**Cheesecake Chemistry**

**Ingredients**

- 4 eggs
- 500g of Tnuva Quark Creamy Soft Cheese 5% milkfat (may be substituted for the same amount of ricotta)
- One cup of plain whole milk cow yoghurt
- 4 tbsp of oat flour
- 2/3 cup of light brown sugar
- 1/2 tsp of vanilla extract
- One nice lemon

**Why Meringue?**

Meringue takes center stage in this recipe, lending a light and fluffy texture to the cheesecake. Meringue plays a crucial role in providing structural support during baking. There are various techniques for making meringue, such as the French, Italian, and Swiss methods. In this recipe, French meringue is utilized for its compatibility with light batters.

Small details in recipe execution can greatly influence the cake's outcome. Leaving the meringue for too long before incorporating it into the batter and baking can lead to flattening. Letting the cake chill overnight causes beads of sugary syrup to separate from the foam and form on the frosting. While bakers often try to avoid this result, my family and I restrain ourselves from devouring this cheesecake immediately just to let the 'drops of gold' emerge.

**Directions**

1. Separate the egg yolks from the whites. Avoid touching the whites with bare hands.
2. Beat egg whites and add 1/2 a cup of sugar gradually until stiff peaks form.
3. Mix together the other ingredients in a large bowl.
4. Zest the lemon into the batter, being careful to only grate the yellow part and avoid the bitter white pith underneath.
5. Gently fold in most of the meringue, leaving some to the side for frosting.
6. Bake for about 1/2 an hour until a little golden brown on top and check that a chopstick comes out clean.
7. Spread remaining meringue on top and return to the oven until the meringue frosting begins to brown.

**What is the Science Behind Meringue?**

Egg whites are comprised of 90% water. The remainder is mostly proteins. Protein molecules consist of amino acids, some that are attracted to water, and others that repelled by it. Egg whites create voluminous and stable foams due to interactions between various proteins. The main proteins in egg whites are ovalbumin (54%), conalbumin/ovotransferrin (13%), ovomucoid (11%), ovoglobulins (4%), lysozyme (3.5%), and ovomucin (2%). While globulins contribute to foaming, ovomucin is crucial for stabilization. Ovomucin, lysozyme, ovomucoid, and conalbumin individually have minimal foaming capacity, but their interactions significantly enhance foaming and stability.

Absorption at the air-water interface causes partial denaturation of egg white proteins, exposing hydrophobic residues. Beating the whites introduces air, causing hydrophilic regions to bind to water and the hydrophobic regions cling to air. The denatured proteins can then form intermolecular protein-protein bonds, typically disulfide bonds, creating a nano-thickness amphipathic network on the surface of bubble walls, which stabilizes the foam. The more you beat, the more bubbles with a protein coating are produced, and the more whites fluff up. At higher degrees of whipping however, there is more liquid film thinning, mechanical deformation, and bubble-wall rupture, leading to a less voluminous meringue. Cake volume hinges on both the air beaten into the egg and the limited collapse of air bubbles during baking, linked to foam stability. Sugar serves as a glue, providing structural integrity and flavor. Being hydrophilic, sugar draws water out of the egg whites, lightening the protein network and keeping it from coagulating for a stronger, more elastic foam.

We avoid using egg yolk in meringue because its fat content disrupts protein alignment, preventing proper films from forming around bubbles. If the bubbles are not adequately protected, the meringue flattens. Chefs also avoid touching egg whites with bare hands as skin oils can undermine stability.

**Sources:**


*Recipe by my grandma Photos by me Graphics designed in Canva*