



The Science of Artisan Bread



INTRODUCTION



Why is artisan bread so popular right now?

**It's simple, clean label, authentic,
has room for creativity and uses starters.**

Here's an overview on key ingredients, processing & more.



Start With: Flour

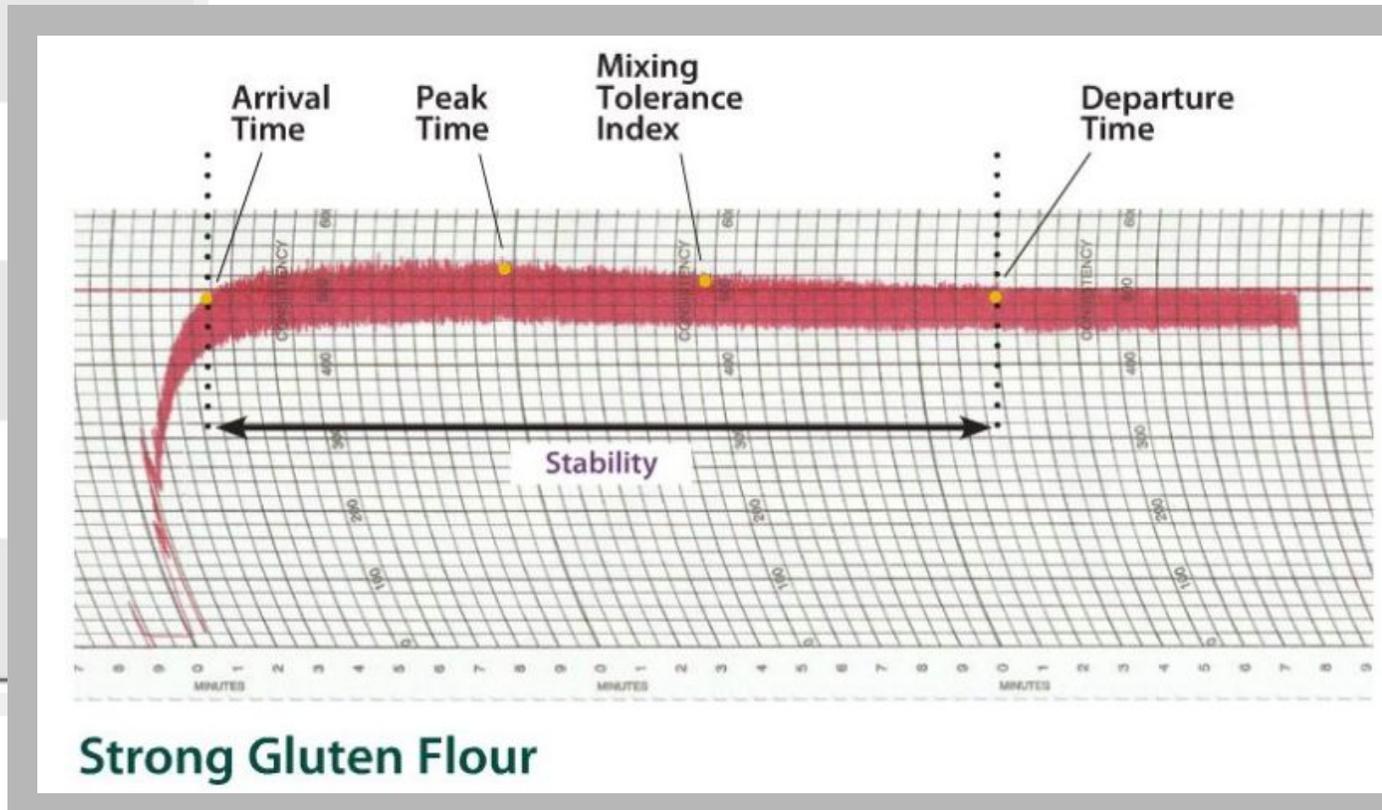
Quality Requirements:

- ✓ **Protein:** 10.5-12.5%
- ✓ **Ash:** 0.48-0.55%
- ✓ **Farinograph water absorption:**
62-64%
- ✓ **Hard Red or Hard White Spring**



Artisan Flour vs. Bread Flour

| | Artisan Bread Flour | Bread Flour |
|---------------------------|---------------------|-------------|
| Water Absorption (500 BU) | 64.9 | 62.9 |
| Water Absorption (14% mb) | 64.0 | 59.9 |
| Development Time (min) | 14.9 | 2.2 |
| Stability (min) | 15.3 | 10.5 |
| Mixing Tolerance Index | 17 | 20 |



Start With: Water

Considerations:

- Soft water
- Hard water
- Water softener
- Filtration system
- Water quality



Start With: Leavening

Yeast or Starter:

- Instant Dry vs. Compressed or Creamed
- Fermentation systems:
 - Straight dough
 - Sponge and dough, Polish or Biga
- Brews:
 - Water or Flour
- Sourdough starters



Start With: Minors

Other Ingredients:

- Salt
- Sugar
- Fat
- Enzymes



Other Grains

TRY Quinoa, soy, amaranth, millet, buckwheat, oatmeal, sunflower and flax flours and meals.

START with 5-10%.

CONSIDER dough hydration, strength, shaping, and baking to determine exact amount.



Innovative Ingredients

To improve quality:

- ✓ Wheat protein isolates
- ✓ Gluten-free technologies
- ✓ Alpha dextrins
- ✓ Heat treated flour



Mixing

- **Blend and disperse**
- **Hydrate**
- **Incorporate and entrap**
- **Kneading**
- **Development**
- **Distribution/size
reduction of air cells**



Fermentation

- Bulk fermentation
- Hydration
- Relaxation
- Machinability
- Acids
- Enzymes
- Alcohol



Make Up

- Dough dividing
- Dough rounding
- **Sheeting**
- **Hand forming**
 - Uniformly disperses the air pockets
- **Panning/Couche**



Shaping & Scoring

The role of scoring

Gives an identity to the bread

Controls breaks during oven spring

Influences final volume and crust



The Bake

- Crust forms
- Steam help gelatinize surface starch faster
- Caramelization and Maillard reaction
- Enzyme activity halted: 60-85°C (140-185°F)
- Total inactivation of yeast: 60°C (140°F)
- Starch gelatinization: 75°C (167°F)

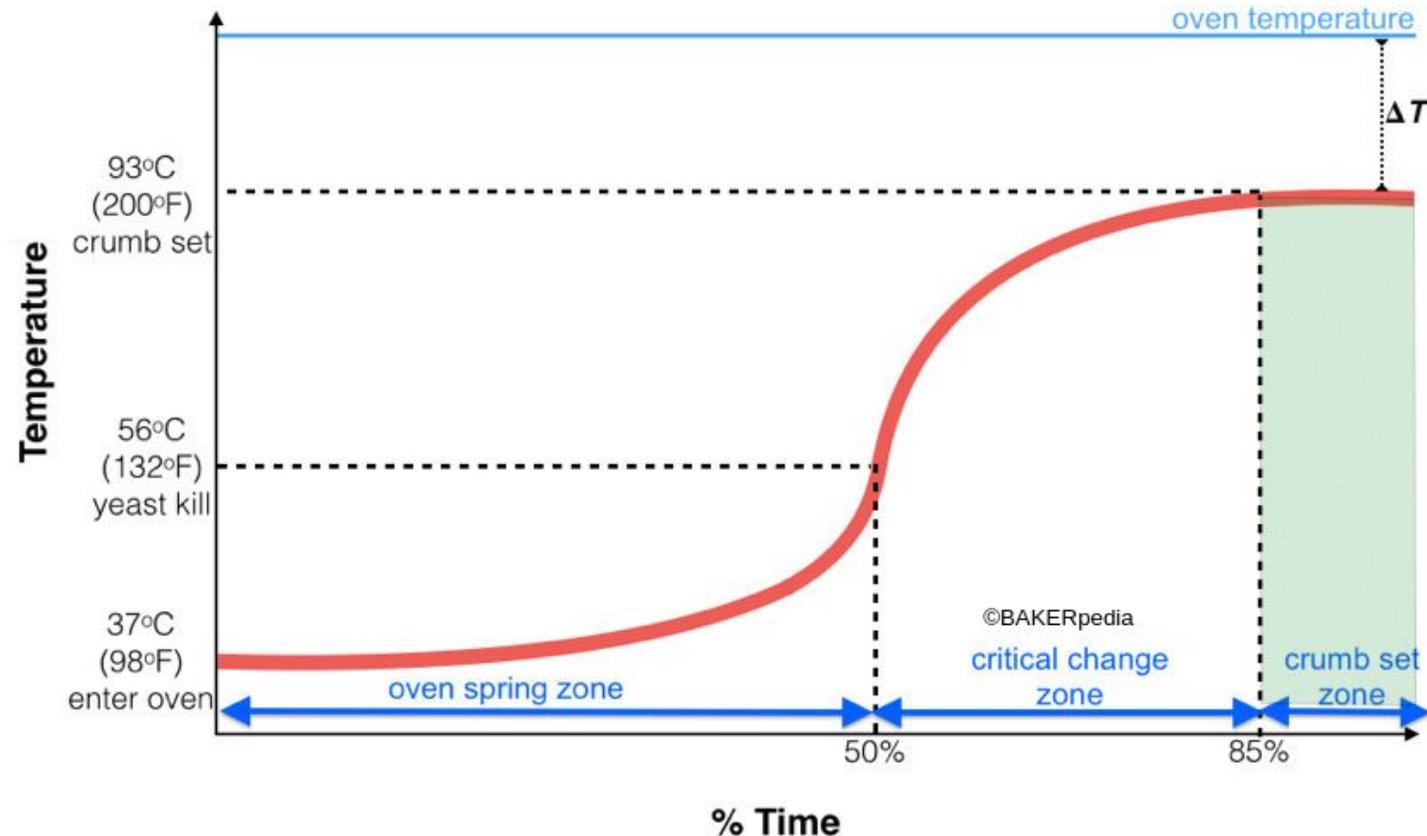
Starch absorbs any free water, stabilizing crumb



The Bake

- Core temperature reaches 92-95°C (198-203°F)
- Use [thermal profiling](#)
- 9-12% moisture bake out
- Baking times for:

- **Baguette 12oz:** 18-25 mins
- **Ciabatta 12oz:** 20-28 mins
- **Bâtard 16oz:** 22-28 mins
- **Boules 16oz:** 24-30 mins



Cooling

- Moisture continues to escape
- Crust hardens
- Cool to $<40^{\circ}\text{C}$ (104°F)
- Reduces molding
- Integrity of loafs improve
- Cooling is dependent on:

- **Temperature of bread coming out of oven**
- **Relative humidity of air $<85\%$**
- **Air temperature 24°C (75°F)**



Defining Quality

pH: measured with pH meter

Acidity: TTA

Flavor Profile: Flavor Mill vocabulary

CONSISTENCY



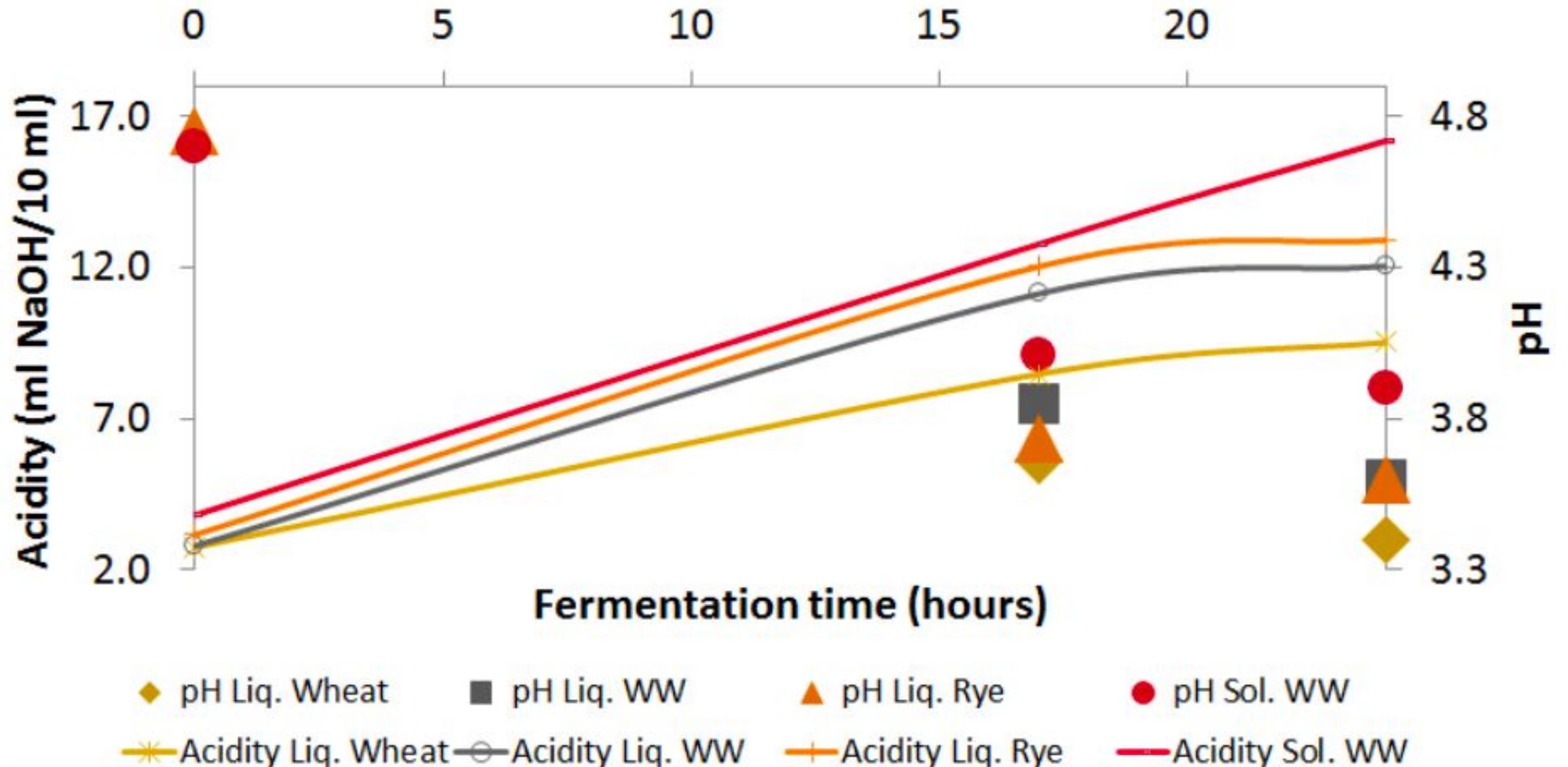
Defining Quality

- ✓ Ingredient specifications
- ✓ Secure the recipe to use
- ✓ Fermentation parameters
- ✓ Trained workforce
- ✓ Sanitary conditions

DISCIPLINE



Fermentation Time



Challenges

- Increase complexity:
 - Production Planning
 - Cleaning
- Equipment breakdown
- Risk of contamination
- Size for daily production schedule

How many flavor profiles can be managed?



Challenges

Is the mother dough split into multiple tanks?

Are there multiple mother doughs?

Are sourdough refreshments done at the same time?

Is the production line down time taken into account?



Episode 17: Bread and Fermentation

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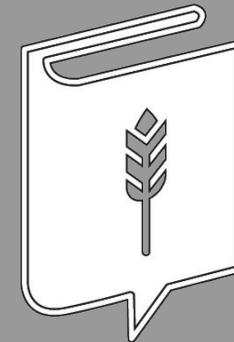
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