays different roles according to the pastry, a sucrose alternative may require a combination of reducing the sucrose quantity to the minimum to deliver essential properties.
and selecting a sweetener and a bulking agent with synergistic effects (Luo et al., 2019). Table 82.1 gives some examples in specific pastries.

**Experimentation**

A two-day workshop was organized with the Cacao Barry company and its Cacao Barry Lab, Ramon Morato, creative director, and some pastry chefs from the Relais Dessert Association. The theme was exploring new ways for a healthier patisserie. Tests were conducted and led to the organoleptic validation of recipes for lemon tart, Paris-Brest and a chocolate tart. The reduction of sugar could reach up to 30% in certain sub-elements of each of the three recipes.

If we focus on lemon tart, three recipes and their nutritional values are shown in Figures 82.3–82.9.

### Table 82.1

<table>
<thead>
<tr>
<th>Pastry category</th>
<th>Alternative sweeteners</th>
<th>Bulking agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>cookies</td>
<td>sucrose, maltitol, erythritol, stevioside</td>
<td>inulin, maltodextrin</td>
</tr>
<tr>
<td>muffins and cakes</td>
<td>rebaudioside A, sorbitol, maltitol, isomalt, erythritol</td>
<td>inulin, polydextrose, dietary cocoa fibre</td>
</tr>
</tbody>
</table>

*Source: Di Monaco et al. 2018.*

### References


### Regular Lemon Tart

#### Almond shortcrust pastry
- 825g Plain flour
- 50g Cornstarch
- 250g Ground almonds
- 8g Salt
- 500g Butter
- 335g Caster sugar
- 120g Eggs
- 1 tbsp Mycryo®

1. Using a spatula, combine the flour, cornstarch, ground almonds, salt and diced butter to a sandy texture
2. Add the caster sugar, then the eggs
3. Mix until the pastry holds together. Roll out, cover, then refrigerate for 24 hours
4. Roll out the pastry to 3mm thick, then shape into tartlets 6cm in diameter and 2 cm high, after spraying Silpain on the sides
5. Allow to rest for 20 minutes, then bake in a preheated oven at 160°C

#### Lemon cream
- 200g Lemon juice
- 250g Sugar
- 120g Egg yolks
- 140g Eggs
- 12g Lemon zest
- 250g Butter

1. Mix the freshly-squeezed lemon juice with the sugar, eggs and egg yolks
2. Heat to 85°C and add the lemon zest, then allow to cool to around 40°C
3. Add the diced butter and blend until smooth
4. Strain out the lemon zest and refrigerate

#### Assembly
1. Sprinkle the tart crusts with Mycryo® when they come out of the oven
2. Allow to cool and add a fresh mint leaves and basil
3. Place small pieces of candied lemon on the sides
4. Pour in the lemon cream, filling the tart to the top
5. Refrigerate until set
6. Finish with a thin layer of gelatine, followed by the meringue
7. Decorate

#### Meringue
- 300g Sugar
- 200g Pasteurised egg whites

1. Heat the egg whites with the sugar in a bain-marie to around 50°C or until the sugar has dissolved
2. Beat until stiff and use immediately

#### Other
- 1 tbsp Mycryo®
- 1 tbsp Fresh mint leaves
- 1 tbsp Fresh young basil leaves
- 1 tbsp Candied lemon peel
- 1 tbsp Candied lemon zest

---

**FIGURE 82.3** Regular lemon tart.
**Slim Lemon tart**

<table>
<thead>
<tr>
<th>Almond shortcrust pastry</th>
<th>Lemon cream</th>
<th>Meringue</th>
<th>Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>825g Plain flour</td>
<td>250g Lemon juice</td>
<td>200g Sugar</td>
<td>1 Sprinkle the tart crusts with Mycroc® when they come out of the oven</td>
</tr>
<tr>
<td>50g Cornstarch</td>
<td>150g Sugar</td>
<td>200g Pasteurised egg whites</td>
<td>2 Allow to cool and add a fresh mint leaves and basil,</td>
</tr>
<tr>
<td>250g Ground almonds</td>
<td>300g Egg</td>
<td>3g Gelatine sheets</td>
<td>3 Place small pieces of candied lemon on the sides</td>
</tr>
<tr>
<td>8g Salt</td>
<td>11g Lemon zest</td>
<td></td>
<td>4 Pour in the lemon cream, filling the tart to the top</td>
</tr>
<tr>
<td>500g Butter</td>
<td>90g Butter</td>
<td></td>
<td>5 Refrigerate until set</td>
</tr>
<tr>
<td>250g Caster sugar</td>
<td>90g Cocoa butter</td>
<td></td>
<td>6 Finish with a thin layer of gelatine, followed by the meringue</td>
</tr>
<tr>
<td>120g Eggs</td>
<td>1g Gelatine sheets</td>
<td></td>
<td>7 Decorate</td>
</tr>
</tbody>
</table>

1. Using a spatula, combine the flour, cornstarch, ground almonds, salt and diced butter to a sandy texture
2. Add the caster sugar, then the eggs
3. Mix until the pastry holds together. Roll out, cover, then refrigerate for 24 hours
4. Roll out the pastry to 3mm thick, then shape into tartlets 6cm in diameter and 2cm high, after spraying Silpoin on the sides
5. Allow to rest for 20 minutes, then bake in a preheated oven at 160°C

Meringue

| 200g Sugar |
| 200g Pasteurised egg whites |
| 3g Gelatine sheets |

1. Heat the egg whites in a bain-marie to around 50°C or until the sugar has dissolved
2. Add the pre-soaked gelatine sheets
3. Beat until stiff and use immediately

Other

| 1 tbsp Mycroc® |
| 1 tbsp Fresh mint leaves |
| 1 tbsp Fresh young basil leaves |
| 1 tbsp Candied lemon peel |
| 1 tbsp Candied lemon zest |

**FIGURE 82.4** Slim lemon tart.
Skinny Lemon tart

Almond shortcrust pastry
- 825g Plain flour
- 50g Cornstarch
- 250g Ground almonds
- 8g Salt
- 500g Butter
- 150g Caster sugar
- 100g Inulin
- 140g Eggs
1 tbsp Mycryo®

1. Using a spatula, combine the flour, cornstarch, ground almonds, salt and diced butter to a sandy texture
2. Add the caster sugar, the inulin and then the eggs
3. Mix until the pastry holds together. Roll out, cover, then refrigerate for 24 hours
4. Roll out the pastry to 3mm thick, then shape into tarts 6cm in diameter and 2cm high, after spraying Silpam on the sides
5. Allow to rest for 20 minutes, then bake in a preheated oven at 160°C

Lemon cream
- 250g Lemon juice
- 100g Sugar
- 70g Inulin
- 300g Eggs
- 10g Lemon zest
- 60g Butter
- 3g Gelatine sheets

1. Mix the freshly-squeezed lemon juice with the sugar, inulin and eggs
2. Heat to 85°C and add the lemon zest and the gelatine, then allow to cool to around 40°C
3. Add the diced butter and blend until smooth
4. Strain out the lemon zest and refrigerate

Assembly
1. Sprinkle the tart crusts with Mycryo® when they come out of the oven
2. Allow to cool and add a fresh mint leaves and basil
3. Place small pieces of candied lemon on the sides
4. Pour in the lemon cream, filling the tart to the top
5. Refrigerate until set
6. Finish with a thin layer of gelatine, followed by the meringue
7. Decorate

Meringue
- 200g Pasteurised egg whites
- 85g Inulin
- 155g DE 44 glucose syrup

1. Heat the egg whites and the inulin in a bain-marie to around 50°C or until the inulin has dissolved
2. Beat until stiff and add the hot glucose syrup
3. Use immediately

Other
- 1 tbsp Mycryo®
- 1 tbsp Fresh mint leaves
- 1 tbsp Fresh young basil leaves
- 1 tbsp Candied lemon peel
- 1 tbsp Candied lemon zest

FIGURE 82.5 Skinny lemon tart.
Anne Cazor, Ramon Morató

**FIGURE 82.6** Comparison of the three tarts.

### Nutritional values

<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Slim</th>
<th>Skinny</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy kcal/kJ</td>
<td>260.28 / 1,090.84</td>
<td>226.57 / 948</td>
<td>161.73 / 684.98</td>
</tr>
<tr>
<td>Fat g</td>
<td>15.3</td>
<td>13.66</td>
<td>9.06</td>
</tr>
<tr>
<td>of which saturated fatty acids g</td>
<td>8.04</td>
<td>7.21</td>
<td>4.38</td>
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<tr>
<td>Carbohydrates g</td>
<td>27.17</td>
<td>21.89</td>
<td>16.39</td>
</tr>
<tr>
<td>of which sugars g</td>
<td>22.07</td>
<td>16.57</td>
<td>8.23</td>
</tr>
<tr>
<td>Proteins g</td>
<td>3.59</td>
<td>4.01</td>
<td>4.15</td>
</tr>
</tbody>
</table>

**FIGURE 82.7** Almond shortcrust pastry

### Almond shortcrust pastry

#### Lemon tart 70g

**Ingredients**
- Low-protein flour, T55
- Ground almonds
- Salt
- Butter
- Caster sugar
- Eggs
- Cornstarch
- Inulin

**Functional values as a %**

<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Slim</th>
<th>Skinny</th>
</tr>
</thead>
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<tr>
<td>Water</td>
<td>13.7</td>
<td>14.2</td>
<td>14.9</td>
</tr>
<tr>
<td>Dry matter</td>
<td>86.3</td>
<td>85.7</td>
<td>85.2</td>
</tr>
<tr>
<td>Sugars</td>
<td>16</td>
<td>12.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Fat</td>
<td>27.1</td>
<td>28.3</td>
<td>28.2</td>
</tr>
<tr>
<td>Other solids</td>
<td>43.2</td>
<td>44.9</td>
<td>49.6</td>
</tr>
</tbody>
</table>

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**Lemon cream**

Lemon tart 70g

![Diagram of ingredients for Lemon cream](image)

**Meringue**

Lemon tart 70g

![Diagram of ingredients for Meringue](image)