

An Engineer's Book About Cooking and Baking

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Chapter 1

Theoretical Introduction

1.1 Baker's Percentage

A universal method of measuring the amount of an ingredient in baking is the baker's percentage. It is a notation indicating the proportion of an ingredient relative to the flour used in the recipe. Baker's percentage expresses the ratio of the weight of an ingredient to the total weight of the flour as a percentage:

$$\text{baker's percentage} = 100\% \times \frac{\text{mass}_{\text{ingredient}}}{\text{mass}_{\text{flour}}}$$

For example, a recipe calling for 65% water will require 292.5g of water if 450g of flour are used ($\frac{450 \times 65\%}{100\%} = 450 \times 0.65 \approx 292.5$).

1.2 Flour

In Europe there are several prevailing systems for labeling flour types, however, all correspond to a certain standardised process. A sample of flour is incinerated in a laboratory oven at a very high temperature for a long time. The amount of ash residue indicates the amount of whole grain that was present in the flour. When the ash is measured in milligrams per 100g of flour, the German flour types are obtained, such as 450 or 550. Similarly, the French types are the same ash measured in milligrams per 10g of flour, e.g. 45 or 55 which correspond to the German types 450 and 550. The Italians took a different approach and instead assigned the most commonly used flour types numbers 00, 0, 1 and 2. Those correspond to the German 405, 550, 800 and 1050. In general, the higher type flours have higher protein content, but beyond 1100 the protein content begins to drop slightly.

1.3 Kneading

1.4 Melting Chocolate

1.5 Thickening Sauces

1.6 Carryover Cooking

Chapter 2

Pasta

Ingredients

Instructions

Chapter 3

Noodles

3.1 Udon

Ingredients

1. wheat flour
2. water 40%
3. salt 3-4%

For a single portion, 100g of flour is sufficient.

Instructions

Mix and knead the ingredients into a rough dough. Cover and let rest for at least 30 minutes.

Once ready to make the noodles, divide into 150g balls. Using a rolling pin, roll a ball out to a thick sheet. Then, using a pasta machine, roll it to 3mm thickness (number 2 on Atlas 150) gradually decreasing the thickness setting on the machine. Fold in half, roll to 3mm thickness. Fold in half from the opposite end and roll to 3mm thickness. At this point the dough should be roughly in a rectangular shape. If it is not, continue folding and rolling. You may fold from both ends at the same time overlapping the folds or turn the dough 90 degrees and continue from there. Although udon is standardised to be at least 1.7mm in diameter (when round) or width (when square), there is no one true udon thickness, hence roll it to your preferences.

Once done, dust generously with flour. If you have a bigoli (3.5mm round), trenette (3.5mm square), spaghetti (2mm round) or spaghetti chitarra (2mm square) attachment, run your sheet through. Otherwise, place

your sheet on a cutting board and fold in half twice ensuring that the layers are generously dusted with flour. Using a sharp knife cut using little pressure and moving your knife back and forth. Do not press as that might cause the noodle to stick to itself. Move the cut noodle to the side ensuring it does not stick to the other noodles (the freshly cut sides are sticky).

Boil water, at least 1L as the boiling process is long. Once the water is boiling, drop your noodles in, stir after 1 minute and then occasionally every few minutes. Boiling udon takes at least 10 minutes, but it heavily depends on the thickness. Thicker noodles require longer boiling.

Strain your noodles and cool them with cold water or in an ice bath.

3.2 Soba

Chapter 4

Breads, Buns and Rolls

4.1 Pre-Ferment Bread

Ingredients

For a single loaf

Pre-Ferment (Poolish)

1. 150g flour (12%+ protein or type 650+)
2. 150g water (room temperature)
3. 1g fresh yeast

Dough

1. 400g flour (12%+ protein or type 650+)
2. 280g water (35C)
3. 6g fresh yeast
4. 10g salt

Instructions

Prepare the poolish by mixing all ingredients in a glass jar or a glass container. Leave to ferment in room temperature for 16-24 hours.

Once the poolish is ready, mix it with the ingredients for the dough in a large bowl until homogenous. Leave to rest for around 30 minutes, then

fold several times onto itself. Repeat at least one more time and leave to rest for 30 minutes.

Take the dough out of the bowl onto a surface lightly sprinkled with flour. Fold the dough onto itself several times by grabbing an edge of the dough, stretching it up and bringing it to the opposite side. Work clockwise or counterclockwise. Flip the dough upside-down and shape into a ball to form a smooth surface by pulling the dough under itself. Keep the seam at the bottom of the ball throughout the process.

Prepare a proofing basket or line a large bowl with a clean kitchen towel and toss very generously with flour (otherwise the dough will stick to the towel). Toss the top of the dough with flour and place it seam side up in the proofing basket. Proof at room temperature for 30 minutes to one hour.

While the dough is proofing, heat the oven and a dutch oven (you may use a large steel pot with a lid as a replacement) to 250C. Once hot, sprinkle the bottom of the dutch oven with flour and carefully place the dough in it. Do not drop the dough as it will lose the gases built up during proofing resulting in a flatter loaf. Score the top of the bread deeply. Bake covered for 20 minutes, remove the cover and bake for 20 or more minutes to achieve dark brown crust.

4.2 Sourdough Bread

4.3 Pide

4.4 Burger Bun

This recipe makes 6 buns (150g).

Ingredients

1. 125g milk (lukewarm or room temperature)
2. 125g water (lukewarm or room temperature)
3. 20g yeast
4. 15g sugar
5. 1 whole egg + 1 egg yolk
6. 10g salt

7. 525g flour
8. 65g butter (softened)
9. sesame (optional)
10. 1 whole egg for egg wash

instructions

1. Mix together milk, water, yeast, sugar, salt and eggs.
2. Add flour, mix, then knead for up to 5 minutes.
3. Knead the butter into the dough and continue kneading until the dough does not stick anymore.
4. Form into a ball and leave for at least an hour to rise.
5. Divide into 6 even portions and shape into balls. Place on sheets of parchment paper, then lightly coat the tops of the buns with oil and gently flatten with the bottom of a glass.
6. Cover the buns with cloth and leave to proof for 30 minutes to an hour.
7. Preheat the oven to 190C.
8. Mix together an egg and a little water (about a tablespoon), then brush the tops of the buns with the egg wash. Coat generously with sesame.
9. Bake for 17-20 minutes.

4.5 Hoagie Roll

Chapter 5

Pizza

5.1 Pizza Napoletana

Ingredients

1. wheat flour (11-12% protein or type 450)
2. 60%+ water (room temperature)
3. 0.5% fresh yeast
4. 2% salt

Measuring

It is important to measure the appropriate amounts of ingredients, so that we may divide the dough evenly without any leftover (too large pieces will result in pizzas with a thick bottom, while too small pieces will result in smaller pizzas). We will be dividing the dough into 280 ± 5 g pieces. For example, if we want to make 4 pizzas, we should make 1120g of dough. The mass of the entire dough is approximately the sum of the masses of the ingredients, hence we may calculate the amount of flour needed:

$$mass_{flour} = mass_{dough} \times \frac{100\%}{percent_{flour} + percent_{water} + percent_{salt} + percent_{yeast}}$$

For a 60% hydration dough we need $\frac{1120}{1+0.6+0.02+0.005} = \frac{1120}{1.625} = 689.3$ g flour.

Instructions

We mix the ingredients in a large bowl, then knead using any technique for about 20 minutes. For high hydration dough we may instead choose the folding technique and perform it periodically during the resting period. We leave the dough for at least 2h to rest, but due to it being a low yeast content dough, we may leave it for 5h or more.

After the dough rests, we prepare containers to store it. We may use small containers for each piece of dough or large fermentation boxes (as seen in commercial pizzerias) for multiple. Cover the containers with a thin layer of oil. Divide the dough into $280 \pm 5\text{g}$ pieces, shape into balls with a smooth surface (extremely important) by, for instance, folding the dough into itself and place them in the containers. If storing multiple ball in one container, leave at least 5cm of space inbetween each pair. Store in the fridge and let ferment for at least 8h. It is possible to store the dough in the fridge for up to a week.

After taking out of the fridge, let rest for around 30 minutes or until it reaches around 16C. In the meantime preheat the oven to the highest available temperature. Carefully take one dough ball out of a container (it is important to not push the gases out of the dough at this stage) onto flour and stretch using any technique while being cautious to not press the gases out of the crust. Bake until the crust turns crispy (for reference, 6-8 minutes in 250C).

Chapter 6

Burgers

6.1 Beef Burgers

6.2 Chicken Burgers

6.3 Vegetarian Burgers

Chapter 7

Sandwiches

7.1 Chopped Cheese

7.2 Chicken Sandwich

Chapter 8

Dumplings

8.1 Pierogi

8.2 Gyoza

Chapter 9

Sides

9.1 Spring Rolls

9.1.1 Wrappers

Ingredients

1. wheat flour
2. 50% water
3. 10% oil
4. 2% salt

Instructions

1. Mix the ingredients into rough dough and leave to autolyse for 30 minutes to an hour.
2. Knead the dough lightly to ensure it is homogenous, form into a ball and leave to rest for 30 minutes up to overnight in the fridge.
3. Measure out 35g portions of the dough and roll them into 1mm thick sheets, then cut into squares. Dust generously with flour to ensure they do not stick when stacked. If using a pasta machine, roll the entire dough into 1mm thick sheet, then cut into squares.

9.1.2 Filling

Ingredients

1. 250g ground pork
2. 1 carrot
3. 2 leaves of napa cabbage
4. 1/2 red bell pepper
5. scallion
6. 2 cloves of garlic

Marinade

1. 15ml soy sauce
2. 5ml sesame oil
3. 5g sugar

Sauce

1. 30ml fish sauce
2. 30ml oyster sauce
3. 15g sugar

Instructions

1. Mix the marinade ingredients together, then mix the marinade with the ground pork.
2. Mix the sauce ingredients to allow the sugar to dissolve.
3. Cut all vegetables into thin slices.
4. Heat up your wok, then fry the meat on low heat until lightly browned.
- 5.

Chapter 10

Main Courses

10.1 Chicken Broccoli

10.2 Katsu Chicken

10.3 Sweet-Sour Chicken

The sweetness of the sauce comes from the pineapple juice and the pineapple chunks, while the sour taste is attributed to the rice vinegar. Balance those to your liking. Additionally, the pineapple juice, if not on hand, may be replaced by a sugar syrup.

The colour of the sauce ranges from an intense red to a dark brown depending on the ingredients used. Industrial food colouring will yield a bright red. Tomato products, such as concentrate, puree, ketchup, will result in dark red. The addition of soy sauce will darken the colour farther into browns.

The chicken may be battered and fried, however, this recipe is intended to be as quick and cheap as possible so that it is possible to make it when running short on time, hence this step is omitted.

Ingredients

Chicken and Vegetables

1. one small chicken breast
2. red bell pepper (may use more varieties for more vivid colours)

3. red onion
4. 100-150g pineapple
5. 4 cloves of garlic
6. 2cm knob of ginger
7. spring onions for garnish

Sauce

1. 120g pineapple juice
2. 30g tomato concentrate, tomato puree, ketchup
3. 30ml soy sauce
4. 30ml rice vinegar
5. MSG (optional)
6. potato starch

Instructions

Preheat your wok on highest heat at any point during the prep.

First, prepare all ingredients as the cooking process will be rather short and fast paced. Cut the spring onions and set aside in a bowl. Cut bell pepper, onion and pineapple into large chunks (at least 1cm), set aside. Mince garlic and ginger, and set aside separated. Cut the chicken breast into large chunks (at least 2cm).

In a bowl mix the pineapple juice, tomato product, soy sauce, vinegar and MSG. In another bowl mix the starch with a little bit of water to make a slurry. Remember to stir the slurry before adding it as the starch will settle at the bottom.

To the hot wok add a little bit of oil and spread it around the wok to cover its surface. Add chicken and fry on one side until browned lightly, then stir so that the other side is not pink anymore and transfer to a large bowl. You should not be taking too long to fry the chicken as the carryover cooking will do its job.

Next, add a little bit of oil and fry the bell pepper and onion stirring frequently. After around 1 minute, add the pineapple and fry stirring for 1 more minute. Transfer to the bowl with chicken.

Once again, add a little bit of oil and fry the aromatics (garlic and ginger) for about 30 seconds. You may save about 30% of your garlic for the end to give the dish additional spice and garlicky taste. Pour in the sauce and boil for 30 seconds. Pour the slurry slowly to thicken the sauce to desired thickness remembering to stir constantly as the slurry will quickly set into gel.

Once the sauce is thickened, transfer all the vegetables and the chicken to the wok, stir and toss until thoroughly coated and cut the heat. If saved some of the garlic, add it now and stir.

Serve with rice and garnish with the spring onion.

10.4 Zuǒ Zōngtáng Jī (General Tso's Chicken)

10.5 Chénpí Jī (Orange Chicken)

10.6 Yaki Udon

10.7 Döner

10.8 Hotpot (Garnek)

A lot of the flavour of the hotpot comes from the fat rendered from the meat, hence it is best to pick sausage and pork belly that are high in fat content.

Ingredients

1. 250g sausage
2. 500g pork belly
3. 1 carrot
4. 1 red bell pepper
5. 1/2 small white cabbage
6. 400g potatoes
7. 5 garlic
8. ground cumin

9. ground pepper
10. 2 bay leaves
11. coriander seeds
12. paprika
13. basil
14. potato starch

Instructions

Use a stainless steel pot.

1. Cut sausage (preferably rangiri) and pork belly (cubes) into large chunks, then fry in the pot until lightly browned.
2. Peel vegetables, then cut carrot (rangiri), pepper, cabbage and potatoes into large chunks. Add to the pot, then fill the pot with water until it covers the contents.
3. Peel and mince garlic. Add all aromatics, herbs, spices. Leave to cook at least until the potatoes are tender.
4. Mix potato starch with water to make a slurry, then add slowly while mixing to the pot to thicken lightly.

Chapter 11

Cookies and Biscuits

11.1 Savoiardi

Ingredients

1. 2 eggs
2. 40g sugar
3. 40g flour
4. 20g starch

Instructions

1. Preheat your oven to 200C.
2. Separate the yolks from the whites.
3. Add sugar to the whites and whip until smooth and forms peaks.
4. Whip the yolks until pale and foamy.
5. Incorporate the flour and the starch into the yolks so that no lumps remain.
6. Fold the yolks gently into the whites until homogenous.
7. Fill a piping bag with the batter and pipe the fingers onto a parchment paper.
8. Bake for 7 minutes.

11.2 Oatmeal Cookies

Ingredients

For about 18 cookies:

1. 250g oatmeal
2. 200g flour (type 450-650)
3. 150g butter
4. 2 eggs
5. 4g salt
6. 4g cinnamon
7. dried fruits (for example cranberry)
8. 100g 64% chocolate or chocolate chips
9. brown sugar, honey or caramel (optional)
10. water (optional)

Instructions

Preheat your oven to about 165C.

Take a steel pot and set it over medium heat. Add butter and brown until butter solids appear and the liquid turns golden brown. It is important to transfer the liquid butter to a bowl or another container, or cool the pot in a water bath until it is around room temperature because otherwise the butter might burn from the heat stored in the pot.

Blend half the oatmeal coarsely, transfer to a container, then blend the dried fruits until they turn into tiny pieces. We do not want to turn them into a paste, though. Cut the chocolate into rough 5mm squares.

Take a large bowl and mix eggs and sugar. Add butter and mix until combined, then add flour and whisk until the mass turns smooth. Add your remaining ingredients and mix until the mass is uniform. If the mass is crumbly, add some water.

Line a baking tray with parchment paper. Scoop a small portion of the dough, form into a rough ball, then lay on the tray and press down until about 1cm thick. Repeat to make 9 cookies. Bake for 17 minutes or until the bottom of the cookies is brown.

Chapter 12

Desserts

12.1 Tiramisu

Ingredients

1. 4 eggs
2. 50g sugar
3. 500g mascarpone
4. 14 savoiardi (for a recipe, see section 11.1)
5. 300ml espresso (lukewarm or cold)
6. cocoa powder

Instructions

The coffee must not be hot as otherwise the savoiardi dipped in it will melt the mascarpone creme.

If you follow the order of whipping, you won't have to clean your mixer. Otherwise, make sure to not stain the whites with any yolks or mascarpone, and to not introduce mascarpone to your yolks.

1. Separate whites from yolks.
2. Whip the whites until stiff.
3. Add sugar to yolks and whip until pale. They will significantly increase in volume, so be mindful of the container you use.

4. Whip the mascarpone until soft.
5. Fold the yolks into the whites, then fold mascarpone into the mix until smooth. Do not overmix as the eggs will lose the air.
6. Lay the first layer of savoiardi dipping them in the coffee (do not soak them!) just before placing them.
7. Place a thick layer of the mascarpone.
8. Repeat with the next layer.
9. Refrigerate for several hours, preferably overnight.
10. Dust with cocoa powder before serving.

12.2 Panna Cotta

Panna Cotta may be served and garnished in a variety of ways, e.g. layered in a glass or inverted onto a plate with a side of fruits. In this recipe we will be making a 3-layer Panna Cotta in whiskey glasses, however, the recipe for the cream itself may be used to make any variety of Panna Cotta.

Ingredients

For 3 servings:

Cream

1. 500ml cream 36% or 30%
2. 25g sugar
3. 7g gelatin (powder, for other kinds use the appropriate method to dissolve)
4. vanilla bean (optional)

Chocolate

1. 30g dark chocolate 64%+
2. 20g butter

3. confectioner sugar (optional)

Fruit Sauce

1. 100g strawberries, peaches or any other fresh fruits
2. sugar (optional)

Garnish

1. 1 large strawberry, 1 slice of peach or a part of the fruit used to make the sauce
2. 2 mint leaves

Instructions

In a small bowl mix 3 spoons of cream with the gelatin. To a large pot, add the sugar and the rest of the cream and set over small heat. Use a thermometer to measure the temperature and stir constantly. Pour in the cream mixed with the gelatin and mix until thoroughly incorporated. If using vanilla or other spices, add them now. Once the temperature reaches slightly below 80C, cut the heat and distribute evenly into 400ml whiskey glasses. Cover tightly with plastic foil and place in the fridge for at least 4h.

Once the cream sets and you are ready to serve the dessert, prepare the chocolate and the fruit sauce. Melt the chocolate and the butter in a water bath. Blend the fruits. You may optionally cook the fruits before blending. Prepare the garnish. Remove the cover from a glass and wipe any moisture from the inside. Layer chocolate thinly as it has quite an intense flavour. Pour the sauce gently on top and garnish with fruit and mint.

12.3 Brownies

There are two types of brownies - fudgy and cakey. Fudgy brownies are chewy, gooey, moist, while cakey brownies resemble a very dense genoise. It is up to your personal preference which type you will make.

The proportions of fats (from butter and chocolate) and flour will vary the fudgyness of the brownies. For fudgy brownies add more fat (butter and chocolate) and for cakey brownies add more flour. The mixing technique, the baking time and the temperature also affect the texture of the brownies.

For fudgy brownies, barely mix the ingredients and bake shorter, while for cakey brownies do the exact opposite - ensure the ingredients are thoroughly incorporated, preferably using a mixer, and the brownies are baked for a longer time. Additionally, for the cakey brownies, add baking powder to improve the height and the fluffiness .

Farthermore, using less sugar will prevent the sweetness from overwhelming the bitter taste of the chocolate and the cocoa resulting in a richer flavour variety (the following recipe already reflects that). However, the sugar, when baking, caramelises at the top forming a light crust. Adding too little sugar will result in no crust and extremely bitter brownies.

The following recipe is for a 22x22cm baking pan of fudgy brownies.

Ingredients

1. 180g 64% chocolate
2. 115g butter
3. 110g white sugar
4. 3 eggs
5. 60g flour
6. 50g cocoa powder
7. 7g salt
8. 120g 64% chopped chocolate or chocolate chips

Preheat your oven to 165C and line a 22x22cm baking pan with parchment paper.

In a water bath, melt the chocolate and the butter stirring occasionally to combine. Once fully melted, take off the heat source, add sugar and salt, and mix. Beat the living hell out of the eggs with a mixer (at least 10 minutes). Pour in the chocolate mixing continuously on low speed. Add the dry ingredients (flour, cocoa powder) and the chopped chocolate or chocolate chips. Fold gently until no flour pockets remain (we do not want to deflate the batter).

Pour the batter into the pan and bake for 18-20 minutes. Let cool in the pan on a wire rack for several hours before cutting. Cut into 9 pieces.

12.4 Crescent Rolls

Chapter 13

Pies

13.1 Apple Pie

1. 400g flour
2. 150g butter
3. 2 egg yolks (about 30g)
4. 150g cream 30% or 36%
5. 8g salt
6. 75g sugar

Chapter 14

Cakes

14.1 Genoise

14.2 Shortcake

14.3 Carrot Cake

This recipe is scaled to a 15cm (diameter) cake tin.

Ingredients

1. 120g eggs (room temperature)
2. 70g sugar (prefer brown for better moisture retention, but white is also perfect)
3. 77g oil (odourless, e.g. canola)
4. 110g flour
5. 55g almond powder (substitute with flour if not available)
6. 3g cinnamon
7. 6.5g baking powder
8. 2g salt
9. 170g carrots (mass after peeling)
10. 50g walnuts

11. 50g raisins

Instructions

1. Line the bottom and the sides of your tin with parchment paper.
2. Preheat oven to 165C.
3. Submerge raisins in rum/water/liquid of your choice and leave to soak.
4. Grate carrots on the fine side of your grater.
5. Chop walnuts.
6. Whisk eggs and sugar.
7. Add oil and whisk until well combined.
8. Add dry ingredients (flour, almond powder, cinnamon, baking powder, salt) and mix well with a spatula.
9. Add carrots, walnuts, drained raisins and mix.
10. Pour into the tin. Drop the tin from about 10cm to remove large air bubbles in the batter.
11. Bake 40-45 mins.
12. Invert onto a cooling rack, remove the tin and the parchment paper. cool for 10 mins, then flip up-side-down and continue cooling until edible or room temperature.
13. Slice into 3 layers of 1.5cm to 2cm height. Layer with cream cheese frosting.

14.4 Cream Cheese Frosting

Ingredients

1. 320g cream cheese (room temperature)
2. 120g powder sugar
3. 160g butter (room temperature)
4. 3.5g lemon zest
5. 30g heavy cream

Instructions

1. Mix the cream cheese with the powder sugar.
2. In another bowl mix the the butter to soften it. This helps ensure there will be no clumps of butter in the frosting.
3. Add the butter to the cream cheese and mix until homogenous.
4. Add lemon zest and heavy cream. Mix until homogenous.
5. Chill in the fridge for about 20 minutes before using.