

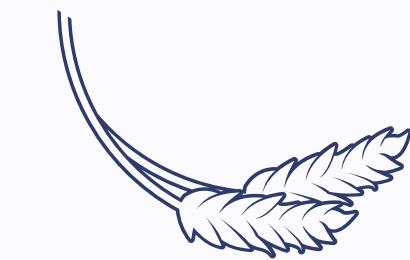
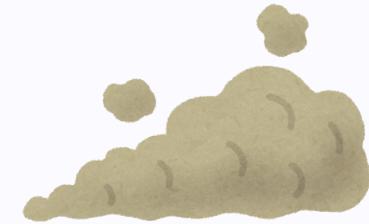
The Science of Sourdough

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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*.

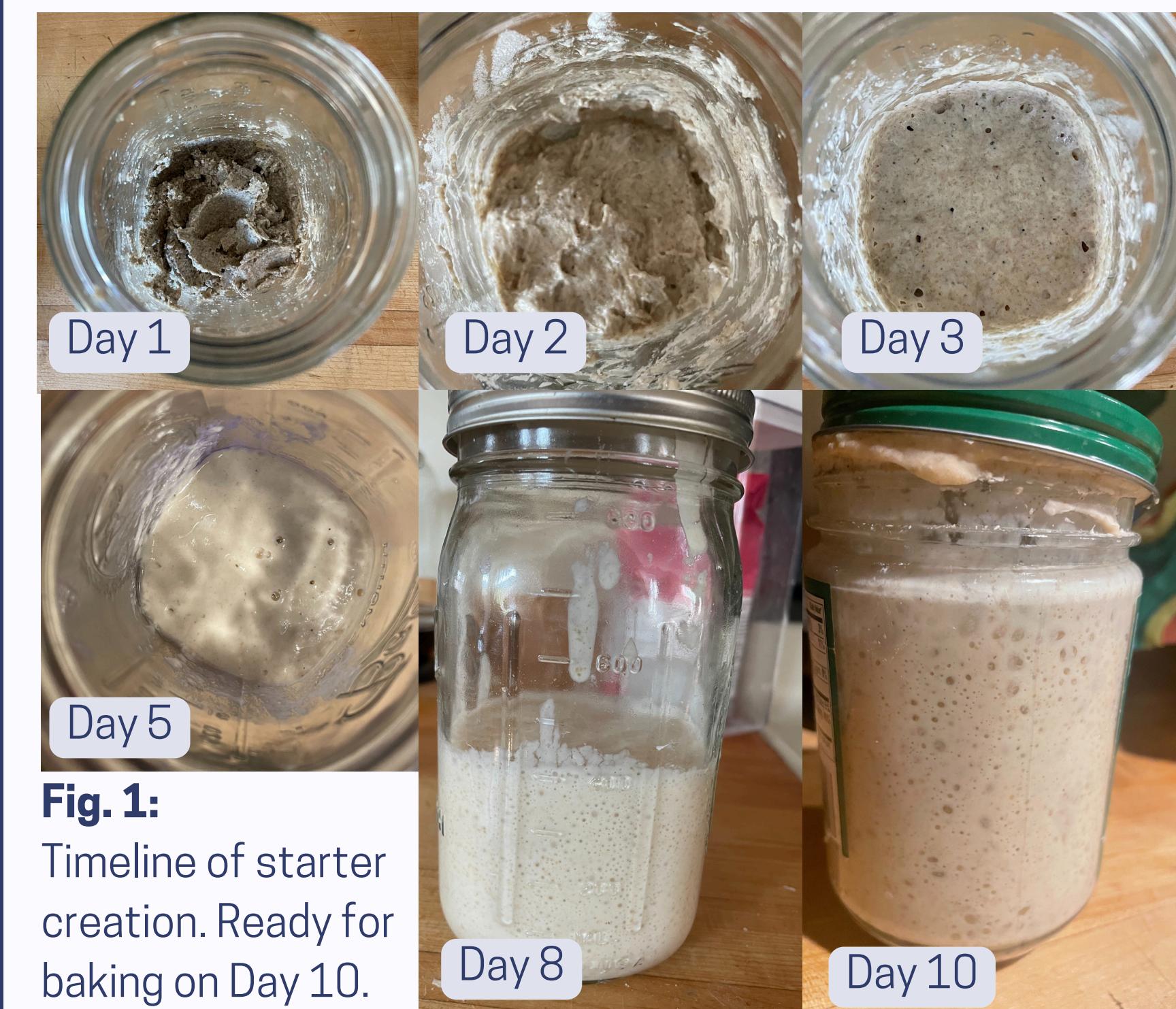


Fig. 1:
Timeline of starter creation. Ready for baking on Day 10.

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

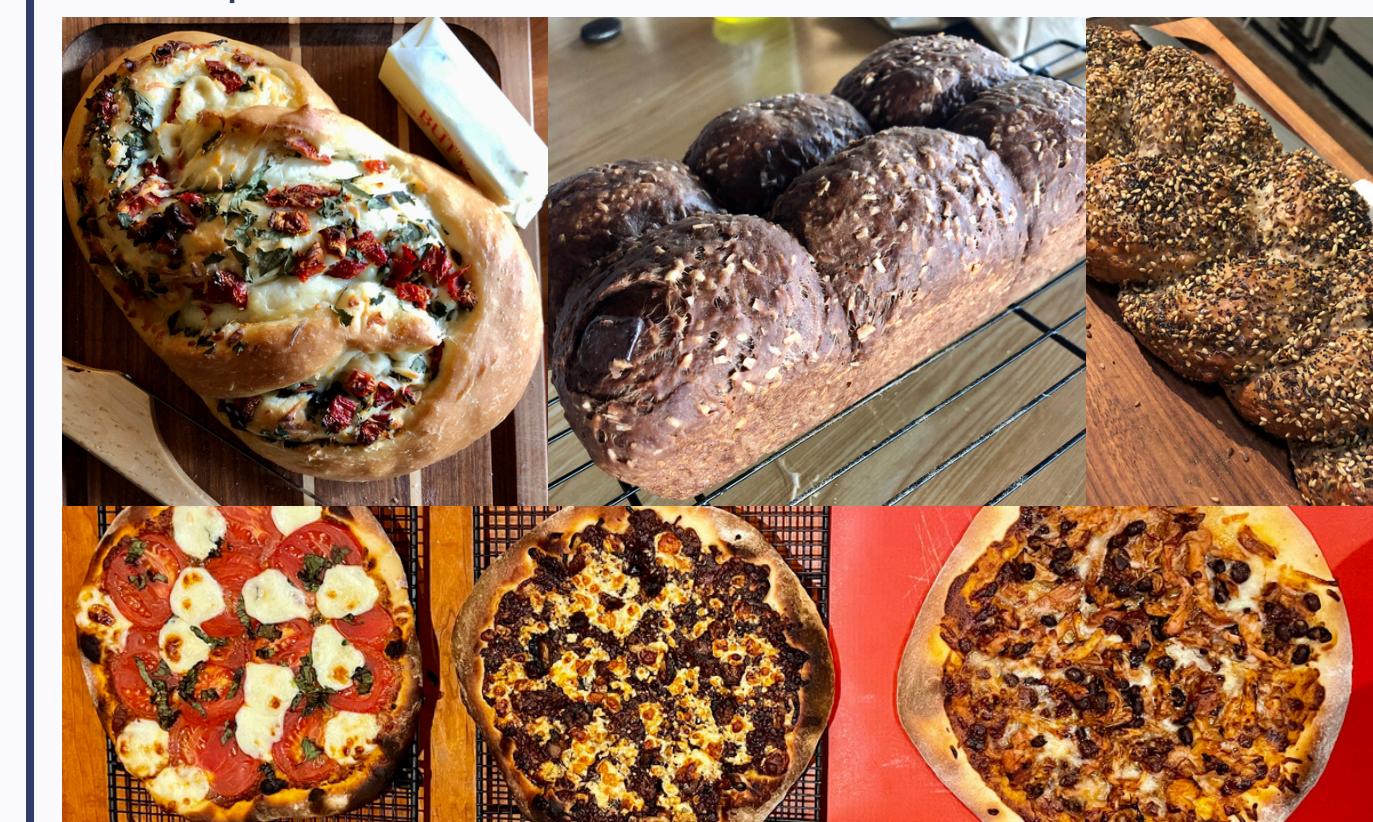


Fig 4: future directions for an aspiring baker