



WATER

Water is an ingredient of considerable importance in bread dough. Although it is easy to overlook -- after all, turn on the tap and it is there -- it is beneficial to be aware of the effects water has in our baking. The most important attributes are the following:

- It is in the presence of water that gluten forms.
- Water serves as a solvent and dispersing agent (for salt, sugar, and yeast).
- Water is necessary for yeast fermentation and reproduction; softer doughs will ferment more quickly than dry doughs;
- Water is responsible for the consistency of bread dough.
- The temperature of water can be varied in order to obtain dough of the correct temperature.

WATER HARDNESS

The degree of hardness is an indication of the amount of calcium and magnesium ions in water, expressed in parts per million (ppm). Soft water has less than 50 ppm, while hard water has over 200 ppm. Generally, water of medium hardness, with about 100 to 150 ppm of minerals is best suited to bread baking. The minerals in water provide food for the yeast, and therefore can benefit fermentation. However, if the water is excessively hard, there will be a tightening effect on the gluten, as well as a decrease in the fermentation rate (the minerals make water absorption more difficult for the proteins in the flour). On the other hand, if water is excessively soft, the lack of minerals will result in a dough that is sticky and slack. Generally speaking, most water is not extreme in either direction, and if water is potable, it is suitable for bread baking.

In the creation of a sourdough or levain culture, there is another consideration. If the water used is highly chlorinated, the chlorine can have a negative impact on the culture. In this case, simply leave a bucket or jar of water out overnight, uncovered. By the next day, most all the chlorine will have dissipated.

WATER AND pH

The degree of acidity, expressed as pH (potential hydrogen), also has an effect on fermentation. Hard water is more alkaline than soft water, and can decrease the activity of yeast. Water that is slightly acid (pH a little below 7) is preferred for bread baking.

STEAM

The other way in which water has an effect on bread is in the form of steam that is injected into the oven at the time of loading. Anyone who bakes with a steam-injected oven knows the virtues of steam. Proper steaming has a profound effect on bread for a number of reasons. It promotes a rich color to the crust, a surface shine on the loaf, and also increases the volume of the bread.

Crust color is enhanced when steam is injected into the oven. This is because at the early stages of baking, there is a rapid increase in enzymatic activity on the surface of a loaf. These enzymes break down the starches in the dough into sugar-like compounds called dextrins, and other simple sugars called reducing sugars. Steaming the oven has a cooling effect on the dough, and this enables the enzymes to remain active for a longer period of time. This in turn contributes to crust browning through the Maillard reaction, and later through caramelization of the crust. In an unsteamed oven, the surface of the loaf quickly becomes too hot for these enzymes to function, and the resulting bread has a pale, lusterless crust.

A properly steamed oven promotes a crust with a good sheen to it. This is because steam at the initial stages of baking provides moisture that gelatinizes the starches on the surface of the loaf. The starches swell and become glossy, giving us a shining crust. In an oven without steam, the crust undergoes a process called pyrolysis. Instead of gelatinizing, the starches, and the crust of the bread, remain dull.

A properly steamed oven results in bread with better volume. When we load an oven without steam, the surface of the loaf quickly heats up. As a crust forms on the surface, oven spring is reduced, and the bread's ability to attain further volume is impeded. On the other hand, in a steamed oven, the surface of the dough remains moist longer, enabling greater oven spring to occur before the formation of a surface crust, and the result is bread with superior volume.

The benefits of steam occur only during the first third or so of the baking cycle. If the baker neglects to inject steam at the time of bread loading, he cannot compensate by steaming the oven several minutes later. In order to ensure that the crust remains thin and crisp, it is important to finish the bake in a dry oven. For this reason, the oven should be vented or the doors notched partially open for the last portion of the bake.