Sourdough Bread

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Image source: https://www.theperfectloaf.com/fifty-fifty-whole-wheat-sourdough-bread/
The RISE of Sourdough (*pun intended*)

• Disclaimer

• Popularity
  • Prized for sensory characteristics

• Oldest bread – 3500 BCE
  • (Rothe et al., 1973; Samuel, 1996)

Sourdough – a mixture of many names

- Lavin
- Poolish
- Biga
- Barm
- Pate Fermentee
- Mother
- Chef
- Sponge
- Starter

Making Sourdough Bread - Overview

STEP 1
- Pre-ferment

STEP 2
- Final dough

STEP 3
- Baked bread
Distinctive Characteristics of Sourdough bread

• Sour taste
• Crumb vs Crust
• lactic acid, acetic acid and volatile compounds (and flavour precursors)
• Broader range flavour compounds (196)

To date, 196 volatile compounds:
43 aldehydes,
35 alcohols,
33 esters,
19 ketones,
14 acids,
13 furans,
11 pyrazines,
2 lactones,
2 sulfurs,
21 others and alkanes.
Fermentation Process

• So many environmental and ecological factors to consider and control:
  • Temperature, pH, redox potential, ionic strength, dough composition, dough yield, and microbial enzymatic reactions

• Its all about microbes!

• Symbiotic Lactic Acid Bacteria (LAB) and Wild Yeast

• Ratio of LAB to yeast ranges from 10:1 to 100:1
Lactic Acid Bacteria

• Produce lactic acid and carbon dioxide gas (CO₂) – by products

• 50 different species sourdough LAB (De Vuyst and Neysens 2005).

• *Lactobacillus*,
  • *L. sanfranciscensis*,
  • *L. brevis* and
  • *L. plantarum* (Gänzle et al. 2007).

• Optimum temp 30 – 40 °C
  • (Hammes and Vogel 1995).

• Primary role – sour taste and leaven bread

Wild Yeast

• Single-celled facultative microbes
• Convert simple sugars into ethanol and CO$_2$ under anaerobic conditions

• Primary roles
  • leaven the dough
  • flavour and aroma production

• 20 different species of yeasts (De Vuyst and Neysens 2005).
• **Saccharomyces** and **Candida** (Corsetti and Settanni 2007).
• Optimum temperature for growth = 30 - 35 °C (Walsh and Martin, 1997)
• Create a good balance between LAB and Yeast < 30 °C

Source: https://www.growforagecookferment.com/how-to-make-a-wild-yeast-starter/
Fermentation Pathways

Glucose → Pyruvic Acid

- Lactic Acid Bacteria (lactic acid fermentation) → LACTIC ACID
- Yeast (alcohol fermentation) → ETHANOL + CO₂
Back Slopping – Feeding the Microflora

Initial Flour + Water Dough

Flour + Water Refreshment (5–25%)

8–24 hrs 20–30°C

Back-slop cycle (5–10 times)

Inoculum (10–40% w/v)

Mature Sourdough Starter

Sourdough Bread
Conclusions

• Temperature control < 30 °C
• pH 4.0
• Number of back slops - 5 -10

Source
https://www.dispatch.com/storyimage/OH/20190619/ENTERTAINMENTLIFE/190618395/AR/0/AR-190618395.jpg
Thank you!

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