

CHAPTER 2 BREAD HYDRATION SCIENCE & ARTISAN BAKING

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CHAPTER 2

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Detailed Exploration of Hydration

Hydration plays a central role in the bread-making process. Understanding how water interacts with flour and its subsequent effects on the dough is crucial for achieving desired bread textures and flavours.

1. Science of Hydration

- Water and Flour Interaction: When water is added to flour, it begins to hydrate the proteins and starches present. Two proteins, glutenin and gliadin, absorb this water and begin to form gluten, the network of proteins that gives bread its structure.
- **Gluten Development**: As more water is added, the gluten structure becomes more extensive and interconnected. A dough with higher hydration will have a more extensible (stretchy) gluten network, whereas a drier dough will have a tighter and less flexible structure.
- **Starch Gelatinisation**: Water also interacts with the starch in flour. During baking, as the internal temperature of the bread rises, the water absorbed by the starch begins to gelatinise it. This process contributes to the bread's final texture and crumb structure.

2. Impact on Dough Characteristics

- **Dough Extensibility and Elasticity**: Higher hydration doughs tend to be more extensible but less elastic, meaning they can stretch out more easily but resist snapping back into their original shape. Lower hydration doughs exhibit the opposite behaviour.
- **Crumb Structure**: High hydration doughs generally yield bread with an open crumb (large air holes) due to the increased extensibility of the gluten network. In contrast, low hydration doughs result in a tighter crumb.
- **Flavour and Crust**: Wet doughs can often result in bread with a more complex flavour profile because they allow for longer and slower fermentation. Additionally, they tend to produce bread with a thinner and crisper crust, whereas drier doughs might result in a thicker crust.

3. Flour Absorption Capacities

Different flours have varying capacities to absorb water, influenced by their protein content, processing, and type of grain:

- **Bread Flour**: With a higher protein content, bread flour can typically absorb more water than all-purpose flour.
- Whole Grain Flours: These flours, like whole wheat or rye, can absorb a lot more water due to their bran and germ content. However, they also require a longer time to fully hydrate.
- **Freshly Milled vs. Aged Flour**: Freshly milled flour often absorbs less water than aged flour. Over time, as flour is exposed to air, it undergoes oxidation, which can affect its water absorption properties.
- **Environmental Factors**: The humidity and temperature of the environment can affect how much water the flour needs. On a humid day, you might need less water than on a dry day.

Tips for Bakers:

- **Baker's Percentage**: This is a standard way of expressing the ratio of ingredients in bread recipes. Hydration is often expressed as a percentage of the flour's weight. For example, a dough with 500g of flour and 350g of water has a hydration of 70%.
- Adjusting on the Fly: It's essential to know that the specified water amount in a recipe is a guideline. Bakers often hold back some water and add it as needed, judging by the dough's feel.
- **High Hydration Challenges**: Working with wet doughs can be challenging due to their sticky nature. Techniques like the stretch and fold or using a wet hand or tools can help manage these doughs.

Understanding the science behind hydration and its practical implications in the baking process allows bakers to make informed decisions about dough consistency, leading to bread that aligns with their desired taste and texture goals.

Artisan Breads & Hydration

Artisan breads are often celebrated for their unique, irregular crumb structure, crispy crust, and deep flavour profiles. One of the primary factors that contribute to these characteristics is hydration.

1. High Hydration and Open Crumb Structure

- **Gluten Network Flexibility**: With increased hydration, the gluten network in dough becomes more extensible. This means it can stretch more without tearing. This increased stretch allows for larger pockets of gas (from fermentation) to form, leading to the open crumb structure that is often sought after in artisan breads.
- **Gas Retention**: A more hydrated and flexible dough can retain more of the carbon dioxide gas produced during fermentation. This retained gas, when trapped within the extensible gluten network, results in larger and more irregular air pockets.

2. Role of Fermentation

• Longer, Slower Fermentation: Artisan breads often undergo extended fermentation times, sometimes with a combination of room temperature and cold fermentation. This longer fermentation not only develops flavour but also allows for more extensive gas production. With high hydration facilitating better gas retention, the result is a pronounced open crumb.

3. Crust Development with High Hydration

- **Crispy and Thin Crust**: High hydration doughs tend to produce bread with a thinner and crisper crust. The reason is that the excess moisture on the surface of the dough quickly evaporates in the oven, leading to rapid crust formation.
- **Better Oven Spring**: The high water content in the dough turns to steam in the oven's initial baking phase. This steam puffs up the dough, leading to what bakers term as "oven spring." The result is a loftier loaf.

4. Challenges with High Hydration Doughs

- **Handling**: These doughs can be quite sticky and challenging to work with. Techniques like "stretch and fold" and using wet hands or bench scrapers can assist in handling.
- **Shaping**: High hydration doughs can sometimes lack the tight structure required for certain shapes. Bannetons or proofing baskets are often used to provide support to the dough during its final rise.

5. Examples of Artisan Breads with High Hydration

- **Ciabatta**: Known for its extremely open crumb and high hydration, it's a classic example of the relationship between water content and bread structure.
- **Tartine-style Sourdough**: Inspired by the famous San Francisco bakery, this bread boasts an open crumb, crispy crust, and deep flavours, attributes that are achieved, in part, due to its hydration levels.

Tips for Aspiring Artisan Bakers:

- **Start Moderate**: If you're new to high hydration doughs, start with a slightly lower hydration level and gradually work your way up as you become more comfortable.
- **Flour Choices**: While hydration plays a crucial role, the choice of flour is equally vital. Strong bread flours with high protein content can better handle and support the structure of high hydration doughs.
- **Observe and Adapt**: Every environment, flour type, and even water source can bring nuances to the dough. Being observant and adapting as needed is crucial.

The world of artisan breads, with its open crumb and unique textures, showcases the beauty of hydration in bread-making. By understanding and mastering the principles of hydration, bakers can craft loaves that are not only visually stunning but also rich in taste.



