











White Flour

White Flour is made mostly of the kernel

- All-Purpose used for many recipes and as a thickener(10-12% protein)
- Southern Brands for biscuits and frying (8% protein)
- Unbleached Preferred for yeast requiring breads (bleach inhibits growth of microbes)
- Bread Flour Higher protein content (12-14% high gluten content)
- Cake Flour High protein 6-8%, low gluten content
- · Seminola/Durum high gluten from endosperm

Whole Wheat Flour – Ground bran and germ plus the kernel. More dense and will not rise as well (poor gluten formation).



















Gluten – a tale of two proteins

Glutenin – Long and very large proteins which have lots of sulfur atoms. Coiled proteins which can stretch and recoil. Sulfur (cystine side chains) help hold these together Gliadins – Smaller proteins which act like lubricants or ball bearings – allowing parts of glutenins to move past each other





Gluten Formation

Stretching of dough pulls the glutenin into long strands which pulls back when relaxed.

Kneading unfolds and aligns the proteins into strands















Strengthen your flour muscle

Oxidizing agents – alter sulfur links and increases strengths of gluten

- Flowing oxygen gas through the flour "ages" it by allowing sulfur-sulfur links to form – giving more cross-links (stronger flour)
- Chlorine gas and brominates (can do same thing) but no longer approved
- Ascorbic acid (vitamin C) is now used instead of gasses.
- · Also causes the flour to whiten (bleaching)





Gluten Intolerance is not the same. Several studies indicate most who report gluten problems may not be real (<u>Is it in your head?</u>) It might be small polysaccharides or other sugars poorly digested. Impacts people with irritable bowel syndrome but not the same as CD









Proofing Yeast

Adding sugar or honey supports the "awakening" of the yeast. Ensures proper raising of the dough!







Preparing the Dough

Mixing - add all ingredients together

- Starch will swell when wet
- Enzymes from flour will digest some of the sugars reducing yeast growth
- Initial mixing of gluten draws proteins together but as air oxidizes sulfur ends, the glutens form end to end bonds creating long chains

Autolysis – mix water and flour first to let gluten and starch absorb water before adding rest of components



Kneading your Dough

Kneading stretches and compresses proteins over and over to strengthen the gluten network

- Aligns proteins on long strands
- Encourages links between strands
- Also creates pockets of air to expand when heated
- Low kneaded breads will result in large air pockets with less developed gluten







baked bread!









Pancakes

More flour and thick batter than crepes or popovers (more fats and water)

- Folding batter with low water, a bit more salt and cooking slow create softer thicker pancakes (less gluten and bigger gas bubbles)
- High mixing, more water, higher heat (quick cooking time) and low salt will produce thinner but more dense pancakes



Leavening Agents

Dough with low gluten, runny batter and minimal mixing (biscuits, pancakes) do not have ability to hold gas bubbles for long

- · Yeast production takes too long
- Quick breads use a chemical means to produce gas in a short time

Most chemical leavening agents produce CO₂ gas bubbles from one source or another





gluten formation





around bubbles and starch swells Final stage solidifies protein/starch and browns proteins for final flavor

Generation of the Foam The Science of Cooking Creaming the butter – critical step to incorporate air into cake mix.

- "cream butter and sugar together until light and fluffy"
- Key source of gas bubbles
- Mixes sugars to support protein cages around the gas
- Eggs develop the foam and provide moisture
- Whipping organizes hydrophobic / hydrophilic interface around air bubble