Autolyse (Autolysis)

An autolyse stage, as used in the making of bread, was first introduced by Professor Raymond Calvel. He noticed that when the dough was given a chance to hydrate when first mixed without the addition of salt (or other ingredients besides flour and water), it produced a superior outcome in the final bread.

The word Autolyse (sometimes pronounced… *auto-leese*)(dictionary.com pronounces it as [awt-l-ahyz]) means to consume self or digest self. au·tol·y·sis [aw-tol-uh-sis] The breakdown of plant or animal tissue by the action of enzymes contained in the tissue affected; self-digestion.(dictionary.com)

It seems like an odd meaning, but it actually does make sense. When water and flour are first mixed together, an enzyme called Protease is activated (other enzymes are also activated as well). Protease is a protein. Protease goes after and breaks down other proteins in the dough, notably proteins called Glutenin and Gliadin which help to make up the gluten network in dough. When Protease does it's work on these other proteins, it is actually breaking them apart or breaking them down, digesting them. Hence the label of self-digesting . We have a protein munching on another protein, kinda cannabilistic, don't you think?

The Protease enzyme, breaks apart and realigns protein strands, helping to promote the formation of newly aligned gluten bonding. At the same time it also weakens the bonds so that the dough is not too tough/rubbery. Dough needs a certain amount of extensibility which means it can stretch out. You don't want dough so tough that you cannot handle it or stretch it. It needs to stretch as well as have a certain amount of bounce back to it (elasticity). The gluten protein Gliadin is responsible for the gluten strands being able to extend and the other main protein, Glutenin is responsible for allowing the dough to bounce back or be elastic. Too much of either one and you have a problem with dough that is too weak or dough that is too strong (information from Bread Science- Emily Buehler).

Autolysis is used on dough for different reasons and in different situations. It depends on the outcome you desire. A very high protein flour or a strong flour will be enhanced by an autolyse period as it will

allow the dough to be more extensible (stretch more easily and get those large holes). A very weak flour, pastry flour, cake flour, some AP flours will not benefit from an extended autolysis. However a short autolyse period can be used to hydrate the gluten, help align gluten strands and cut down on the amount of mixing time.

Autolyse Experiment:

- Mix up three pounds of dough at 66% hydration.
- Divide the dough into three 16 oz/453g pieces.
- Add salt (.2 oz/5g) immediately to dough # 1.
- Let dough #2 Autolyse for 30 minutes, then add salt (.2oz/5g).
- For dough # 3 Autolyse for 2 hours and then add the same amount of salt.
- Allow all dough pieces to bulk ferment for six hours folding a total of three times (covered and at room temperature).
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Interesting things happened with this experiment. Right after mixing I added salt to dough number one. The salt was easy to incorporate, there was no real gluten bonding yet and the dough was easily mixed and mushy feeling. After the 30 minutes autolyse period for dough number two, the salt was also easy to mix in, the dough felt sticky and was mushy like the first dough. The surprise came with dough number three which was autolysed for two hours. The dough felt silky, smooth and was noticeably cohesive with a lot of gluten bonding, it was full of activity and bubbles. The salt was not as easy to incorporate into dough number three, but it was a small amount of dough, so it wasn't overly difficult. All of the dough was folded three times during the six hour bulk ferment with no other kneading taking place except to incorporate the salt.

After the six hour bulk ferment, dough number one, which was salted right away had a nice feel and was moderately filled with bubbles. Dough number two which was autolysed for 30 minutes, was sticky and bubbly but was hard to handle and slumped during preshaping.

Dough number three really surprised me, it felt better than dough number one, was filled with bubbles and sat up higher after being preshaped.

I was surprised enough that I will now autolyse for two hours before adding salt. My technical advisor on our forum gave me the idea for a two hour increment. I have autolysed overnight, multiple days and even for an hour, but not two hours. He was reading that two hours was an optimum time for autolysis. I have only done this experiment once, but it gave promising results for a two hour autolyse period. The dough used was from the same batch and the same room temperature was used. The only difference was the time when I added the salt to the dough.

After the six hour bulk ferment I preshaped, then final shaped and refrigerated(covered) all three loaves. In the morning I took out all three loaves at once, I was planning to bake them at the same time but I noticed right away that even though they were the same weight, they were different sizes and at different levels of being proofed. I ended baking loaf three first it was the largest(by volume not by weight) and most active, bubbly loaf throughout this experiment. Then I baked loaf number two next, it was denser and ended up smaller than loaf number one. Last I baked loaf number one, the loaf which had the salt mixed in right at the beginning. It was also denser, took the longest to proof and did not get the oven spring and volume that loaf number three did. So I ended up baking the loaves backwards from loaf number three to loaf number one.

Baking was accomplished with a fully proofed loaf, which was slashed, sprayed with water and covered with a roasting pan lid for the first 18 minutes in a preheated oven at 450F degrees using a baking stone. After the 18 minutes, the roasting lid was removed and the bread was allowed to brown up and crisp for 12 minutes more, turning once. Preheat the lid before using for the next loaf.

Of the three loaves, loaf number three which was autolysed for two hours was more active and bubbly throughout the experiment at all stages, had a nice firm hand feel, it wasn't as sticky as the loaf which had only been autolysed for 30 minutes and it lost the most weight during baking (a lightweight fluffy loaf).

Loaf three (two hour autolyse) weighed 16 oz when I baked it(they all started out at 16 oz) and was 13.4 ounces after baking.

Loaf number two (30 minute autolyse) weighed 13.6 ounces after baking.
Loaf number one (no autolyse) weighed 13.8 ounces after baking.

I am guessing loaf number three lost so much more weight because it had a much more open crumb and a greater volume so it was able to let off more water vapor during baking. The volume of loaf number three is so much greater than the other two that it is easy to identify which loaf it is in the pictures.




The crumb of the long autolysed dough (# 3) was velvety to the feel, soft and springy, the crust was thin, flaky, crusty and covered with blisters. The crumb of the shorter autolysed dough (# 2) was soft, open but did not have a velvety feel and was not as light and airy. The crumb of the dough which was not autolysed at all was not as soft, stiffer and less airy yet still got a good open network of holes. The crust on all three was similar but dough # 3 had a lot more blisters. Loaf # 3 felt like it was going to float away, it was so light for it's size while the other two felt heavy (probably just in comparison to dough # 3) even though there was only a couple of tenths of an ounce difference between the loaves.

I would like you to know that this was not the expected outcome. The outcome I had expected was that the bread autolysed for 30 minutes would have been the superior loaf, with the two hour loaf being more sticky and slumpy (that a word?, if not, it is now) and a slightly lower final volume. The bread which had no autolyse did not surprise me. I have done extensive work with long autolysed doughs, but

they were usually overnight at room temperature or days at cold temperatures. I have had good results with the long autolysed doughs. However, the shorter versions seem to be in their own category.

I will redo the experiment a few more times to see if the results are consistent. Please do the experiment yourself and report back. It would be nice to get some feedback from other bakers.

I believe the dough using a two hour autolyse, not only had the Protease working, but all of the enzymes and yeasts were able to get a good jumpstart before the salt was allowed to inhibit their action. I am guessing that is why the loaf had so much activity and was more bubbly and resulted in a larger volume. I also have the thought that the salt may not have been incorporated into loaf three as well as the first two loaves and that may have given it the advantage as far as volume goes.

This experiment will have different results on whole grain breads which have a weaker gluten bonding and would benefit from some inhibition of enzyme activity (adding some salt early on) or a short autolyse.

Here is the formula for making up the three pound batch of dough:

- 11 oz/311g of starter @ 100% hydration, the starter had been fed 24 hours and then eight hours before using.
- 14 oz/396g water
- 24 oz/680g bread flour
- Salt is used at .2/5g per loaf when the time comes to incorporate it.

This makes 3 lbs 1 oz / 1389g of dough at 66% hydration

Mix up all ingredients except salt. Weigh out three 16 oz/453g pieces of dough and then follow the directions already given above for timing and adding salt.

I have so often heard people say they do not bother to autolyse because it is a waste of time or the salt is too hard to incorporate once the dough is mixed. I kept the dough a wettish 66% to help with salt

incorporation. I have also used a slurry to add salt to a mixed dough later, like in the formula for Big Bear's Bread. So there are ways to incorporate the salt into mixed dough. Regardless, the loaf autolysed for two hours resulted in such a superior outcome, that I am convinced.