

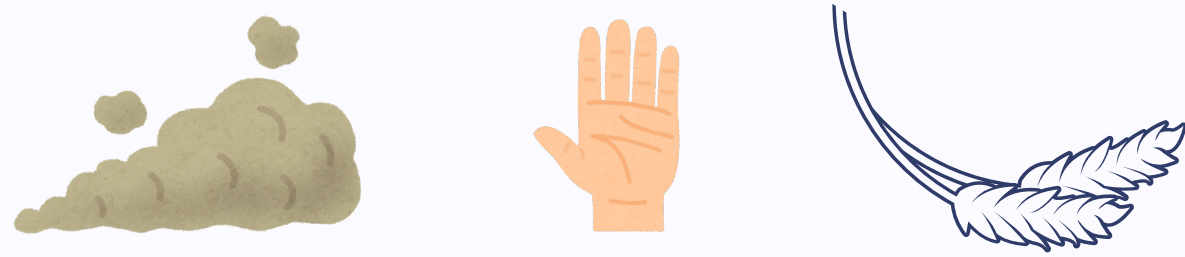
# The Science of Sourdough

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## Introduction

What is sourdough starter?

Living culture used to make bread rise & give bread flavor



Microbes from dust, hands, and flour populate water and flour mixture

## Materials

### Yeast

Convert carbohydrates to carbon dioxide  
Gas bubbles are trapped by gluten in flour to create airy structure in crumb\*

### Lactic acid bacteria

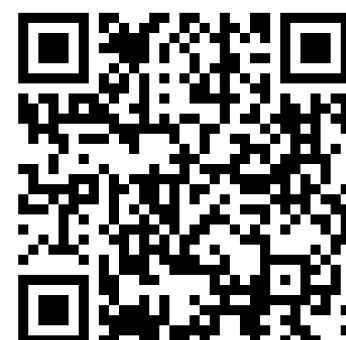
Convert carbohydrates to lactic acid  
Acidity creates tangy bread flavor and makes starter environment hostile to pathogens

## Methods Aim I: starting a starter

1. Mix 50g water + 50g rye flour
2. Wait 24 hr
3. Discard 50g
4. Add 50g water, 50g AP\*\* flour; mix
5. Wait 24 hr
6. Discard 50g
7. Add 50g water, 50g AP flour; mix
8. Wait 12h

Repeat steps 6-8 until starter is bubbly and doubles in size 1-2 hours after feeding

Scan for detailed breadmaking demonstration



\*Crumb: soft, inner part of bread (not crust)

\*\*AP: all purpose

(1) Reese AT, Madden AA, Joossens M, Lacaze G, Dunn RR. 2020. Influences of ingredients and bakers on the bacteria and fungi in sourdough starters and bread. mSphere .



**Fig. 1:**

Timeline of starter creation. Ready for baking on Day 10.

## Methods Aim II: making a loaf

Ingredients:

- 250g water
- 90g rye flour
- 260g bread flour
- 8g salt
- 110g starter

Instructions:

1. Mix ingredients
2. Refrigerate 12+ hours
3. Remove from fridge
4. Let rest on counter for 20 min
5. Shape into boule
6. Let rise 1 hour in proofing basket
7. Preheat oven to 500F
8. Bake covered 25 min
9. Reduce heat to 450F
10. Bake uncovered 20 min
11. Remove from oven; let cool



**Fig 2:** bread making

**A:** ingredients after step 2

**B:** loaf after step 4; pre-rise

## Results



**Fig 3:** Rosemary sourdough loaf baked 9/15/2024

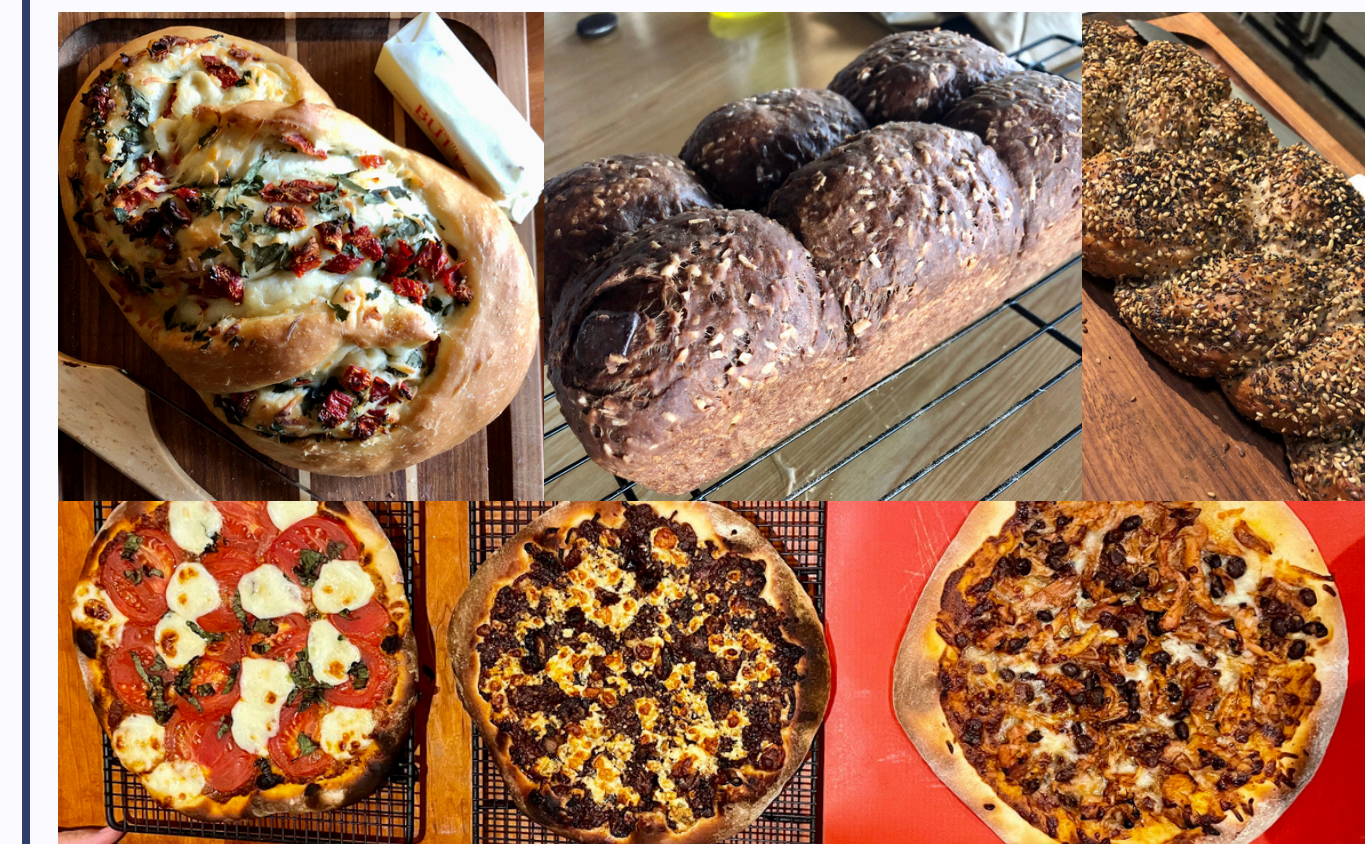
**A:** pre-slicing

**B:** post-cooling, post-slicing, pre-buttering

- Warm kitchen temperatures contributed to short rising time
- Presence of rosemary sprigs in kitchen led to incorporation of minced rosemary in shaping phase using lamination

## Discussion

- No two starters are identical
- Microbial composition of starter impacts bread flavor and starter pH levels
- Starter microbiome influenced most by flour and microbial community on bakers' skin(1)
- Starter can be used in a variety of recipes beyond the traditional loaf, including pizza, pancakes, muffins and granola, and more complex breads



**Fig 4:** future directions for an aspiring baker