

About Wheat and Baking Gluten Free

A Local Foods Culinary Workshop

*Kansas State Dept of Education
Child Nutrition & Wellness*



Presented by Sharon Davis,
Family & Consumer Sciences
Education
HomeBaking.org

Food is fabulous.

Food should be

assured, anticipated, appreciated;

shared among family, friends, community;

More than just convenient.

Savored!

Not feared.

Food is essential to energy, health, beauty, success.



“The preparing, cooking, and sociable eating of food are so central to the human experience that the culinary arts may well be what made us human in the first place... There is no record anywhere of any people who have lived without cooking.”

Richard W. Wrangham, Professor of Anthropology, Harvard University. *Lost Recipes*, p.57, Marion Cunningham. 10/2003.

Grains feed the world.

Grains are the harvested seed of grasses.

Globally, grain servings provide almost half- 48% OR MORE—of daily calories in many countries

- ▶ **Staple grains:** wheat, rice, corn (maize) are the most common
- ▶ 2nd-3rd world: People consume 150-195 KG (430 lbs) yearly of bread and rice if they have it
- ▶ Also, millet, sorghum, barley and rye
- ▶ Whole grains are a balance of micro and macro nutrients

In the U.S.- “Make half your grain servings whole” is important

- ▶ Enriched flour products to equal the number of servings you need
- ▶ Portion sizes matters
- ▶ <https://www.myplate.gov/eat-healthy/grains>

Resource:

Poster: www.wholegrainscouncil.org
<https://education.nationalgeographic.org/resource/grain/>

OLDWAYS
WHOLE
GRAINS
COUNCIL

WHOLE GRAINS 101

Whole grains are healthier, with more fiber, more protein, and higher levels of many essential nutrients. Most of the grain kernel's nutrients—and flavor—are in the bran and germ, which are routinely stripped out to make white flour.

Grain Anatomy

Whole Wheat 100% of nutrients

Nutrient	Whole Wheat Flour	Refined Wheat Flour	Enriched Wheat Flour
Vitamin E	100%	0%	100%
Vitamin B6	11%	0%	11%
Magnesium	10%	0%	10%
Thiamin (B1)	24%	0%	156%
Riboflavin (B2)	24%	0%	299%
Niacin (B3)	22%	0%	119%
Fiber	25%	0%	0%
Potassium	29%	0%	0%
Iron	32%	0%	129%
Folate	59%	0%	661%
Protein	78%	0%	78%

EXAMPLES OF WHOLE GRAINS. TRY A NEW ONE EVERYDAY!

AMARANTH

BARLEY

BUCKWHEAT

BULGUR

CORN

FARRO

FONIO

FREEKEH

MILLET

OATS

QUINOA

RICE

RYE

SORGHUM

TEFF

TRITICALE

WHEAT

WILD RICE

HOW TO FIND WHOLE GRAINS

100% WHOLE GRAIN
16g or more per serving
100% OF THE GRAIN IS WHOLE GRAIN

50% WHOLE GRAIN
32g or more per serving
50% OR MORE OF THE GRAIN IS WHOLE GRAIN

WHOLE GRAIN
13g or more per serving
EAT 48g OR MORE OF WHOLE GRAIN DAILY

The different gram amount on each Stamp tells you how many grams of whole grain are in ONE serving of the product.

LOOK FOR THESE WORDS IN THE INGREDIENTS:

- Whole Grain:** whole [grain], whole [grain] flour, wheat berries, stoneground whole [grain], oats, oatmeal, brown or wild rice, millet, quinoa, amaranth, hulled or hull-less barley
- May or May Not be Whole Grain:** flour, wheat, wheat flour, organic unbleached, semolina, multigrain, stoneground [grain]
- Not Whole Grain:** enriched flour, bran, germ, wheat germ, degerminated, pearled barley, degerminated corn, white rice

THE 100% STAMP	THE 50% STAMP	THE BASIC STAMP
Products where ALL of the grain is whole grain	Products where at least 50% of the grain is whole grain	Products that contain a significant amount of whole grain, but which contain primarily refined grain
Minimum requirement: 16 grams whole grain per serving	Minimum requirement: 8 grams whole grain per serving	Minimum requirement: 8 grams whole grain per serving

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OLDWAYSPT.ORG • WHOLEGRAINSCOUNCIL.ORG

Many cook and bake to control ingredients.

- ▶ Reduce Na; increase Ca, Mg, Fe
- ▶ Increase whole grains, variety of grains
- ▶ Add fruits, veggies (85% or more liquid, reduce liquids)
- ▶ Add protein (soy, dry milk, egg, nuts)
- ▶ Add heart healthy fats (nuts, oils, seeds, flax meal, wheat germ)

▶ Food allergies

Top 8: Peanuts, tree nuts, dairy, soy, wheat, eggs, fish and shellfish

- ▶ Gluten sensitivity
- ▶ Celiac Sprue



Important to respect, but not self-diagnose allergies

- ▶ In surveys, nearly one-in-three American adults indicate they are allergic to some food(s). In reality, **two percent** of population is food allergic. Foods allergies should be diagnosed by a board-certified allergist.”
- ▶ Children are most susceptible—up to five percent have allergies—especially milk and eggs...may outgrow by age 5😊

Daryl Altman, MD, American College of Allergy, Asthma and Immunology/Allergy Information Services.

- ▶ Unnecessary food restrictions reduces nutrient balance.

Gluten Intolerance is not an allergy

- ▶ Important to not assume, confuse
- ▶ Celiac sprue is hereditary- an autoimmune disease
- ▶ Blood testing best
- ▶ 6% gluten sensitivity
- ▶ No rye, barley, wheat, spelt
- ▶ www.csaceliacs.org

- Wheat allergy: IgE-mediated response to wheat protein in testing
- Wheat-free only
- See Lesson, [Kitchen Science Baking for Special Needs](#)
Glossary, Gluten Free
www.homebaking.org
- Food Allergy Network, www.foodallergy.org
- www.ific.org
- Gluten-free Baking, [You searched for Gluten Free Baking - Red Star® Yeast \(redstaryeast.com\)](#)
- King Arthur Baking, <https://www.kingarthurbaking.com/learn/guides/gluten-free>



Gluten-Free & Wheat *Fad Diets* are Costly

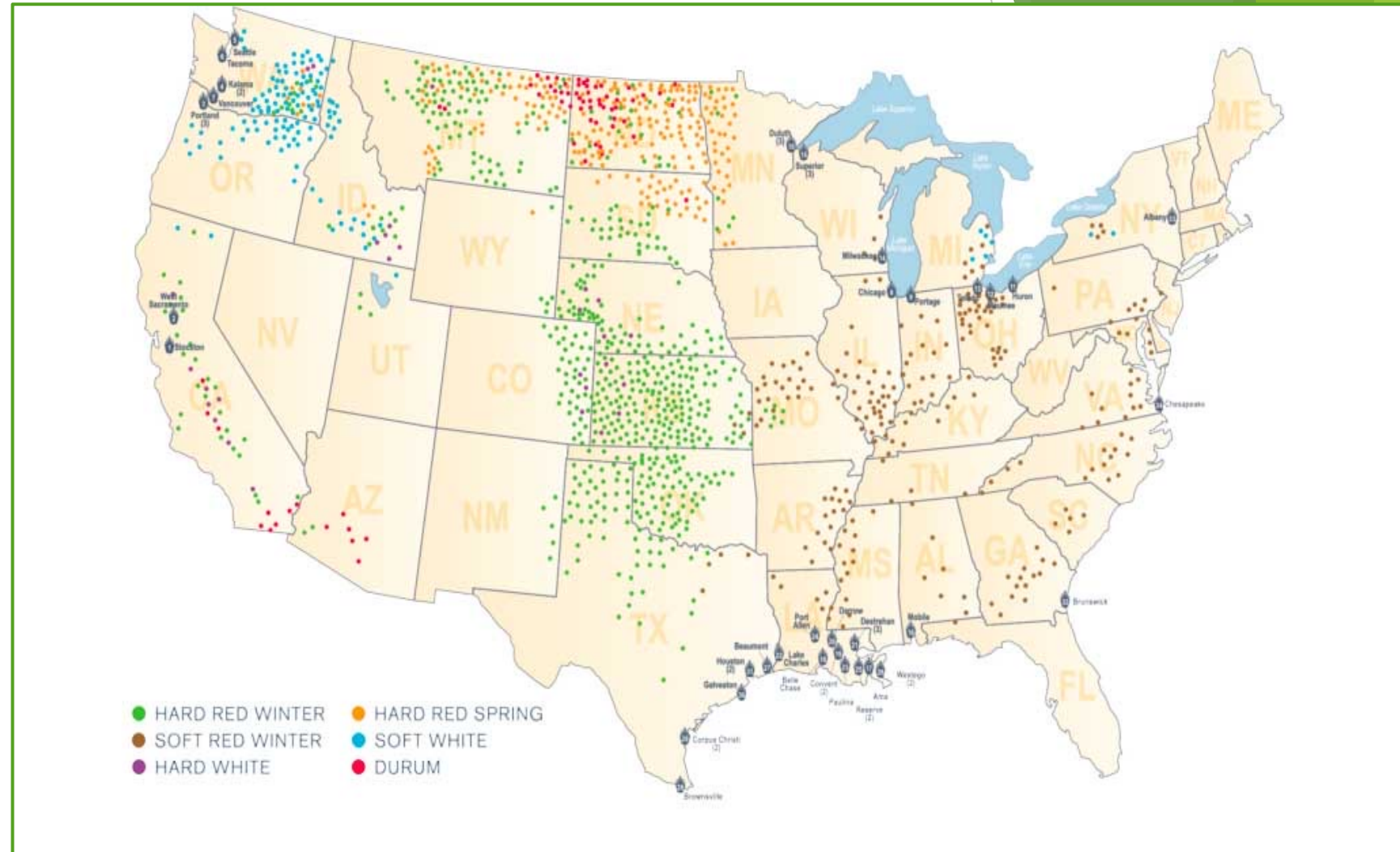
- ▶ >1% w/ celiac disease need true respect
- ▶ 93% of population can include gluten-containing foods—about 6% are Non-celiac gluten sensitive (18 million)—no test available, determine how much gluten tolerable
- ▶ GF foods costs 100-242% more
- ▶ GF often higher in fat, lower whole grain, higher starch, not enriched with iron, calcium, B vitamins, zinc Mg...found in wheat barley, rye
- ▶ GF is NOT a weight loss diet plan-- No caloric advantage to eating non-wheat foods
Carbs=4 calories/gm, Fats=9 calories/gm\
- ▶ GMO is NOT part of this-- Wheat is not genetically modified—
GMO-not in world food supply

<https://my.clevelandclinic.org/health/diseases/21622-gluten-intolerance>, Accessed 7/15/23

Wheat States - 11,000 years of wheat

Triticum...

- ▶ Goat grass ...einkorn...
emmer
- ▶ First grown in KS- 1839
near Kansas City
- ▶ Most successful- Ukrainian
Mennonites hand-picked
seed kernels 1874
- ▶ Turkey Ard Red Winter
Wheat
- ▶ Kansas is typically the top-
producer of hard red and
hard white winter wheat
varieties
- ▶ <https://kswheat.com/consumers/education>
- ▶ <https://eatwheat.org/learn/>



- *Wheat: Field to Flour-power point pdf*
<https://nationalfestivalofbreads.com/sites/default/files/field-to-flour.pdf>

Wheat is not just wheat.

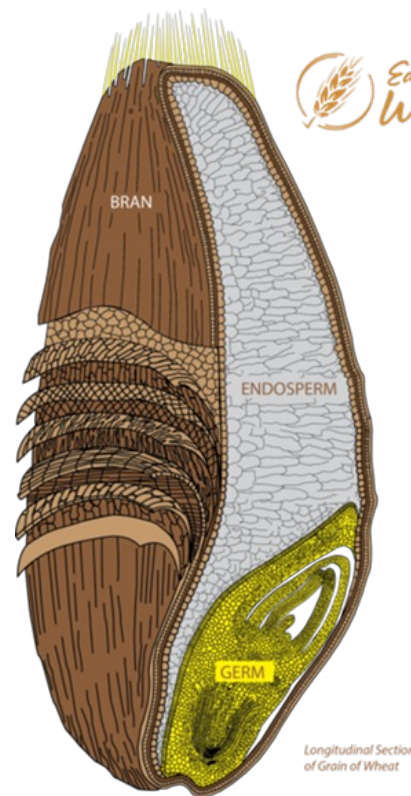
Thousands (30,000) of wheat varieties are organized by *class*.

- ▶ **Classes** are formed based on:
 - Growing season (winter or spring)
 - Bran color (red or white)
 - Kernel hardness (hard or soft)

There are six classes:

- ▶ Hard Red Spring
- ▶ Hard Red Winter Wheat
- ▶ Hard White Wheat
- ▶ Soft White Wheat
- ▶ Soft Red Winter
- ▶ Durum Wheat

www.wheatworld.org/wheat-101/



Wheat Foods

- ▶ Whole Berries
- ▶ Cracked
- ▶ Bulgur
- ▶ Rolled
- ▶ Cereals - bran, whole wheat, enriched. shredded
- ▶ Flour- whole, enriched
- ▶ Farina (cereal)
- ▶ Semolina (pasta)
- ▶ Gluten, starch

Resources:

International Food Information Council, www.ific.org

www.WheatFoods.org

www.GrainFoodsFoundation

www.kswheat.com and www.eatwheat.org



So what IS Gluten?

glutenin + gliadin

- ▶ *Gluten doesn't form until water and flour containing gluten-forming proteins mix*
- ▶ *Flour is NOT Just Flour- Lab 3- baking science activity, video at HomeBaking.org*
- ▶ *Grains/grain foods with gluten*

Barley

Farro

Bulgur

Kamut

Durum (wheat)

Rye

Emmer

Spelt

Einkorn

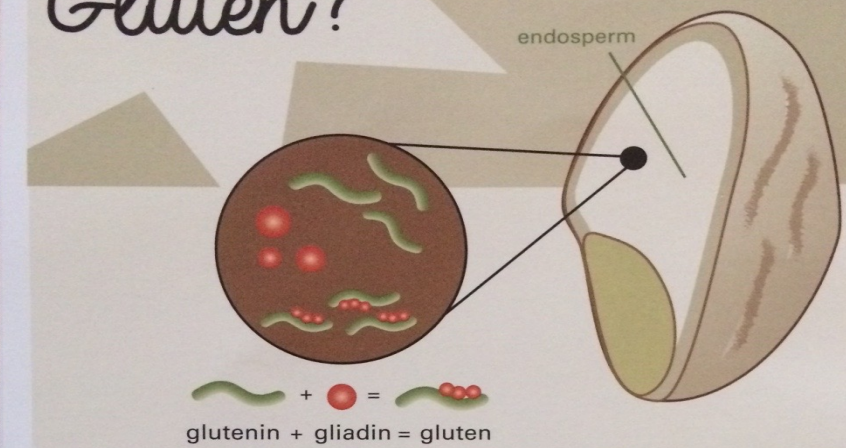
Triticale

Farro

Wheat

What is **Gluten?**


Proteins *glutenin* and *gliadin* combine to produce *gluten*.



endosperm

glutenin + gliadin = gluten

Gluten-free items may contain more calories and sugars, so...
a *gluten - free diet* may cause you to *gain weight!*




Celiac disease is an auto-immune *disorder* where gluten affects the small intestine. You have to carry the gene(s) to develop celiac disease.

1%

Around *one percent* of Americans have celiac disease.

Gluten gives dough *elasticity* and *volume* and makes bread *chewy*.



Gluten Free Flours

Grains, Seeds, Legumes, Veggies

- ▶ Amaranth
- ▶ Buckwheat
- ▶ Chia
- ▶ Corn; corn masa (blue, white, yellow)
- ▶ Flax
- ▶ Oats
- ▶ Rice (white or brown)
- ▶ Sorghum
- ▶ Millet
- ▶ Quinoa
- ▶ Soybeans; tofu

STARCHES, NUTS

- ▶ Cassava, tapioca, potato, corn
- ▶ Almonds, black walnuts
- ▶ Coconut flour

See <https://panhandlemilling.com/ingredients/gluten-free/>

Good to Know

When buying gluten-free grains, (such as corn, rice, or oats), check the product label to make sure the grain wasn't processed in a plant that is gluten-free - look for the Gluten Free Certified badge

- ▶ Some gluten-free grains can also be exposed to gluten during the growing process.
- ▶ **Subbing for wheat flour:** multiple ingredients needed to substitute - the gluten really is essential! GF flours + xanthan or guar gums for structure
- ▶ **1:1 Blends** (all-purpose- non-yeasted recipes) bread, and specialty mixes)
- ▶ Blends today include coconut, almond, cassava or tapioca starches
 - Xanthan gum: $\frac{1}{4}$ to $\frac{1}{2}$ tsp. per cup of GF flours (quick breads); $\frac{3}{4}$ tsp - $1\frac{1}{2}$ tsp (yeasted breads)
- ▶ Which should I choose?
<https://www.kingarthurbaking.com/blog/2023/05/04/which-gluten-free-flour-should-i-use>
- ▶ www.gfco.org



Corn

- ▶ Baking secret to creating moist, tender gluten-free corn muffins:

pre-soak the cornmeal and gluten-free flour blend to soften before using.

Consider boosting nutrients and flavor with

- ▶ a “confetti” of chopped red, green, yellow, orange sweet or hot peppers
- ▶ Cheddar cheese or sweet corn



<https://www.kingarthurbaking.com/recipes/gluten-free-corn-muffins-recipe>

Oats

- ▶ Most U.S. oats are used for animal feed and never leave the farm or immediate area.
- ▶ Oats used for human consumption are primarily utilized as rolled oats and whole oat flour.
- ▶ Premier food uses: hot breakfast cereals, specialty applications include cold cereals, bakery products, granola bars, and baby foods.

Resources:

www.namamillers.org;

<https://www.northern-crops.com/crops-of-the-northern-us>

www.wholegrainscouncil.org



Baked oats...yum😊

Heartland Mill, Marienthal, KS

- ▶ Corn
- ▶ Oats
- ▶ Millet
- ▶ Spelt, Wheat and Rye

<https://heartlandmill.com/pages/products>



Sorghum

- ▶ White, primarily for human food use
- ▶ Red for animal feed uses
- ▶ Baking with sorghum
- ▶ *Peach Skillet Cake* [Sorghum Peach Skillet Cake - National Sorghum Producers \(sorghumgrowers.com\)](#)
- ▶ *Molasses Sorghum cookies*, <https://wholegrainscouncil.org/recipes/molasses-sorghum-cookies>

About Sorghum:
<https://wholegrainscouncil.org/grain/sorghum>



Soybeans

- ▶ Soy flour can stand in for all-purpose (wheat) flour in baking
- ▶ For the best results, you should mix soy flour with other gluten-free flours.

Use one of these flour mixes to replace an equal amount of all-purpose flour in recipes.

- ½ cup soy flour + ½ cup potato starch flour
- ½ cup soy flour + ½ cup rice flour
- ½ cup soy flour + ¼ cup potato flour + ¼ cup rice flour
- ¼ cup soy flour + ¼ cup tapioca flour + ½ cup brown rice flour

SOURCE: www.thesoyfoodscouncil.com



- ▶ De-fatted soy flour most palatable
- ▶ Complete protein
- ▶ Tofu or flour may be egg substitute

Rice

www.usarice.com



- ▶ Brown
- ▶ White
- ▶ Sticky
- ▶ Red
- ▶ Black
- ▶ Purple
- ▶ Wild rice

<https://wholegrainscouncil.org/whole-grains-101/grain-month-calendar/rice-and-wild-rice-september-grains-month>

- ▶ *White and brown rice flour are popular in GF baking*
- ▶ *Gluten-Free Baking Mix, (HBA, Why Bake, Lab 1)*

2 cups brown rice flour, 2/3 cup potato starch, ½ cup tapioca flour, 1 tsp. xanthan gum- Whisk to blend.

Yields 3 cups



Gluten Free Baking Hacks, Tips

- ▶ *Kitchen Science, Baking for Special Needs*
- ▶ *Why Bake?* (Lab 1: *A Baker's Dozen Labs* Manual)
- ▶ *Whole Grain Baking 101*, www.HomeBaking.org
- ▶ HBA's monthly [Baking Calendar of Hospitality and Hacks](#)

TIPS/Hacks:

1. Quick breads- 25% increase baking powder or soda
2. Do not use more yeast
3. Use an electric mixer to prevent clumping
4. Batters more sticky- scrape mixer bowl often
5. Use accurate measuring tools or scales
6. Allow batter to stand, absorb
7. May use an extra egg for structure (egg whites are drying)
8. **Compatible GF products:** Flat breads need less structure
Crackers, biscuits, pastries- lower protein wheats used
Muffins, bars, cookies- smaller, no slicing needed

Test kitchen resources/references:

Chef Stephanie Petersen, www.panhandlemilling.com

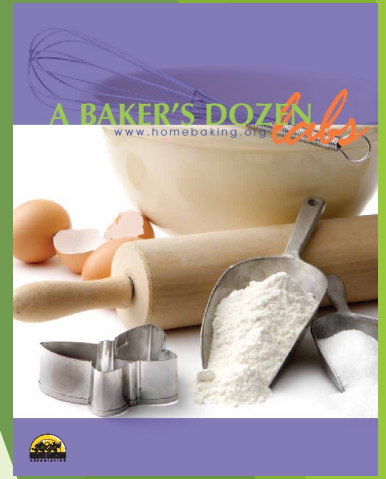
Red Star Yeast, www.RedStarYeast.com

King Arthur Baking, www.kingarthurbaking.com



<https://panhandlemilling.com/best-quick-and-easy-gluten-free-sandwich-bread/>

More Kitchen Science @www.HomeBaking.org



► BAKING HACK:

Condition raisins/dried fruit

1. Cover in orange juice, water, tea or other liquid you wish to infuse in the raisins.
2. Drain after 5 minutes.
3. Refrigerate any unused conditioned raisins.

Gluten Free Oatmeal, Flax and Cranberry Cookies



Mix it Up! Designer Pancakes

Ingredients and Method:

Stir to blend in bowl: 1 cup all-purpose flour variable blend

¼ cup dry buttermilk powder

1 tablespoon granulated sugar

1 teaspoon baking powder

½ teaspoon baking soda

1/8 teaspoon salt

In liquid measuring cup, mix 1 cup water

1 large egg or egg substitute*

2 Tablespoons melted butter or oil

Directions: Label your plate 1, 2, 3, 4, 5 or 6 for sampling.

1. Wash hands and surfaces. Oil griddle. Blend the dry ingredients well, make a dip in the center.
2. Preheat the oiled griddle to 400° F. Add liquid mixture to dry.
3. Stir just until blended...never beating. Drop by small scoops onto hot griddle; when bubbles appear and bottom is browned, flip once, baking until browns.
4. Wash hands, surfaces, utensils.
5. Enjoy warm with powdered sugar!
6. Evaluate your product using the evaluation rubric



→*More Baking Science* @ www.homebaking.org and *A Baker's Dozen Labs*.

Thank you!

<https://www.homebaking.org/baking-food-safety/>



Flour & Baking Food Safety
Safe steps in food handling, cooking & storage

BAKING TEMPERATURES

Ingredient and Process Temperatures	
Cutting in Butter	35 - 40°F
Creaming Butter	65 - 75°F
Blooming Instant Yeast (Water Temp)	85 - 100°F
Blooming Dry Active Yeast (Water Temp)	105 - 115°F
Yeast Flour Blend (Water Temp)	120 - 130°F
Dough Proofing (Proof Box Temp)	80 - 90°F
Dough Proofing (Proof Box Humidity)	80 - 90%

Check Your Altitude
Decreased air pressure at elevations above 3,000 ft. can increase the evaporation of liquids and the expansion of gases. Increase oven baking temperature by 10-25°F (5-14°C). See thermomix.com/ high-altitude.

Doneness Temperatures*

NORTH AMERICAN MILLERS' ASSOCIATION

Food Safety

Craft-
tory Compliance & Documents

nces Education, HomeBaking.org